

Digitalization to Advance Sustainability: Where China Stands

The Chinese economy has undergone a rapid process of digitalisation over the past decades, especially since the beginning of the 2010s. The country has assured world leadership in several specific areas of digitization, such as mobile payments and e-commerce: China accounts for 52% of the global retail e-commerce, followed by the United States (19%) and the United Kingdom (5%)¹. For instance, the amount of Internet retails reached RMB 11.76 trillion in 2020, accounting for one fourth of total consumption in China². Besides e-commerce and mobile payment, flourishing entrepreneurial activities and rising VC investment, new business models emerge and evolve at a very high speed. Deep integration between digital technology, artificial intelligence and the real economy is reshaping the landscape of the digital economy in China. Meanwhile, the Chinese government is increasingly emphasizing green development and has made commitments to achieve carbon peaking by 2030 and carbon neutrality by 2060. The realization of these commitments involves all sectors of the economy and faces enormous challenges, where the digital sector has played and will continue to play an important role in the green transformation of the Chinese economy.

Against this background, the study aims to explore the link between digitalisation and sustainability, address major issues regarding the environmental and social impact of China's digital economy and provide policy recommendations. This introductory paper is an intermediate draft of the Scoping Study coordinated by the German Environment Agency, the GIZ and the World Economic Forum within the research framework of the China Council for International Cooperation on Environment and Development (CCICED).

¹ Data source: Statista

² Data source: Ministry of Commerce of China

In addition, it serves as a discussion piece to stimulate a debate on relevant policy issues at the workshop planned on 24th of February, 2022.

Key observations of the relationship of digitalisation and sustainability in China

First, digitalization and green transformation are mutual supportive, coevolving with each other in China. Empirical results demonstrate a significant impact of digitalization on productivity growth; regarding employment, a key dimension of sustainable development, the booming digital sector has become a new engine for job creation, while millions of jobs have disappeared due to “digital disruption”, with the net impact being positive (Zhang and Chen, 2019). The rapid development of the electric vehicle (EV) industry is a typical example. In fact, electric cars are also smart cars -- a combination of battery-based power system and innovative digital solutions, with the latter being an increasingly important and valuable part of a car. In 2021, China's pure electric car production and sales reached 2.94 million and 2.92 million, respectively, both ranking first in the world, accounting for 11% of the country’s total passenger car production and sales. A group of newly established Chinese EV manufacturers (NIO Inc., XPeng Motors, Lixiang Auto, NETA Automobile...), together with the older BYD Company founded in 1995, contributed to this achievement.

Second, large Internet companies and digital giants are powerful global players. Guided effectively and used properly, this influence can become a powerful force for sustainable development. Especially the operators of the platform economy have significant economic and ecological influences. This is manifested in their influential power on the market and consumers, on upstream and downstream industries and enterprises in their ecosystems, as well as on technology and innovation through their own R&D investment together with corporate venture capital (VC) investment of a very large scale.

Third, inclusiveness is a very important consideration in the digitalization process. Indeed, some vulnerable parts of the society may face marginalization as digitization goes ahead. On the one hand, we need to develop the digital infrastructure and provide necessary

training in order to bridge the digital divide. On the other hand, enterprises and other commercial or non-commercial players need to enhance the degree of inclusiveness in their accelerated process of digital transition. In China, for instance, in promoting business digitization, a few small-sized banks have closed their counter cash business, which will inevitably bring inconvenience to some elderly customers and have received the attention of financial watchdogs.

Towards the future, new business models and application scenarios powered by entrepreneurship and innovation in digital economy will continue to emerge, contributing to sustainable development in China. However, it is essential to observe the emerging models and scenarios with an eye on their ecological footprints. In the meantime, it is important to promote entrepreneurial and innovative activities in the closely interrelated areas of digital and green economies and encourage the emergence of “born green” high-tech start-ups (Liang, 2021).

How sustainable is the digital sector in China?

In China, as the digital sector becomes larger, it has left a more and more significant environmental footprint. However, there seems to be not enough awareness and actions towards sustainability of the digital companies. In 2020, 30% of the top 50 companies in the digital sector in China did not publish environmental, social and governance (ESG) reports³. Among the companies that published ESG reports, some still followed the conventional CSR reporting approach, without providing sufficient data on their sustainability performance.

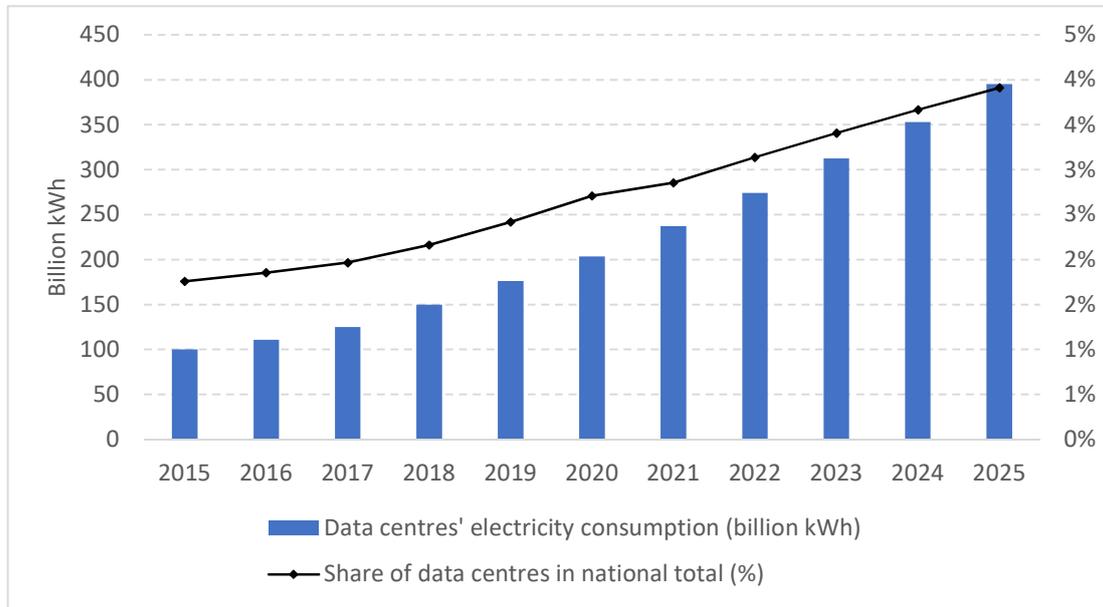
In the meantime, energy-related problem of digital industry becomes increasingly serious in China, highlighted by the rapid growth of energy consumption by data centres. Estimates show that the world’s data centres consumed about 1% of total global electricity (Masanet et al., 2020). In China, due to their huge appetite for power, data centres are often called

³ Data Source: Syntao

“electricity tigers”. In 2020, data centres consumed more than 200 billion kWh of electricity, accounting for 2.7% of China's total consumption, much higher than the global level, and a growth trend is likely to continue (Figure 1). There have been heated debates on how to deal with the problem in China, and the government has taken actions. For instance, the Ministry of Industry and Information Technology (MIIT) has planned to formulate strict standards for data centres within the overall framework of carbon peaking standard setting for a range of industries. The National Development and Reform Commission, the Cyberspace Administration of China, the National Energy Administration and the MIIT have jointly planned 10 national data centre clusters to shift the computing power from the east to the west and optimize the overall geographic layout of data centre construction. At the firm level, some companies have announced a time frame to achieve carbon neutrality, for instance by 2030.

Another major issue is social, related to the qualitative employment impact of digital economy, such as the food delivery platform. Indeed, the booming e-commerce sector and the sharing economy have created millions of jobs, but the quality of these jobs has become a concern. Digital platforms for food delivery require a large number of delivery riders, thus creating a lot of jobs. However, the hiring relationship between platforms and riders is in many cases loose, involving third-party entities. Therefore, the platform may not have to assume the necessary responsibility as an employer. For example, on April 28, 2019, Mr. Shao, a rider, was injured while delivering meals, but, after complicated legal procedures, the employer could not be identified, and thus Mr. Shao's legal rights could not be protected (Zhicheng Research Center, 2021). In addition, the algorithm of platforms' “real-time intelligent distribution system” has problems in setting the delivery time, sometimes “eating up minutes”, which brings a great pressure to delivery riders.

**Figure 1. Electricity consumption of data centres in China and the share in national total:
2015-2021 and forecasts for 2022-2025**
(Billion kWh and percent)



Data source: China Electronic Energy Saving Technology Association and China Electricity Council⁴.

The digital upgrade of Chinese industry

China has the world's largest manufacturing industry: industrial added value accounts for around 30% of the global total, and manufactured products account for nearly 20% in global exports. The sector is also the most prominent emitter in China: in 2017, manufacturing accounted for 53.27% of China's total CO₂ emissions (IPCC, 2019). Within the sector, heavy industries, including metal smelting and processing, non-metallic mineral products, chemical raw materials and chemicals, petroleum and other fuel processing industry, are the most significant emitters, and should be the top priorities for GHG emission reduction during the 14th Five Year plan period (Wang et al., 2020). As a major

⁴ Note: The amount of national electricity consumption in 2022-2025 is forecasted based on a consecutive annual growth rate of 5% from the level of 2021.

polluting industry, which accounts for 4% of the national CO₂ emissions and have a very high emission intensity,⁵ China's chemical industry also calls for a low carbon transformation. To achieve the emission reduction target, it is necessary to drive the transformation and upgrading of China's manufacturing with innovation and take green and smart production as the main drivers for improving the quality and efficiency (ibid.).

In the field of smart manufacturing of consumer products, Chinese companies have made active explorations. For example, Haier, a leading company in the global home appliance industry, has introduced intelligent manufacturing since 2012 and established the first industrial Internet platform COSMOPlat in 2018. With continuous attention and capital injection from VC investors, start-ups have played an important role in smart manufacturing. Meanwhile, digital giants are also active players. Alibaba's Rhino Smart Manufacturing Factory was put into operation in September 2020, positioned as a smart manufacturing platform serving SMEs. Technology company Xiaomi is building the second phase of its smart factory, which operates 24 hours a day, with most of the work done by smart machines, and will produce 10 million smartphones annually. In this and other cases, the high degree of automation inevitably lead to discussions about the impact on employment (Wang and Dong, 2020).

Latest policy developments in China

Chinese government has paid more and more attention to the development of the digital economy. Along with the country's new five-year plan, it has formulated the *14th Five-Year Plan for the Development of the Digital Economy*, proposing a series of goals and specific measures by 2025. In the context of economic security and risk prevention, the policy document touches upon the issue of sustainability. The document points out the importance of healthy and sustainable development of the digital economy and emphasizes

⁵ Data source: Carbon Emission Accounts & Datasets (CEADs).

guiding private capital to invest in original innovation fields and supporting business models in favour of sustainable development.

Meanwhile, the government has considerably tightened its oversight of the digital sector. For example, in the fields of competition policy and antitrust law enforcement, new regulations have been introduced specifically on the digital (platform) economy, while the Chinese government has strengthened institutional settings by establishing the State Anti-Monopoly Bureau. In 2021, the digital economy became the main target of antitrust investigations, and companies such as Alibaba and Meituan received huge fines for their alleged monopolistic behaviour. Overall, the regulatory environment for the digital sector has changed drastically in China. The current policy focuses include regulation, antitrust policy, financial stability and cross-border data security. A number of new priorities include to curb the abuse of market dominance, deal with algorithmic discrimination, strengthen consumer data protection, and achieve more accurate data rights confirmation and more reasonable data use.⁶

Although China is currently at the forefront of the formulation of a digital economy-related agenda, there are still some international experiences to draw from in balancing the digitalization process and sustainable development. For instance, the proposal of the Digital Markets Act in the European Union and some legislation efforts related to AI in the US are interesting progresses. There exist also potentials for China to shape together with other countries for global digital agenda.

Role of Government Policy: Issues for Discussion

In China, sustainability is not yet at the top of the agenda in the current policy shift for the digital sector. However, the shift provides an opportunity to factor in sustainability and

⁶ Yi Gang, the Governor of People's Bank of China, Keynote speech: China's experience with regulating big tech, Regulating big tech: between financial regulation, anti-trust and data privacy, 11th BIS Research Network meeting, 6-7 October 2021.

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mainstream environmental and social consideration into a new policy framework in the making. In the environmental and social fields, policies should play a guiding role, to mobilize the green initiative of enterprises, and to maintain the basic role of market in allocating resources while coping with market failures.

In practice, sound policy making is based on a comprehensive and objective assessment of the environmental and social impacts of the digital sector, both direct and indirect. Therefore, a full picture and a balanced view are essential. In terms of employment, for instance, the positive direct impact and negative indirect impact coexist, and, thus, the net result matters, so is the qualitative effect. We also need to keep the methodological challenges in mind, such as the establishment of counterfactuals in assessing the environmental and social impact of digitalization. Overall, it is crucial to address the missing links, including those between policy objectives and company strategies, between national and international agendas, and between research and policy making.

How to make the digital sector and the digitalization process greener depends on the industrial ecosystem, regulatory environment and social supervision, as well as the values, strategies and behaviours of enterprises themselves. Therefore, digital enterprises take the key responsibility here. Obviously, the timely and accurate disclosure of sustainability performance is essential for an assessment of their impact on sustainable development and helpful to enhance their responsibilities. Regarding the algorithm, the balance between efficiency and equality, as well as the incorporation of human dignity and sustainability factors rely mainly on enterprise's own behaviour. Nevertheless, government policies can play an active role in the environmental, social and governance aspects. In the short to medium term, major policy issues are as follows:

- Policy direction: Identify the digital sector as an important aspect of environmental protection policy and carbon neutrality strategy; formulate environmental and social norms for economic digitalization; improve the environmental regulations for digital economy, and sufficiently leverage the role of carbon markets.

- Priorities: 1) Focusing on the key issues of electricity consumption and carbon emissions in the digital sector, improve the energy efficiency of data centres by formulating standards and guide their rational use of clean energy; 2) Aiming at the problems existing in the system and algorithm, set the ethical bottom line and promote sustainability considerations; 3) Guide employers to give necessary basic social protection to employees in the emerging new economic sectors, who participate in the labour market often through a “flexible mode”; 4) The government and industry organizations play a guiding role to promote the sustainable information disclosure of digital enterprises.
- Policy formulation and coordination: relevant stakeholders, such as enterprises and research institutes and external experts, need to be actively involved in the policy making process; relevant policy areas and departments coordinate effectively in the process of policy formulation and implementation.

As highlighted by the analysis in the preceding sections, below are several key questions for discussion as well as for future research, including that planned for the Phase VII of CCIED studies:

- What lessons can be learned from latest national experiences and international practices on strengthening the nexus of digitalisation and sustainability?
- What role can government policies play for greening the digital sector and encouraging the decarbonization of the digitalization process?
- How to guide private capital to invest in original innovation fields and to support the emergence of new technologies and business models in favour of sustainable development?
- What best practices and innovative solutions can China learn from to upgrade its manufacturing, especially heavy industries, and faster a green industrial transformation?

- How to regulate algorithms to avoid situations that violate public interests and social values, how to enhance algorithmic transparency and accountability, and how to incorporate sustainability considerations?

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