

China's Energy Transition (I)

中国的能源转型(上)

The State Council Information Office of the People's Republic of China

中华人民共和国国务院新闻办公室

2024年8月

August 2024

Preface

Energy is essential to human survival and development, and the way we develop low-carbon energy will be of great significance to the future of humanity. Since the First Industrial Revolution, the extensive use of fossil fuels has propelled human progress, but has also caused major problems, such as resource depletion, climate change, and geopolitical tension. As a result, the international community widely recognizes the importance of transitioning to renewable energy sources and using energy in a sustainable way to promote people's wellbeing and drive long-term economic growth.

Over the past 75 years since the founding of the People's Republic of China in 1949, China has experienced rapid growth in its energy sector, and has emerged as the largest energy producer and consumer in the world. After the 18th National Congress of the Communist Party of China in 2012, China's energy sector entered a stage of high-quality development. In 2014, President Xi Jinping proposed a new energy security strategy aimed at revolutionizing consumption, supply, technology, and institutions, while strengthening all-round international cooperation. This strategy has charted the course and laid out the fundamental principles for China's energy development in the new era. Guided by this strategy, China is pursuing a path of energy transition that is suited to its actual conditions, follows the general trends of global development, and meets the changing needs of our times.

Based on high-quality development, China's energy transition aims to build a clean, low-carbon, safe and efficient energy system. This initiative will provide a strong guarantee for the country's economic and social development and meet the people's growing desire for a better life.

With a view to eco-environmental progress, China's energy transition is gathering pace to develop a new model of energy consumption that is economical, efficient, green and inclusive. This will create synergies for cutting carbon emissions, reducing pollution, expanding green development, and stimulating economic growth, with the ultimate goal of building harmony between humanity and nature.

Acting on the vision of a global community of shared future, China is committed to advancing its energy transition by strengthening international cooperation in green energy. As a strong advocate of global energy transition, China is prepared to collaborate with other countries to build a future of sustainable energy. China respects the energy transition path independently chosen by other developing countries based on their national conditions and advances its energy transition in an equitable, just and orderly fashion.

The Chinese government is publishing this white paper to document China's successful actions and historic achievements in energy transition over the past decade.

I. China's Path of Energy Transition in the New Era

The world is currently witnessing a new revolution in science, technology

前言

能源是人类赖以生存和发展的重要物质基础，能源低碳发展关乎人类未来。工业革命以来，化石能源大规模开发利用有力推动了人类文明进步，但也产生资源枯竭、气候变化、地缘政治冲突等问题。加快能源转型发展，实现能源永续利用，持续增进民生福祉，为世界经济提供不竭动力，已成为各国共识。

新中国成立75年来，能源事业加快发展，中国已成为世界上最大的能源生产国和消费国。党的十八大以来，中国能源进入高质量发展新阶段。2014年，习近平总书记提出推动能源消费革命、供给革命、技术革命、体制革命和全方位加强国际合作的“四个革命、一个合作”能源安全新战略，为新时代能源发展指明了前进方向、提供了根本遵循。在能源安全新战略指引下，中国走出了一条符合国情、顺应全球发展大势、适应时代要求的能源转型之路。

中国的能源转型，立足于高质量发展，加快构建清洁低碳、安全高效的新型能源体系，为经济社会发展提供坚强的能源保障，不断满足人民日益增长的美好生活需要。

中国的能源转型，着眼于生态文明建设，加快形成节约高效、绿色普惠的能源消费新模式，协同推进降碳减污扩绿增长，推动实现人与自然和谐共生。

中国的能源转型，服务于构建人类命运共同体，持续深化绿色能源国际合作，积极做全球能源转型的推动者，携手各国共建可持续能源的未来。中国尊重发展中国家自主选择符合国情的转型路径，以公平、公正、有序方式推进能源转型。

为全面介绍十年来中国能源转型取得的历史性成就，分享中国能源转型的实践做法，发布本白皮书。

一、新时代中国能源转型之路

当今世界，新一轮科技革命和产业变革深入推

and industry. Green and low-carbon development, digital and intelligent technology, and sustainability have become the overwhelming trends of our times. Despite differences in development stages and available resources, all countries share the goal and challenge of securing their energy supply and achieving a green and low-carbon transition. Guided by its new energy security strategy, China has made significant progress in its energy transition, contributing its solutions to a key global issue of our time, demonstrating its approach to governance, and fulfilling its responsibility as a major country.

1. Energy Transition Is the Only Way Forward

The development and utilization of energy is an important aspect of the interaction between humanity and nature. When reviewing the history of human development, we see that every significant human progress is fundamentally tied to changes in energy extraction and utilization and shifts in primary energy sources.

Over the years, China has established a comprehensive energy supply system encompassing coal, oil, gas, nuclear, hydro, wind, and photovoltaic (PV) energy, providing robust impetus for the fast and sustained development of the economy and society.

China's drive towards all-round socialist modernization has brought about new requirements for high-quality energy development. Despite being the world's largest developing country, China has comparatively low per-capita energy consumption. As the country has not yet completed its industrialization and urbanization, however, its energy demand is likely to continue growing. With an industrial structure dominated by heavy industry and an energy mix primarily based on coal, China will continue to face resource and environmental constraints in the long run. Energy transition is the fundamental solution to the above challenges.

China's energy transition focuses on transforming the model and drivers of energy development by achieving the substitution of primary energy sources from fossil fuels to non-fossil fuels. This transition is essential for the country to overcome resource and environmental constraints and achieve its peak carbon and carbon neutrality goals. It is vital for the country to seize the opportunities brought about by the latest round of revolutionary changes in science, technology and industry and foster new quality productive forces. It is crucial for the country to establish green ways of production and life and realize high-quality economic and social development. It is key for the country to fulfill its responsibility as a major country and contribute to a global community of shared future. For these reasons, China has taken proactive actions to advance its energy transition and will stay committed to this initiative as an imperative for a better future.

2. Accelerating Energy Transition

China respects the global trend of energy development and firmly applies its new energy security strategy. To achieve harmony between humanity and nature, and advance human progress, China has been shifting from a resource-reliant model of energy development to one driven by innovation. The country has charted a path for energy transition that is tailored to its own realities and responsive to the needs of our times.

China's energy transition abides by the following principles:

—Putting the people first. Energy is inseparable from daily life. By upholding a people-centered development philosophy, China has improved its energy services throughout society to secure a reliable supply of clean energy and ensure that the people have a greater sense of gain, fulfillment and security.

—Pursuing green and low-carbon development. Energy transition is critical for balancing economic growth and eco-environmental protection. China adheres to green and low-carbon development that prioritizes eco-environmental protection and promotes harmony between humanity and nature. Energy transition is a vital objective for economic and social development in the country. China has made energy and resource conservation a top priority and employs a comprehensive conservation strategy while raising energy efficiency by making the best use of every bit of coal, oil and electricity. Guided by its green and low-carbon philosophy, China has taken vigorous measures to substitute renewables for fossil fuels and aims to create an energy supply system dominated by non-fossil fuels.

—Serving national development. To ensure that it always has control over its own energy supply, China has increased its capacity to meet its domestic needs. The country has applied the practice of establishing the new before

进, 绿色低碳、数智化、可持续发展成为时代主题。各国经济发展阶段、资源禀赋不同, 如何统筹能源安全稳定供应和绿色低碳转型既是共同的目标, 也是面临的难题。中国提出能源安全新战略, 推动能源转型取得显著成效, 回答了世界之问、时代之问, 展现了中国之治、大国担当。

(一) 能源转型是必由之路

能源的开发利用, 是人与自然互动的重要方面。纵观人类社会发展史, 人类文明的每一次重大进步, 往往伴随着能源开发利用方式的变革、主体能源的更替。

经过长期发展, 中国建立了煤、油、气、核、水、风、光等全面发展的能源供给体系, 为经济社会持续快速发展提供澎湃动力。当前, 中国开启全面建设社会主义现代化国家新征程, 对能源高质量发展提出新要求。中国是世界上最大的发展中国家, 但人均用能水平不高, 工业化、城镇化尚未完成, 未来一段时间能源需求仍将增长; 产业结构偏重、能源结构偏煤, 资源环境约束长期存在。应对这些困难挑战, 根本要靠能源转型。

中国的能源转型, 注重加快转变能源发展方式, 转换能源发展动力, 推动主体能源从化石能源向非化石能源更替, 这是破解资源环境约束、实现碳达峰碳中和目标的迫切需要; 是抢抓新一轮科技和产业变革机遇, 加快培育新质生产力的迫切需要; 是推动形成绿色生产方式和生活方式, 实现经济社会高质量发展的迫切需要; 是主动担当大国责任、推动构建人类命运共同体的迫切需要。中国推进能源转型, 不是别人让我们做, 而是我们自己要做; 也不是能不能做, 而是必须做。

(二) 坚定不移加快能源转型

中国顺应全球能源发展大势, 坚定不移贯彻落实能源安全新战略, 着眼于促进人与自然和谐共生, 开创人类文明新形态, 推动能源发展方式逐步从资源依赖型向创新驱动型转变, 走出了一条符合中国国情、适应时代要求的能源转型之路。中国的能源转型, 坚持以下理念原则:

——坚持人民至上。能源与人民生活息息相关。中国坚持以人民为中心的发展思想, 持续提升全社会能源普遍服务水平, 为更好满足人民美好生活需要提供清洁可靠的用能保障, 不断增强人民群众的获得感、幸福感、安全感。

——坚持绿色低碳。既要绿水青山, 也要金山银山, 能源转型是关键。坚持走生态优先、绿色低碳的发展道路, 着力促进人与自然和谐共生, 把能源转型作为经济社会发展重要目标。把节约能源资源放在首位, 实施全面节约战略, 充分用好一克煤、一滴油、

discarding the old and implemented strong overall planning to ensure that safe and reliable new energy is secure before phasing out conventional energy. China has improved its energy production, supply, storage and sale systems while shoring up the weak points in its energy reserve regulation and using fossil fuels as safeguards of energy security, thus forming an effective response strategy to energy security risks and challenges.

—Boosting innovation as an impetus for growth. Innovation is the key to energy transition. By applying an innovation-driven development strategy within its energy sector, China has achieved breakthroughs in core technologies and created new technologies, industries, and business models. It aims to make new energy technology and its related industries the key drivers of industrial upgrading and foster new quality productive forces. China has also advanced market-oriented reform in its energy sector by ensuring that the market plays the decisive role in resource allocation and the government better plays its role, in order to boost the vitality of all business entities.

—Expanding opening up and cooperation. Sustainable development and climate change are common challenges for all of humanity. Holding the vision of a global community of shared future, China has been expanding high-standard opening up in the energy sector, strengthening all-round international cooperation, and advancing an energy transition towards green and low-carbon development through mutually beneficial cooperation. China has played an active role in the reform of global energy governance to help build a governance system based on equity, justice, balance and inclusiveness.

3. Making Notable Progress in Energy Transition

Over the past decade, China has furthered reform of its energy production and consumption methods, upgraded its energy supply capacity under the guidance of its new energy security strategy, and achieved historic breakthroughs in green and low-carbon energy development. These achievements have provided strong support for realizing high-quality economic and social development and better meeting the people's growing desire for a better life, and served to underpin the Beautiful China initiative.

Fast-tracking clean energy development. In 2023, the share of clean energy consumption reached 26.4 percent of China's total energy use, up 10.9 percentage points from 2013. In the same period, the share of coal consumption dropped by 12.1 percentage points. In 2023, the total installed capacity of power generation reached 2,920 GW, of which clean energy accounted for 1,700 GW, or 58.2 percent. In the same year, electricity generated from clean energy was about 3,800 TWh, accounting for 39.7 percent of the country's total electricity generation, up by around 15 percentage points from 2013. Over the past decade, electricity generated from clean energy has accounted for more than 50 percent of the increase in total electricity consumption, marking a growing share of green energy in China's energy mix.

Underpinning high-quality economic and social development. China has realized greater control over its own energy supply. Over the past decade, its capacity for primary energy production has grown by 35 percent, providing a strong basis for steady and sound economic growth. In the same period, investment in fixed assets in the energy sector totaled about RMB39 trillion, which has stimulated the growth of investment in upstream and downstream industrial chains and related industries. A series of key energy projects have been completed and put into operation, and a complete industrial chain for energy equipment manufacturing has been built. Technological innovation in new energy, hydropower, nuclear power, power transmission and transformation, and novel energy storage has accelerated, and the clean energy industry has become a new pillar of China's modern industrial system.

Meeting the people's need for a better life. Over the past decade, China's energy demand and supply have remained balanced. Energy prices have also remained generally stable, ensuring energy security for more than 1.4 billion people. Per-capita electricity consumption has doubled from about 500 kWh to nearly 1,000 kWh over this period, and the total number of natural gas users has reached 560 million. China rose to a rank of 12th in Getting Electricity, an indicator of the global business environment by the World Bank.

The energy sector has helped to facilitate poverty alleviation and rural revitalization. Over RMB100 billion from the central budget has been invested into upgrading rural power grids, stimulating local governments and enterprises

一度电，不断提升能源利用效率。以绿色低碳为导向，大力实施可再生能源替代，加快构建以非化石能源为主体的能源供给体系。

——坚持立足国情。能源的饭碗必须端在自己手里，立足国内增强能源自主保障能力。坚持先立后破、通盘谋划，传统能源逐步退出必须建立在新能源安全可靠替代的基础上，加强能源产供储销体系建设，补足能源储备调节短板，发挥化石能源兜底保障作用，有效应对能源安全风险挑战。

——坚持创新引领。创新是打开能源转型之门的“金钥匙”。加快实施创新驱动发展战略，加强关键核心技术攻关，加快能源技术、产业、商业模式创新，推动新能源技术及其关联产业成为带动产业升级的新增长点，培育壮大新质生产力。深化能源市场化改革，充分发挥市场在资源配置中的决定性作用，更好发挥政府作用，激发各类经营主体活力。

——坚持开放合作。推动可持续发展、应对气候变化，是人类面临的共同挑战。秉持人类命运共同体理念，扩大能源领域高水平对外开放，全方位加强能源国际合作，构建能源绿色低碳转型共赢新模式。深度参与全球能源治理变革，推动建立公平公正、均衡普惠的全球能源治理体系。

(三) 中国能源转型发展取得显著成就

十年来，在能源安全新战略指引下，中国深入推进能源生产和消费方式变革，能源供给保障能力全面提升，能源绿色低碳发展实现历史性突破，有力保障了经济社会高质量发展，更好满足了人民日益增长的美好生活需要，有效支撑了美丽中国建设。

中国能源转型推动清洁能源发展驶入快车道。2023年，清洁能源消费比重达到26.4%，较2013年提高10.9个百分点，煤炭消费比重累计下降12.1个百分点。发电总装机容量达到29.2亿千瓦，其中，清洁能源发电装机容量达到17亿千瓦，占发电装机总量的58.2%。清洁能源发电量约3.8万亿千瓦时，占总发电量比重为39.7%，比2013年提高了15个百分点左右。十年来，新增清洁能源发电量占全社会用电量一半以上，中国能源含“绿”量不断提升。

中国能源转型支撑经济社会高质量发展。能源饭碗越端越牢，一次能源生产能力十年增长了35%，有力支撑了我国经济平稳健康发展。十年来，能源领域固定资产投资累计约39万亿元，显著拉动了上下游产业链及相关产业的投资增长。一系列能源领域重大工程建成投产，建立起完备的能源装备制造产业链，新能源、水电、核电、输变电、新型储能等领域技术创新加快，推动清洁能源产业成长为现代化产业体系的新支柱。

中国能源转型保障人民美好生活需要。十年来，