Developing “new quality productive forces” and accelerating energy transition

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Building a better working world

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What is the "new quality productive forces"?

During this year's "two sessions", the term "new quality productive forces" has become a buzzword. "New quality productive forces", a concept first put forward by President Xi Jinping in his inspection tour of Heilongjiang Province in September 2023, represents advanced productivity developed by integrating technological innovation resources, developing strategic emerging industries and future industries, and transforming and upgrading traditional industries. It features high-tech, high efficiency and high quality, characterized by innovation, with high quality and a substantial increase in total factor productivity as the key.

How to understand the "new quality productive forces" in the context of energy transition?

Firstly, technological innovation is the core element for developing "new quality productive forces". Leveraging new technologies to promote the development of new industries, new modes and new development momentum is the key to the transformation of the energy industry. On one hand, we need improve the utilization and allocation efficiency of fossil energy and resources and reduce the consumption volume and intensity of energy and resources through technology-based transformation, green and intelligent development. On the other hand, it is also necessary to develop advanced productivity in advanced renewable energy-based power generation, smart grid and energy internet enabled by advanced technologies including big data, Internet of Things and artificial intelligence. Examples include the application of fourth-generation nuclear power technology, core technologies in the field of hydrogen energy, all-solid-state battery technology, efficient recycling of raw materials and the development and application of carbon dioxide capture, utilization and storage (CCUS).

Secondly, a three-pronged approach is the key to developing "new quality productive forces" and accelerating energy transition, i.e., giving overall consideration to the upgrade of traditional industries, developing strategic emerging industries and fostering future industries.

- Giving overall consideration to the upgrade of traditional industries: Innovation does not mean that traditional industries are disrupted, while accelerated digital and intelligent transformation of traditional industries featuring high pollution and high energy consumption has entered a critical period. In power, coal, oil and gas and other traditional energy sectors, it is an urgent need to deeply integrate a new generation of information technology with energy resources, to build pilot and demonstration energy plants and stations integrated with regional smart energy system, and to lead the way toward transformation and upgrading of the energy industry.
- Developing strategic emerging industries: Accelerating the fostering and development of strategic emerging industries including new energy, new materials, new energy vehicles, energy conservation and environmental protection industries, featuring high-content technology, low resource consumption and strong pull effect. It is not only an inevitable step toward energy conservation, emission reduction and energy transformation, but also a strategic choice to promote green, low-carbon and circular development, accelerate the transformation and upgrading of the economy, and enhance international competitiveness.
- Fostering future industries: Under the dual carbon strategy, the new energy storage industry, featuring flexible arrangement, fast response and short construction cycle in combination with high effectiveness to serve energy industries, has quickly become a key area of energy transformation and development worldwide. Also, developing new energy storage capacity was written into the "Government Work Report" for the first time this year. With an increased share of new energy storage in China, the affordability of industrial and commercial energy storage, the growing importance of sodium-ion battery and vanadium flow battery and the trend of independent energy storage and virtual power plants, new energy storage industry will enter a new stage of development.

Lastly, "new quality productive forces" is in itself green productivity. The combination of new technologies and new factors to improve green total factor productivity will help optimize industrial structure to mitigate issues including high energy consumption and severe environmental pollution. Meanwhile, it is expected to improve quality productive forces with higher environmental quality and better financial performance, prompt the transformation on the supply side of energy and promote the application in more diverse scenarios to best utilize resources, help energy conservation, pollution mitigation and emission reduction, thus facilitating to achieve win-win situation for economic growth and environmental governance.

How to develop the "new quality productive forces" amid energy transition?

Promoting technology-based high-quality transformation of coal-fired power generation industry

Premier Li Qiang stressed in the "Government Work Report" to give play to the fundamental role of coal and coal-fired power to meet demands for economic and social development. With the rapid development of new energy, coal's share in China's total energy consumption is expected to continue to fall, while it will remain an essential energy source amid energy transition.

China has accumulated extensive experience in identifying "new quality productive forces" for coal-fired power generation, including digital technology to support the reduction in coal consumption and improvement in the efficiency of power generation, enhance transformation for higher flexibility, engage deeper in peak load and frequency regulation and maintain power balance. With a clear positioning of coal-fired power transformation, technological innovation and improved capacity pricing mechanism and market-oriented trading mechanism, this will facilitate more coal-fired power generation units with three transformation scenarios and additional application scenarios to create a new revenue-generating mechanism. Taking the transformation for higher flexibility in extraction steam energy storage for coal-fired power generation units for example[1]. It is estimated that there will be an increase of 200 million kilowatts in peak load regulation capacity for power system and a growth of 100 million kilowatts in peak load capacity, if the transformation is performed for higher flexibility, while the new energy consumption capacity will be raised by 600 million kilowatts, bringing an annual reduction in equivalent carbon emissions of 900 million tons (8% of the national carbon emissions). This is helpful to provide sufficient power supply and maintain power balance while the carbon emission of power generation system is declined.

Exploring the path toward electrification in industrial sector

According to the report EY Energy & Resources Transition Acceleration[2], 55% of the increase in global electricity demand between 2030 and 2050 will come from the electrification in the industrial sector. China is a manufacturing powerhouse, boasting the most complete industrial system around the world while the industrial sector is the country's second largest source of carbon emissions. In industrial sector, electrification is not only an effective way to control both total energy consumption and energy intensity, but also an inevitable choice to strengthen supply chain security and green transformation.

Particularly in industries with high carbon emissions including steel, cement and chemical industries, electrification has become a consensus. For example, in a steel plant, distributed renewable energy, energy storage and green grid systems are replacing fossil fuels, and practices in short process of electric arc furnace steelmaking are being introduced; in steel and cement industries, technologies for energy conservation and emission reduction are used, including new kiln combustion technology (oxygen-rich combustion technics, hydrogen energy, etc.), integrated energy services and CCUS, to lessen carbon emissions in the production process. Moreover, the experience from electrification pilot projects, including oil fields and mines, has provided an underpinning for the economic feasibility to develop electrification and offered potential for electrification expansion.

In the foreseeable future, as "new quality productive forces" have great potential in the industrial sector, further support is expected, including policy, financial and tax support as well as supply of resources in the electricity and carbon markets, to promote deeper integration and development of electrification in the industrial sector.

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[1] www.hepuenergy.com

[2] EY Energy & Resources Transition Acceleration, December 2023

Developing a circular economy in China

The circular economy has demonstrated its worth as a viable choice in fostering "new quality productive forces". By fundamentally reshaping the linear and ineffective value chain of conventional industries, this economic framework presents numerous opportunities for China's economy to grow in a sustainable and high-quality fashion. A notable advantage it brings is the decrease in raw material consumption and energy conservation.

In the energy sector, the circular economy has been successfully implemented. It involves the synergistic development of multiple energy sources that are tailored to local conditions. This includes blending coal and electricity biomass fuel, utilizing mine subsidence for photovoltaic+ agriculture and animal husbandry, and even promoting tourism industry. These initiatives have gradually gained popularity and have created new micro-circulation and micro-ecosystems. The user side plays a crucial role in the advancement of a diverse circular economy, using the electric vehicle sector as an illustration. Throughout the entire lifecycle of vehicles and power batteries, the circular economy ensures a closed-loop system for key raw material supply, manufacturing, circulation and recycling. It also includes battery laddering, dismantling and refining, as well as material reforming. As the proportion of "green" electricity used in the process increases, the circular economy model will effectively drive the integrated development and low-carbon transformation of transportation, manufacturing and electric power industries.

Currently, China holds a strong position in the global electric vehicle market development. However, challenges such as rapid production capacity expansion and market competition have emerged. The circular economy is crucial in addressing supply pressure and resource competition for key metal materials like nickel, cobalt and lithium. It also promotes the integration of industrial chain segments for sustainable development. The realization of "new quality productive forces" relies on the harmonious development of industry policies, technical standards, market access, vehicle-network synergy, innovative technologies and business models.

Promoting the development of a digital and intelligent energy system

Digitalization technology will lead the way for the emergence of "new quality productive forces". Over the past few years, China's energy industry has witnessed a significant rise in digital intelligence. Various digital technologies such as big data, cloud computing, Internet of Things, artificial intelligence and blockchain have been extensively utilized. Energy enterprises have leveraged digital technology to transform their business and operational strategies, enhancing the efficiency of energy production, transmission, storage and sales services. This transformation has also facilitated their transition towards low-carbon practices and sustainable development. Additionally, through digital means, energy enterprises have established closer and more efficient connections with users, fostering industrial integration and the implementation of innovative business models. Consequently, this has contributed to the overall low-carbon and green development of society. Undoubtedly, energy digital intelligence represents the most dynamic and promising aspect of the "new quality productive forces".

Currently, the energy industry's digitization has become deeply ingrained in the operations of oil and gas, electric power and mining businesses. It is progressing towards overcoming data barriers, merging industry and finance, and driving business innovation and expansion. As we expedite the development of a modern energy system, there is a growing focus on scenarios that facilitate the seamless interaction of energy and information flows, enabling real-time responses to supply and demand through digital intelligence. For instance, the virtual power plant application leverages a digital platform to precisely coordinate supply and demand scheduling. This allows various types of user-adjustable distributed energy resources to participate in market transactions, in addition to meeting users' electricity self-consumption needs. Consequently, this not only generates trading revenue for aggregated users but also enhances the power system's balance and alleviates short-term investment pressures on the distribution network. By utilizing digital intelligence to empower users with independent management capabilities, foster green energy practices, unlock boundless opportunities and establish a robust foundation for energy as a "new quality productive forces".

Fostering a "demand-driven" market

The supply side of China's new energy installation, new energy storage and electric vehicle industries has made significant progress. However, there is still ample room for the development of clean energy consumption on the demand side. China's energy system is shifting towards a customer-centered model and sustained growth in production capacity can only be achieved if there is a steady increase in demand. This is crucial to avoid the negative impact of disorderly market competition on industry development. To ensure the high-quality and sustainable development of "new quality productive forces" such as photovoltaic modules, energy storage and power batteries, it is important to promote market demand and create more user-side application scenarios.

We believe that promoting market demand for "new quality productive forces" requires coordinated efforts from various aspects. Firstly, policy tools should be designed to incentivize low-carbon and efficient energy use on the user side. This can be achieved by encouraging early and pilot implementation of various initiatives and providing sustained incentives. Secondly, the market should play a significant role in resource allocation. This can be achieved by focusing on market systems such as electricity, carbon quota trading and voluntary emission reduction trading. These systems should be accelerated to promote cross-provincial and cross-regional new energy consumption and ensure flexibility of the energy system and effective linkages between electricity and carbon markets. Additionally, it is important to continue improving the market rule system and clarify the risk-return mechanism for "new quality productive forces". This will maximize investment incentives and stimulate further growth.

Transition finance to play the role in supporting China's energy transition

China's energy transition relies heavily on the strong backing of the financial industry. Effectively managing the risk associated with traditional fossil energy-based asset portfolios, while also fostering the growth of "new quality productive forces" is a top priority for institutional investors. Transition finance that serves as a catalyst for the transformation of old and new energies needs to play a key supporting role effectively. It is recommended that we further refine and enhance policies, regulations and implementation guidelines to bolster the development of transition finance. Financial institutions should be encouraged to create transition finance products tailored to their unique characteristics, with a particular focus on the role of transition finance tools in stimulating market demand and facilitating user-side transformation.

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