Data Industry Green Development Promoted by Public Policy and Law In China

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Article

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Abstract: The current green development in the context of public policy and industrial economy is difficult to fully match the new infrastructure process driven by massive data. Its connotation and extension and the level of rule of law need to be deepened to ensure that data production, processing, circulation, elimination and other activities can get high-quality and sustainable development in the collaborative construction of hard facilities and soft environment in the new era. Based on the practical needs of data industry green development in key areas, we can resolve the legal risk of data industry green development from three aspects: improving the legal level of green public policy, clarifying the green legal benchmark of data industry development, and improving the green legal system of digital society. Then, it considers the design of environmental protection system based on hardware facilities and the structural and readable clean data system innovation of soft data industry development framework mode, so as to clarify the legalization scheme of data industry green development under the new infrastructure. Overall, achieving the green development of the data industry requires not only active attempts by China but also joint efforts by China and other countries.

Keywords: new infrastructure; green sustainable development; data industry; legal measures; public policy; international cooperation

1. Introduction

As China's industry progresses, the green development of is also being given a new meaning. Especially as data has become an important factor of production, the problems of data waste and data unavailability have become increasingly prominent. This has led to the fact that the development carried out by data-centered industries does not meet the requirements of green development. This paper summarizes the requirements of Chinese government authorities for green development in different stages of development. In addition, this paper also tries to promote the green development of the data industry through the construction of high-quality data centers, smart grids, and other new infrastructures, and discusses how to protect the green development of the data industry by improving the legal system.

2. Interpretation of the Implications of Green Development in Multiple Contexts

As an important part of China's new generation of development concepts, "green development" is a guideline and key proposition for promoting the modernization of the nation's governance system and governance capacity. At present, the green ecological civilization is given great attention in the processes of governmental governance, market organization, and social governance, especially in governmental public policies and industrial economic structure. The connotation of "green development" has been gradually clarified and inevitably focuses on the transformation of clean energy production and consumption patterns. However, as the digital economy and the digitization

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of society continue to accelerate, and as the renewal of traditional political and economic structures by new production elements of data expands the meaning of green development, the evolution of green development between the old and new conception is undoubtedly a fundamental point that needs to be sorted out and clarified first.

2.1. Green Development in a Public Policy Context

By combing the Chinese Government Work Reports between 1949 and 2020, government-led green development has experienced a conceptual shift from "put economic development first to balance economic and environmental protection development to put ecological protection first". At the temporal level, it can be divided into "1949-1978 (New China)", "1978-2012 (New Period)" and "2012-2020 (New Era)". In addition this, in terms of content, it can be reflected as "concept conceptualization - environmental management - environmental governance - ecological civilization construction" logical evolution. At present, government-led green development is mainly reflected through public policies, which include a series of strategies, decrees, measures, approaches, methods and regulations formulated by the government to achieve the goal of comprehensive, coordinated and sustainable development of the economy, society and ecology, in response to ecological and environmental problems, as well as ecological and environmental-related economic and social problems [1].

Since the 18th CPC National Congress, green development in the context of public policy has entered a brand-new era, and General Secretary Xi Jinping has put forward the “Two Mountains” [2] theory, elevating the construction of ecological civilization to the height of the national development strategy. In recent years, the Fifth Plenary Session of the 19th CPC Central Committee re-emphasized "promoting green development. The Fifth Plenary Session of the 19th CPC Central Committee re-emphasized " [3] promoting green development, deeply implementing the sustainable development strategy, perfecting the coordination mechanism in the field of ecological civilization, constructing an ecological civilization system, promoting a comprehensive green transformation of economic and social development, and building a modernization in which harmonious coexistence between humanity and nature [4]. It is thus clear that green development at the level of national public policy stands extremely high, is the party and the country adhere to the people-oriented, promote social harmony of the inevitable choice, directly related to the well-being of the people and the future of the nation.

By combing through China’s public policies in recent years, "green development" in the context of public policy can be summarized as realizing the value of green development that considers "intragenerational equity" and "intergenerational equity", practicing green and civilized production and living styles, and promoting green and sustainable high-quality development, among other goals. As a result, economic and social development activities, including “new infrastructure” construction, must always be under the green development requirements of efficient recycling of resources and strict protection of the ecological environment. In the process of creating a new-generation digital infrastructure and building a data governance system, governments, enterprises and individuals should respect, adapt to and protect nature while accelerating the transformation of the mode of economic development and improving the quality and efficiency of development.

2.2. Green Development in the Structure of the Industrial Economy

At the present stage, industry is an important pillar to ensure the high-quality development of China’s economy, but according to the calculations of scholars, since the reform and opening up in 1978, 40.1% of the country’s industrial GDP has consumed 67.9% of the country’s energy and emitted 83.1% of the country’s carbon dioxide [5]. In the face of increasing resource and environmental constraints, green transition is an inevitable requirement for realizing energy conservation, emission reduction and transformation of economic development mode. It is worthwhile to recognize that China’s industrial structure and industry have shown relatively obvious green transformation characteristics, the proportion of output value of low-polluting industries gradually increased, and the intensity of pollution emissions from high-polluting industries declined rapidly. However, China

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is still in the middle and late stages of industrialization and the accelerated development of urbanization, the total energy consumption has not yet reached its peak, the emission of major pollutants is still high, and the sources of pollution tend to be diversified, coupled with ecological and environmental problems still to be solved, the situation of partial improvement in environmental quality and the overall situation of grimness has not yet been radically reversed. In practice, implementing the concept of green development in industrial production and promoting the transformation of economic development and environmental protection from separation to integration have become important indicators of the quality of China's economic and social development, as well as a centralized manifestation of the country's modernized governance capacity.

The social relations involved in combating industrial pollution are relatively complex, and it is difficult to achieve a disciplinary effect simply by relying on industry self-regulation. Therefore, environmental protection related to industrial production has always been an area in which the legislative practice, institutional construction and policy input of countries around the world have been more focused. Although China's environmental protection work started late, but upholds the concept of green development, and adhere to the rule of law throughout the development of environmental protection at almost every stage. Since the promulgation of the first comprehensive environmental protection law——Environmental Protection Law (for Trial Implementation) in 1979, while constantly revising the comprehensive law on environmental protection, the Cleaner Production Promotion Law, the Circular Economy Promotion Law and other specialized laws have been launched one after another, and intensively complemented with the Action Plan for the Prevention and Control of Air Pollution, the Action Plan for the Prevention and Control of Water Pollution and the Action Plan for the Prevention and Control of Water Pollution. " At the level of regulatory mechanisms, China began to implement a sewage fee system for industrial production in 1979. At the same time, it has further established and improved the property rights system for natural resources, the system of compensated use of resources and ecological compensation, and actively utilized new policy tools such as green finance, taxation, pricing and credit, as well as innovating incentive mechanisms for green development [6].

Although China's industry has achieved good results under the concept of green development, with the space for energy conservation and emission reduction in traditional industries constantly being compressed, and subject to resource endowments and the degree of economic development, local governments are caught in a dilemma in eliminating backwardness and resolving overcapacity, and enterprises are not sufficiently motivated to apply green technologies and innovate green products. In particular, China's regional economic development is faced with unbalanced and uncoordinated contradictions, resulting in different regional economic growth targets and green development between the degree of coordination deviation, the local government in the scale of investment in pollution control and the effect of governance presents more obvious differentiation characteristics. Therefore, in the key node of traditional industrial economic restructuring, with the help of new infrastructure and other key information technology upgrading facilities, to achieve high-quality, sustainable and healthy economic development. Based on the rule of law positioning and institutional design of green development in China's long-standing industrial economic structure, green development should be further expanded in the following aspects in the future, and supported by policy and regulatory measures.

Firstly, follow the trend of the new round of scientific and technological revolution and industrial changes, promote the integration of intelligence and greening with the help of "new infrastructure" construction, and make full use of technologies such as big data, cloud computing, artificial intelligence and blockchain. Secondly, based on the key link of structural adjustment within the industry, accelerate the elimination of outdated production capacity of key industries with the help of green concepts, green technologies, and green techniques, and support the production service industries, such as green finance, environmental supervision [7]. Thirdly, it is necessary to actively participate in the process of formulating global green technology standards through the construction

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of “new infrastructures” construction and actively set up a multifaceted platform for mutually beneficial cooperation and exchanges [8].

2.3. Green Development Based on “New Infrastructure” Construction

China’s data resources have been growing exponentially, and the digitization process built on traditional infrastructure has made it difficult for existing governance measures to cope. Therefore, the concept of "new infrastructure" construction is not only a response to the enormous pressure of economic and industrial transformation and ecological deterioration, but also a necessary response to the energy crisis and the risk of green development in the wake of the data explosion. Among them, the in-depth utilization of data is one of the main goals of all kinds of new infrastructure construction. However, the lack of uniformity in the current digital virtualization standards, coupled with the relatively low proportion of structured data, has caused impacts and challenges to the green development of available data, thus triggering a series of "waste" and "unavailability" of elemental resources that are different from the conventional sense. This has led to a series of "wastage" and "unavailability" of factor resources in a different sense from the conventional ones, which urgently requires a forward-looking understanding and an institutionalized response.

2.3.1. “Data Waste” Caused by “New Infrastructure” Construction

The mapping of physical resources into virtual computer resources using hardware and software hypervisors is known as digital virtualization. The virtualization of critical data resources is the foundation and prerequisite for creating a new infrastructure construction on cloud project. From a technical point of view, digital virtualization means adding a virtualization layer to physical devices or systems such as servers, storage and communication networks, to virtualize physical resources into logical units. Through digital virtualization, different brands and levels of equipment resources can be integrated into a large data logic space, through the allocation of the logic space can meet the users’ needs of different users.

As 5G network becomes more prevalent, the demand for data by enterprises, organizations and individuals will increase dramatically and become more specialized. Data shows that traditional data resource utilization before virtualization is only 10-20%, while resource utilization after virtualization can reach 50-60% [9]. Especially in the new infrastructure on 5G network coverage, rapid digital virtualization makes the excess performance of the hardware be accurately time-sharing reuse according to the reality of the application scenario, thus significantly improving the performance of the utilization rate, breaking through the bottleneck of the use of existing resources. Digital virtualization technology under the new infrastructure is a feasible path to efficiently utilize resources to achieve energy conservation, environmental protection and sustainable development. Moreover, network virtualization can logically isolate non-same groups of users in the network environment and multi-tier application environment, which can not only improve data security, but also reduce the complexity of network management. From the perspective of green and safe development, the process of virtualization is a fundamental part of the new infrastructure that cannot be ignored.

Indeed, the smooth progression of the process along the "physical facility — virtual facility" route will depend on the complexity and uncertainty associated with the aggregation of massive amounts of data. As analytic models, data rules, and Big Data converge online, various types of data platforms will become central nodes for virtualized access, execution, and management. However, the existing data platform architecture is not sufficient to cope with the rapidly expanding total amount of data. Due to the fierce competition in the Internet market, most platform enterprises are forced to survive in the process of development, they are more inclined to crude data collection and traffic acquisition, and pay less attention to the virtualization of the infrastructure and the fine management of data quality, which will undoubtedly seriously limit the effectiveness of the utilization of data facilities. But in the long run, it will also pay a very high optimization cost for the early excessive data acquisition, greatly enhance the virtual data resources and the real physical space of the later integration pressure, into the data virtualization resources but the essence of the use of

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inefficient contradiction, to a certain extent, a waste of the data industry development dividend brought about by the “New infrastructure” construction.

2.3.2. New Infrastructure Development Highlights “Data Unavailability”

Since 2020, China’s government has been increasing its support for new infrastructure construction. Based on the massive data resources after the virtualization of infrastructure, data application technologies such as big data, artificial intelligence, algorithms, blockchain and other advanced technologies will be fully cultivated and become the development engine of the new era. Although the current scale of existing data is very large, most of them have problems such as poor quality, lack of standards, and difficulties in sharing. These problems directly lead to the plague of data that is not good to use, cannot be used, and dare not be used. How to compliantly and efficiently solve the compatibility problem of multi-source and differentiated data, and turn the natural language text readable by the general public into a computational language that can be understood by machines is a major challenge that needs to be solved urgently at present. As a result, efforts should be made to make unavailable data usable for computing. The essence of "available data " lies in improving the quality of authorized data, structuring and standardizing them through data governance, a process also known as "data structuring". After data structuring, more diverse and accurate algorithmic models can be constructed and better applied to actual scenarios, thus providing different product solutions to empower other application areas of the new infrastructure and even drive the optimization and upgrading of the entire industrial ecosystem.

This requires that data should be used as close to available data as possible. However, in real-life scenarios, unstructured unavailable data still occupies a large portion of the data, and with the acceleration of the digital virtualization process of new infrastructures, this portion will be further expanded. Common examples include user text, including word processing, spreadsheets, presentations, emails, weblogs, etc.; social media, such as data from Sina, WeChat, QQ, Mate, Twitter, etc.; and industrial production data, such as process procedures, data logging transducer, intelligent algorithms, etc. Most of these data have a relatively independent data format and can’t be directly utilized. It is foreseeable that the increasing expansion of such unavailable data will be a heavy burden on the efficient utilization of data. How to cleanse this text in a structured and standardized way has become a challenge that cannot be ignored. For the time being, the problem of "unavailable" data cannot be completely solved by relying solely on technical means, and it is necessary to introduce a targeted institutional design to address the problem.

Both the digital virtualization of the real world and the further integration of available data can significantly improve the quality of data, thus stimulating the huge potential of data value, but the resulting green development of data should not be ignored. Under the threshold of green development, the collection and circulation of data are relatively mature, but the development and internal management of data are still characterized by many risks such as uneven distribution of resources and leakage of private data. Even if artificial intelligence reduces human intervention in the data processing process, the availability of data aggregation is difficult to guarantee due to the non-uniformity of the operators and maintenance providers of the data entity equipment at the collection end. Therefore, the optimization of data structure needs to be carried out since the collection, organization, analysis, utilization, and sharing of the whole cycle of fine management. Among them, laws and regulations, industry standards and other institutional constraints are the key to the flow of data through the entire chain, but the current reality cannot achieve a broad sense of coordination and unity, especially in the context of the new infrastructure to carry out a large area, the efficient use of data will face more serious virtualization and structural barriers. Reducing data waste and guaranteeing data availability is a must for the implementation and deepening of green development in all areas of new infrastructure.

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3. "New Infrastructure" Construction Promotes Green Development of Data Industry

Traditional capital construction will not only seriously constrain the transformation and upgrading of China's economic structure, but will also lead to a high probability of recurrence of new types of ecological risks, which will cause the relevant industries and enterprises to miss development opportunities and fall into a more difficult contradiction of green development. Therefore, the development of "new infrastructure" construction and the promotion of the rapid development of 5G network, automobile intelligence, new energy vehicles, artificial intelligence, industrial Internet and other industries can not only stabilize the traditional real economy, but also significantly reduce the cost of sharing fixed assets, energy consumption and environmental protection through the virtualization and structuring of data resources. It not only meets the urgent demand for data industry green development in some key areas of the new infrastructure, but also provides the necessary support for how to introduce the rule of law and other institutional constraint tools for data industry green development in this scenario.

3.1. Developing Ultra-high Voltage Smart Grid

The rapid development of the economy requires the consumption of a large amount of energy, as a fast-developing country, China's energy consumption ranks second in the world, resulting in many Chinese cities have reached the maximum emissions of air pollutants. Adjustment of energy structure, prevention and control of air pollution has been imminent. The construction and operation of ultra-high voltage power grid will greatly improve the situation. 2017 end, "four AC and four DC lines " ultra-high voltage （UHV）smart grid are all put into operation, the North China Power Grid initially formed an ultra-high voltage AC grid, Beijing, Tianjin, Hebei and Shandong province new receiving capacity of 32 gigawatts, the Yangtze River Delta new receiving capacity of 35 gigawatts, which can reduce the emission of 960,000 tonnes of sulfur dioxide and 530,000 tonnes of air pollutants annually. 960,000 tons of sulfur dioxide, 530,000 tonnes of nitrogen oxides and 110,000 tonnes of soot per year, and the effect of prevention and control of air pollution is remarkable [10]. With clean energy from the west and north boosting the transformation of energy consumption in the east and central regions, UHV has become an important channel for China's economy to realize green development and it is also a representative field for the digital upgrading of new infrastructure in the future. Among them, the digital power grid built with the help of 5G digital technology is the most important.

UHV smart grid is also known as "Grid 2.0" in China, the most important feature is "data flow" "power flow" and "transaction flow" are highly intertwined, which can better improve the power delivery and use of power, reduce the probability of failure, shorten the fault maintenance time, improve the security of the entire power grid, flexibility, minimize energy consumption and electricity costs. Under the concept of green development, the smart grid will further realize the digital upgrading of the existing power system through the four links of power consumption information collection, automated intelligent power distribution, precise load control and distributed power supply:

First of all, electricity consumption information collection. Through the newly constructed electricity consumption information collection system, it can timely, completely and accurately grasp the data of users' electricity consumption. The data can be used as the basis for charging users for electricity consumption and automatically controlling the power outage and power delivery of functional users. Secondly, implementing smart power distribution. It integrates data transmission, precise control, equipment management and other technologies, and realizes intelligent judgment, analysis, fault location, fault isolation, power supply restoration in non-faulty areas and other operations through peer-to-peer communication between terminals, to make the whole fault-handling process fully automated and minimize the time and scope of faulty power outages. Thirdly, achieving accurate load management. The power load management system integrates modern management, computer applications, automatic management and digital technology to realize various functions such as power marketing monitoring, power marketing management, data collection and network connection. Compared with the traditional power distribution network to

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disconnect the entire distribution line when the load is removed, precise load management is more flexible and intelligent.

Finally, implementing distributed power supply systems. It is a method of energy supply based on the user side, mainly including wind power, solar power, electric vehicle charging stations, energy storage equipment and microgrids. In addition to saving the investment cost of the transmission grid, distributed energy can also improve the reliability of the entire power system. For example, in the event of large-scale damage to the power network, distributed energy can be islanded or microgrid to provide emergency power supply to transportation hubs, hospitals, radio and television broadcasting and other important facilities.

In the various application scenarios of digitalized ultra-high voltage smart grid, the business requirements under different scenarios have large differences, and these differences are mainly reflected in the requirements of different data technology indexes. Although the design and construction of the smart grid has better met the green development requirements, but at the data level there is still the virtualization of power facilities and data standards are not uniform. At present, to help electric companies to amend and guide the technical architecture of the digital grid according to the differences in technical indicators, especially for the environmental protection of the construction of ultra-high voltage facilities and data flow of high-quality and accurate control of the system to regulate the green development of data policies and regulations are seriously lacking, and there is an urgent need to introduce the rule of law to meet the needs of multi-scenarios, differentiated data requirements, so as to achieve the digital ultra-high voltage grid and other There is an urgent need to introduce a rule of law program that can meet the needs of multiple scenarios and differentiated data, so as to achieve the goal of green development under diverse data application scenarios such as digitalized ultra-high voltage power grids.

3.2. Developing Next-Generation Green Data Centers

Against the backdrop of rapidly growing energy and land costs, improving PUE (Power Usage Effectiveness) is one of the core indicators for future data center construction [11]. The new generation data center is inevitably green and sustainable, which can achieve the full use of energy and space resources and create a sustainable computing environment for data center service providers. In next-generation data centers, data center service providers will be equipped with a large number of energy-efficient servers, eco blade server and energy-efficient storage devices, and use new power components, power capping, heat intelligence and other technologies to solve the problems of traditional data centers, and the aim is to realize the seamless integration and management of heat dissipation, power supply and computing resources [12]. In the context of "new infrastructure" construction, green data center has become the common goal of new generation data center construction. Currently, newly built green data centers present the following outstanding features.

Firstly, developing according to circumstances. For example, in the Chinese eastern coastal areas, high energy-consuming equipment is immersed in liquid circulation cooling, and insulated coolant is utilized instead of air-cooling, in which no fan or air-conditioning or other cooling equipment is required, and a lot of space is saved, which is also the most efficient one among the means to reduce the PUE at present; Secondly, improving the process and accelerate innovation. The innovation of green process and technology can save resource consumption, reduce environmental pollution, and guide science and technology in the direction conducive to the development of a green economy; the improvement of process and technological innovation is aimed at reducing the load energy consumption of mechanical data equipment, refrigeration energy consumption, and equipment energy consumption.

As a representative field of new infrastructures, the construction of data centers has been plagued by environmental issues such as excessive energy consumption, and adherence to the principle of green development has become the consensus of the whole society. Although there is no accurate and authoritative definition of green data center, the evaluation index of green data center can be clarified from the side.

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At the policy level, in 2014, Beijing took the lead in introducing the local standard "Data Center Energy Efficiency Grading" (DB11/T 1139-2014), and has been gradually promoting the evaluation of green data centers in Beijing since then; in 2015, the Ministry of Industry and Information Technology, the State Administration of State Organs Affairs, and the National Energy Administration issued the "Pilot Program for the State's Green Data Centers", whose main evaluation indicators include energy efficiency level, carbon emissions, water resources, hazardous materials control, disposal of waste electrical and electronic products, and management system, etc. Green data centers are required to use green energy, realize green procurement, guarantee green operation, and ensure green disposal. On the technical level, in 2014, China's Open Data Center Committee (ODCC) and The Green Grid Committee (TGGC) jointly carried out a green-level assessment of data centers in China, and the assessment indexes involved 3 dimensions of energy efficiency, energy-saving technology and green management; the assessment indexes involved 3 dimensions of energy efficiency, energy-saving technology and green management; and the assessment indexes involved 3 dimensions of energy efficiency, energy-saving technology and green management. management in 3 dimensions; in 2015, the Ministry of Housing and Urban-Rural Development issued the Technical Rules for Green Data Center Building Evaluation, which gives specific guidelines for data centers to carry out green building evaluation according to the Green Building Evaluation Standard (GB/T50378 - 2014); in 2018, the Chinese Institute of Electronics issued the group standard T/CIE 049 - 2018 "Green Data Center Evaluation Guidelines"; in 2019, the Architectural Society of China released the group standard T/ASC05 - 2019 "Green Data Center Evaluation Standards".

Table 1. Green Data Center Assessment Indicators and Main Targets.

Indicators / Targets	safety	Energy Efficiency	Carbon Emissions	Water Resources	Land Resources	Pollution Emissions	Recycling
Building Layout	X	X	X	X	X		
Building Facilities	X	X	X	X		X	X
Equipment	X	X	X			X	X
Operation and Maintenance	X	X	X	X			X

Combined with the above evaluation indexes, a green data center can be defined as a data center that minimizes the consumption of resources and environmental impact from construction, equipment to management under the premise of guaranteeing services, security and reliability. In other words, the existing policies, regulations and industry standards for the construction of green data centers are more inclined to the hardware aspect. According to the data published by the Ministry of Industry and Information Technology in the National Data Center Application Development Guidelines (2018) in 2019: China's data centers are becoming more and more perfect in terms of hardware construction, and new data centers, especially large and mega data centers, are gradually shifting to the western part of the country as well as to cities around the north, upstream, Guangzhou, and Shenzhen. Data centers in Inner Mongolia, Hebei, Guizhou, Ningxia and other regions with sufficient energy and suitable climate conditions account for more than 30% of the total number of racks in use. Based on this, the past relevant policies on green data center hardware

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construction of the guidance space is tightening, from the soft system level innovation will be the future of green data centers and even new infrastructure in other areas to break through the environmental bottleneck of the primary choice. However, the reality is that the local data industry development or digital economy of varying degrees of importance, has been issued to promote the development of big data or digital economy in the local laws and regulations related to green development is relatively limited, not to mention the green data center of this specific area of special norms. In the face of the rapid emergence of green data centers, it is urgent for national and local governments to change the direction of green development policies and regulations.

3.3. Green Cloud Platform

Promoting the development of industrial Internet is a huge and complex systematic project, which requires high requirements on overall planning and ecological layout, and needs to emphasize system design, supply-demand matchmaking, cross-border cooperation, energy saving and efficiency enhancement, scientific and technological innovation, and talent cultivation. The practice cases of the United States, Germany, Japan and other countries have proved this point. For China, our industrial system is complete, the application scene and demand is more complex, more attention needs to be paid to the top system with the green industry ecological construction of the docking.

Firstly, setting up a new standard for the green development of industrial Internet of Things (IIoT). In the field of industrial Internet, the industrial Internet platform is the core of industrial competition. General Electric (GE), Siemens and other industrial giants have utilized their high-end equipment and products to establish industrial Internet platforms with various functions, such as industrial equipment connection, industrial big data analysis and industrial application services with the intention of grasping more initiative in the competition of the global IIoT [13]. At the same time, Microsoft, Cisco, Amazon, Intel and other information and communication giants are also actively developing industrial Internet platforms by utilizing their strong position in software and hardware systems and solutions. It can be seen that the competition for standards, including green, healthy and sustainable, is an important part of the market competition, which directly affects the industry's technological system, industrial system and so on. At present, the promotion of standardization in IIoT is highly valued by countries around the world.

In addition to promoting the construction of industrial Internet platforms and the research and development of standards, manufacturing enterprises, information and communication enterprises, industrial alliances and governments have also invested massive resources in establishing standardized industrial Internet business solutions, cultivating industrial Internet ecosystems, and strengthening industrial Internet application security. Therefore, China to speed up the development of new domestic industrial Internet standards, including green development, and actively docking the current international industrial Internet technical standards system has been the trend, urgent.

Secondly, building a cloud platform to accelerate green development. In recent years, China's industrialization process is accelerating, the cost of labor and material costs continue to rise, consumers pay more attention to the product process and quality, the way of development of enterprises gradually from the factor-driven, large-scale production into an innovation-driven, quality enhancement, green environmental protection. Therefore, manufacturing enterprises must actively embrace new changes, new technologies and new trends, and take advantage of the industrial Internet [14].

It should be emphasized that building a perfect industrial Internet cloud platform requires government departments and industry associations to do a good job of coordinating and integrating their work, and accelerating the research and development of strategic planning for industrial interconnection of manufacturing enterprises and related systems and norms [15]. Among them, actively guiding manufacturing enterprises and equipment and component suppliers, outsourcing manufacturers, equipment manufacturers, platform suppliers, software developers, system integrators and other parties to reach a unified industry standard, to establish a green cloud ecology to support the realization of sustainable development of the Industrial Internet should be the most important.

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Under the concept of green development, the cloud platform upholds the purpose of energy saving and environmental protection, high efficiency and safety to cultivate and develop intelligent production, network collaboration, service extension, personalized customization and other emerging business forms, and comprehensively promote the transformation and upgrading of the manufacturing industry. Relevant enterprises should also actively cooperate with government departments, continue to promote their own cloud infrastructure and equipment intelligent transformation, enhance their ability to collect and apply industrial data, especially to strengthen the standardized use of data, to realize the barrier-free real-time flow of data in the enterprise equipment, workshops, departments, jobs and partners, to improve their own competitiveness in the market at the same time, to reduce the demand for energy consumption, enhance the added value of products, and to improve the competitiveness of China's manufacturing industry to high-tech, low-consumption, low-priced products. Contribute energy to the transformation and upgrading of China's manufacturing industry to high-tech, low-consumption and fully intelligent.

4. Rule of Law Options for Data Industry Green Development

By analyzing the meaning of green development and combining it with the key areas of new infrastructure, it can be clearly seen that green development of data requires the correct guidance of public policies, laws and regulations, and other guarantee systems. In contrast, the instability of policies is slightly insufficient for the continuous supply of governance basis for new infrastructure projects with long investment cycles, so more mature and robust institutional tools should be introduced to guide and regulate them, and the rule of law is the path tool that the current national governance system focuses on using [16]. In fact, with the introduction of the new "Environmental Protection Law", coupled with the strengthening of data legislation around the world, the rule of law to enable the green development of data has gradually reached a consensus. Focusing on the connotations and scenarios of data industry green development in the context of new infrastructure, specific rule of law programs can be considered from the following three perspectives.

4.1. Enhancing the Rule of Law in Public Policies for Green Development

Green development under the leadership of our government should take a characteristic path that meets the realities of the country. While the practice of green politics in the West relies on the environmental awareness of the Green Party and the general public, the road to green development in China requires the top-level design of the ruling party to play the role of value-oriented guidance, and the inclusion of the concept of green development in the top-level design is a macro-strategy to get rid of the developmental misunderstandings in the modernization and governance process [17]. It is difficult for the green movement to gain development solely by the conscious awareness of the public, and it must rely on the ruling party's guidance in thought and promotion in action. Especially as the Party and the State advocate new infrastructure, governments at all levels should uphold bottom-line thinking when formulating public policies for green development, strengthen awareness of the rule of law, and rely on the rule of law framework for national governance to comprehensively enhance the rule of law position in policy formulation and implementation.

Firstly, in the process of formulating policy texts related to ecological environmental protection and the green development of various industries in the new infrastructure, the rule of law procedures should be strictly followed, and the necessity and legitimacy of the policies should be guaranteed from the research and establishment of the project, the solicitation of opinions, public hearings, and timely revisions, etc., and the policies that have a strong reaction from the masses should be communicated and feedback should be made in a timely manner. Secondly, public policies related to green development need to be implemented by executives or organizations at all levels of government, and the more principled and general elements of the policies must be understood flexibly and implemented in a flexible and committed manner. Thirdly, increasing public participation and strengthening supervision outside the party is also an important part of guaranteeing that the formulation and implementation of public policies on green development will always operate on the track of the rule of law [18].

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4.2. Clarifying Green Governance Benchmarks for Data Industry Development

The digital economy has attracted a lot of attention in China, especially after the emergence of the new coronavirus outbreak, the digital economy has developed rapidly, and its strategic position in the development of the national economy has become more and more prominent. 20 April 2020, the National Development and Reform Commission (NDRC) explicitly delineated the scope of the "New Infrastructure", which is to comprehensively strengthen China's digital economy's hardware foundation, The National Development and Reform Commission (NDRC) clearly defined the scope of "new infrastructure" on April 20, 2020, putting forward a macro blueprint for comprehensively consolidating the hardware foundation of China's digital economy and improving the supporting mechanisms. At present, the new infrastructure process is centered around the green development of data and gradually improving the rule of law and other security mechanisms is the right thing to do. However, there are still differences in the level of development of China's digital economy, and regional economies, and compared with other requirements in the new development concept, the rule of law of "data industry green development" is quite resistant. At present, in the provinces, regions and municipalities for the development of the data industry, the degree of attention and support for the rule of law there is not a small gap, in the green development of effective norms still need to be improved.

In summary, the rule of law and standardization process of data industry green development is accelerating, and despite the lack of a system in the current national and local laws and regulations, the enthusiasm of local data legislation activities around the concept of green development is increasing. From the content of the latest provincial and regional regulations, the concept of green development of data is gradually deepening, and will become one of the key indicators for testing the level of digital infrastructure and data rule of law in the future when combined with specific scenarios.

4.3. Improving the Green Rule of Law System for the Digital Society

Under the digital economy, the upgrading and transformation of the model of social production and life has become a general trend. The legal system, which is based on the economic foundation, is undergoing a comprehensive adjustment. In this context, "green development" implies the interpretation of both real and virtual dimensions. Firstly, new infrastructure-led engineering and construction projects need to comply with the design of the existing environmental protection system, including energy saving and emission reduction, air, water and soil protection and other green development. It is the relatively negative, hardware facility-based data industry green development and its operational ideas. Secondly, data summarized by data collection and processing facilities such as the new infrastructure should be structured, readable and cleaning. The stock and new data can be ensured to be efficiently utilized and stored through technological innovation and institutional innovation, which is a positive and flexible model for green development of data.

Compared with industrial digitalization and digital industrialization, the challenge of green development of digitalization is particularly severe. According to the comparison between the traditional environmental protection legal system and the data legal system, it can be clearly concluded that there is still a big gap between the existing legal system and the implementation of the concept of green development, and it is urgent to deepen the content of green development of data in the existing legal system, which can be improved from the legislation, law enforcement, judiciary and law-abiding aspects [19].

In terms of legislation, China has written the construction of an ecological civilization into its Constitution, laying a complete foundation of fundamental party regulations and fundamental national laws. However, the Constitution lacks a systematic elaboration of the construction of ecological civilization, and the right to the environment as a fundamental right of citizens has not been legally recognized. In addition, as the basic law to protect green development, the Environmental Protection Law and related separate laws in the content of the lack of data content considerations, for green development in the face of new problems did not make timely adjustments and revisions, thus affecting the justification of the legal system of green development of the data

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basis [20]. It is recommended that in the future in the Constitution and the Environmental Protection Law in the construction of ecological civilization in the relevant part of the digital society should be introduced into the latest situation, to make up for the lack of the basic rule of law for the green development of data industry.

Regarding law enforcement, in addition to upgrading the level of the rule of law in public policies for green development, many aspects of safeguarding the green development of data, such as the construction of law enforcement teams, the management of law enforcement organizations and the supervision of law enforcement effects, should be brought under the framework of the rule of law. In the past infrastructure development, the performance of localities in law enforcement has been uneven and problematic, for example, too many subjects of environmental regulation, substitution of emotion for law and penalty for law in the law enforcement process, and lack of public supervision of law enforcement are common, which seriously affect the authority of environmental protection law and limit the further promotion and implementation of green development of data industry.

On the judicial front, judicial remedies involving environmental protection are usually realized in the form of public interest litigation. However, the current public interest litigation system has a narrower scope of qualifications for plaintiffs and higher litigation costs, and it is difficult for public prosecutors to obtain strong protection in the system. It is conceivable that cases occurring in the process of data industry green development are more difficult to obtain evidence, which is a serious challenge to the parties involved and the court during the trial; in addition, the prosecuting authority lacks clear regulations on the identity and authority of the investigation and evidence collection of "green data" in the public prosecution cases, which makes it impossible to give full play to the responsibilities of judicial prosecution and judicial supervision. It is recommended that specific judicial interpretations be issued to resolve these problems in future judicial practice, and that the Internet Court be relied upon to make professional judgments in data-based cases.

In terms of law-abiding, Chinese citizens' legal awareness of ecological environmental protection and data industry green development is seriously inadequate. China's transition from an agricultural society to a modern society is still relatively short, the limited degree of development of the industrialized society directly into the information society, the relationship between man and nature in the concept of lagging and disconnect. Nowadays, the public lacks a deep understanding of environmental protection laws and related laws and regulations, and uncivilized behaviors abound in daily life. In other words, the lack of environmental protection concepts under the traditional social production and life also seriously limits the public's understanding of the green development of data. Therefore, the publicity and popularization of the concept of the rule of law of green development at the grassroots level should be combined with the cutting-edge trend of digital society, to make a forward-looking comprehensive deployment. In particular, we should highlight the specificity of data as a production factor and resource endowment, and gradually understand the new connotation, new objects and new behaviors of green development under the trend of social digitization in addition to the continuation of a high degree of attention to conventional environmental protection, so as to create a good atmosphere for the rule of law on the green development of data industry for the new infrastructure.

4.4. Improving Global Data Industry Green Governance System

As mentioned earlier, the accelerated advent of digital globalization is driving profound changes in the global economic landscape and posing great challenges to global governance [21]. Global factor flows are the basis for economic and trade development and international cooperation, and cross-border data flows in the digital era are the basis for globalization activities, which are reshaping the competitive relationship in the labor markets of various countries and their value chains. Cross-border data flows have become inevitable, and the dramatic growth of cross-border data flows far exceeds the growth of goods and services. that cross-border flows of data have made the data industry green development into an important issue for global governance.

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For example, these advanced technologies represented by generative artificial intelligence require massive amounts of data for training, which requires not only a high-quality data supply but also an adequate energy supply. One of the most important characteristics of the data industry is its global nature, so whether it is generating high-quality data or supplying it with green energy, the sustainable development of such technologies cannot be realized without the improvement of global governance. Especially, environmental, social, and governance (ESG) including environmental issues, social issues and corporate governance that always be considered in investing [22], and this is also a concept that needs to be focused on for green governance of the data industry. This indicates that the greening of the data industry cannot be achieved by the efforts of one country alone, but requires close cooperation among Governments.

5. Conclusions

As the core production elements of the "fourth industrial revolution", data, internet, big data, cloud computing, artificial intelligence, blockchain and other technologies are all structured on the infrastructure of the electrification era, and a series of negative impacts brought by traditional energy consumption still need to be paid great attention to in the current scientific and technological innovation and social transformation. Therefore, in the process of "new infrastructure" construction work, the green development system should be strictly implemented in the construction of traditional facilities, and at the same time, the green development concepts and redundant system cleanup triggered by this should also move according to the time, so as to ensure that the data-related production, processing, circulation and cleansing are realized in the efficient linkage between the hard facilities and the soft environment. In view of the comprehensive innovation of the new elements of data on social production and lifestyle, the state does have the need to accelerate the construction of a green development system around the issues related to data governance, especially the rule of law system, only with the most stringent rule of law can we provide adequate protection for ecological governance activities [23]. This will satisfy the needs of society for the rule of law for a green development lifestyle, and will strengthen the new generation of green and sustainable development of global economies. Finally, the green governance of data industry is a global challenge that also requires China to continuously strengthen cooperation with other countries to jointly achieve the green development of the data industry.

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