

中国能源政策解读

能源革命与“一带一路”倡议



许勤华 钟兆伟 ◎著

China's Energy Policy from National and International Perspectives

The Energy Revolution and The Belt and Road Initiative

解读了中国能源政策的发展过程

阐述了中国开展能源革命的前因后果

剖析了“一带一路”倡议下能源合作的机遇与风险

石油工业出版社

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内 容 提 要

本书从国内和国际两个层面全面解读了中国能源政策的发展过程,比较了中国与其他国家的能源文化,阐述了中国开展能源革命的前因后果,剖析了“一带一路”倡议下能源合作的机遇与风险。

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前 言

中国能源发展的基本情况

环境问题不仅是中国能源政策的一个制约因素，也正成为其三个重要方面之一。这三个方面是能源安全，环境和气候。三者之间互为相关，彼此支持，共同维持中国经济的可持续发展。

自 2012 年年底，中国已成为全球最大的能源生产国之一。随着其经济地位的大幅提升，中国已成为世界的焦点，在应对气候变化挑战的同时更加强烈地感受到国民对环境安全的渴求。

在“十一五”期末，中国能源产业得到了实质性的发展。一次能源总产量从 2005 年的 21.6 亿吨标准煤增加到 29.7 亿吨标准煤，能源自给率达到了 91%。可再生能源在一次能源中所占比例从 2005 年的 7.4% 增加到 2010 年的 9.4%，非化石燃料能源由 6.8% 增加到 8.6%。中国与中亚、俄罗斯、中东、非洲、南美以及亚太地区开展海外油气合作，海外股权石油生产逐渐增加。能源强度下降了 19.1%。

至于煤炭产业，中国面临的难题是煤田往往位于离消费区域较远的位置。交通是能源安全的一个巨大挑战。中国也已开始从东南亚进口煤炭，并从澳大利亚大量进口，加强了海外合作。因此，中国已更加依赖海外煤炭。就供电行业而言，电力投资额已达到 1.2 万亿元，且完成了从山西经河南到湖北 653.8 千米的特高压电网模型建设。然而其安全性、经济价值、技术障碍以及可靠性有待进一步检测。在石油和天然气行业，原油依靠海外供给率已占近

60%。根据国家统计局的数据,2015 年中期石油储备二期工程结束后,目前的石油储备能力已经增加到 2860 万立方米。由此而来的石油储备虽然增加了近 40 天,仍然离国际能源署提出的 90 天的安全标准线相差甚远。中国于 2006 年开始进口天然气,于 2007 年变成天然气净进口国。应对气候变化、环境保护和以市场为导向的能源产业刺激中国开拓天然气的进口(包括液化气)和减少煤的使用。对天然气进口的日益依赖已引起国内煤炭产业以及那些倡导核能和页岩气持续发展以此来减少对海外天然气的依赖的人的关注。

各国的经济状况、能源产业发展程度、能源利用方式有所不同,文化及历史背景多样丰富,生活和生产环境、外交策略及政治经济体制又各具特色,因此多种能源文化并存于世。中国对一些关键术语及概念拥有特殊解释,如能源安全、能源效率、能源法、能源独立性、能源进口依赖度、能源外交政策、国有企业、国际能源合作、能源短缺等,这些都充分展现了中国的特色能源文化。

1993 年至 2011 年期间,中国能源结构的实质没有改变,国内绿色能源的总产量无明显提高,其中石油和天然气的供给安全成为一个突出的问题。“十二五”期间出台的能源政策有望解决这一问题。“十二五”期间,低油气价格、能源结构的优化、新能源及可再生能源(NRE)使用比例的增加短期内缓解了能源供给的安全问题,但就长期而言,中国仍有待一场真正的能源革命。

中国的能效变化具有地区差异,碳排放量亦是如此。能效的提高确实有利于环境的改善。中国政府在发电方面实施了四条政策。第一,电厂减少燃煤发电,提高天然气使用率;这会带来石油消耗的持续下降,刺激其他燃料的需求。这一趋势在中国的中、东、南部尤为明显,北部却收效甚微。第二,倡导电厂采用节能减排技术,如烟气脱硫等。第三,鼓励建设 60 万千瓦以上规模电厂代替小型低效电站。第四,制定激励措施,如碳排放税。能效的提高和能源结构的优化有效降低了碳排放量,这一比例从 2004 年的 10.7% 下降到 2010 年的 10.41%。在温室气体减排方面,交通部门的贡献度最高,各类交通运输(海运、空运、陆运、铁运)的有关当局出台了多项法律以提高能效,

减少排放；东部比中、西部人口稠密，所以东部成效较小，西部交通基础设施又欠发达，因而中部的实施效果最佳。

能效的整体改善主要体现在发电行业上，采矿、化工、钢铁、非金属产业能效提升较小。“十二五”期间，中国计划较 2010 年实现二氧化硫减排 8%，一氧化氮减排 10% 和碳强度下降 17% 的目标。各行业能耗中，交通部门的减排潜力最大。官方数据表明这些减排目标超额完成：二氧化硫减排 18.0%，一氧化氮减排 18.6%，碳强度下降了 20%^①。

① http://news.xinhuanet.com/local/2016-02/19/c_128732113.htm

中国政府计划未来能源发展分三个阶段。到 2030 年，能源消耗主要来源于化石燃料，其次是新能源和可再生能源，并越来越接近化石燃料能耗。到 2050 年，可再生能源和化石燃料消耗持平，各占能源消耗总量的一半。2050 年之后，能源消耗主要来自可再生能源，其次是化石能源。中国政府要完成这一宏伟计划，关键要优化能源结构，提高能源效率，提倡使用清洁能源。

中国在能源发展方面多年来一直面临三个主要矛盾：可持续能源需求同人均能源严重不足之间的矛盾，煤炭导向型能源结构同低碳发展之间的长期矛盾，以及化石燃料高能源强度同生态环境高要求之间的矛盾。“十二五”规划是中国政府调整经济发展模式的重要时期。中共十八届三中全会公告指出，在“市场起决定性作用”的经济转型过程中，这些矛盾会更加突出。

中国能源发展“十二五”规划于 2013 年 1 月 1 日正式印发，规划明确指出能源发展的主要目标和首要任务是使用清洁能源，提高能源利用效率，计划到 2015 年，单位 GDP 能耗比 2010 年下降 16%，能源消耗总量 40 亿吨标准煤，其中国内生产 36.6 亿吨标准煤。计划总用电量 6.15 万亿千瓦时，能源利用效率提高 38%。非化石燃料占一次能源消耗比重增加到 11.4%，天然气占到 7.5%。碳排放量比 2005 年减少 17%，污染物排放减少 10%。

2015 年中国实现可再生能源生产大幅提高并不容易，因为中国大部分可再生能源都用于发电。其结果就是，可再生能源生产提高 11.4%，可替代能

源生产如核能、风能、生物质能、太阳能就需要提高 200%。完成单位 GDP 能耗下降 16% 这一计划，不但要求地方政府有效贯彻落实中央政策，还需要 GDP 增长维持在 8% 左右。在不久的将来，中国能源结构依然以煤为主，大约占中国能源结构份额的一半。能源政策带来的环境效益取决于政策的实施。然而有报道称，2015 年中国的太阳能和风能发电容量分别提高了 74% 和 34%^①。

① <https://cleantechnica.com/2016/03/06/china-renewable-growth-soars-fossil-fuel-use-declines/>

中国的石油及天然气长期以来处于供不应求的状态。中国在 1993 年及 1996 年先后成为成品油及原油的净进口国。自 20 世纪 90 年代以来，中国企业就响应“走出去”战略，并积极打造了一项具有前瞻性的全球计划，以满足中央政府围绕“充分利用好两种资源、两个市场”所规定的各项要求。目前，已有超过 100 个石油及天然气国际合作项目在 33 个国家间开展，并大致分为了五大国际石油及天然气合作区域。一个关于石油、液化天然气、天然气、煤和铀的进出口贸易体制已初步形成，并以油轮运输为主，管道及铁路运输为辅。国际市场有多种业绩指标，其中包括了现货、期货及长期采购协议。中国的国有能源企业已大大提升了自身的国际竞争力。

中国对外能源政策的制定经历了若干根本性的转变，这些转变在政府颁布的官方能源安全政策中有迹可循。同时，我们从能源企业的经济活动及其国际合作的参与中也可看出种种变化。能源安全方面的观念转变引发了多方位的能源合作。这使得中国的能源企业在对外能源合作中发挥了重要作用并摒弃了“政府打头阵，企业随后跟”的形式套路。

中国实行积极的对外能源政策，在某种程度上保证了其能源安全，并履行了保护全球能源安全的责任并缓解了部分地缘政治冲突，而这一切都带来了积极影响。然而，随着“走出去”战略逐步实施，中国面临着更多风险。这可能会使正常的双边关系被贴上“能源”标签，进一步强化他国关于“中国掠夺资源”的猜测，对双边外交关系造成消极影响。在参与国际能源合作

20 年后，中国首次正视了其在国际能源秩序中的地位和重要性，并在此基础上对其对外能源政策进行了重新定位。

鉴于石油、天然气及国家安全等多方面的考虑，中国在其对外能源政策上将继续实行全球能源政策，坚持重视与中亚及俄罗斯的双边关系，加大中东地区投资，加强中非合作，推动南美发展以及巩固亚太地区发展。

PREFACE

Basic Information about China's Energy Development

The introduction of a carbon trading market in China shows that environmental concerns are not only a restraint on Chinese energy policy, but they are becoming one of the three key aspects in energy policy. These aspects are energy security, environment and climate and foreign relations. The three are interrelated and mutually supportive of each other with the main purpose of maintaining the sustainable development of the Chinese economy.

Since the end of 2012, China has been one of the world's largest energy producer. As its economic status rises dramatically, China has become the focus of the world, feeling more strongly its citizens' yearning for environmental safety while experiencing the challenges of coping with climate change.

By the end of the Eleventh Five-Year Plan in 2010, China's energy industry had seen substantial development: total production quantity of primary energy had increased from 2.16 billion tons of standard coal in 2005 to 2.97 billion tons. The energy self-supply rate had reached 91%. The proportion of new and renewable energy in primary energy had risen from 7.4% in 2005 to 9.4% in 2010, and non-fossil fueled energy from 6.8% to 8.6%. China had developed its overseas oil and gas cooperation with Central Asia, Russia, the Middle East, Africa, South America and the Asia-Pacific region, and gradual growth had been seen in overseas equity oil production. Energy intensity had decreased by 19.1%.

Regarding the coal industry, China's difficulty is that the coalfields are located far away from the consuming areas. Transportation has been a great challenge for energy security. China has also started to import coal from Southeast Asia and in significant amounts from Australia, which improves overseas cooperation. As a result, China has become more dependent on overseas coal. With regard to the power supply industry, investment in electric power has reached 1200 billion yuan, with the completion of a 653.8 kilometer extra-high-voltage model electric network from Shanxi to Hubei via Henan. However, further testing of its safety, economic value, technical obstacles and reliability is required. In the oil and gas industry, dependence on overseas supply of crude oil has reached nearly 60%. The present petroleum reserve capacity is 28.6 million cubic meters (National Bureau of Statistics of the People's Republic of China) (from 16.4 million cubic meters) after the second construction phase was finished in mid-2015. The resulting net import of petroleum has been increased to approximately forty days, still far from the ninety days suggested by the International Energy Agency. China started to import natural gas in 2006 and the year 2007 saw its net import of natural gas. Coping with climate change, environmental protection and a market-oriented energy industry motivated China to develop natural gas imports, including liquid natural gas (LNG), and reduce coal use. The growing dependence on natural gas imports has caused concern from the domestic coal industry, and from those who advocate continuous development of nuclear power and shale gas to reduce the dependence on overseas natural gas.

A variety of energy cultures exist in the world due to the different development levels of economies and energy industries, ways of using energy, diverse cultural and historic backgrounds, living and production environments, foreign strategies, and political and economic systems. China has its own special interpretation of some key terms and concepts like energy

security, energy efficiency, energy law, energy independence, dependence on overseas supply, foreign policy on energy, state-owned company, international energy cooperation and energy shortage etc., which display a profoundly distinct Chinese energy culture.

There was no change in the nature of the Chinese energy structure from 1993 to 2011, and no obvious increase in total production of domestic green energy. The security of supply of petroleum and natural gas became a prominent issue, which was to be resolved by the energy policies of the Twelfth Five-Year Plan (FYP). With the aid of low oil and gas prices and the optimization of energy mix with the increased ratio of NRE (new and renewable energy) during the Twelfth FYP period, the problem of supply security was alleviated in the short-term, however, for long-term security, China is still awaiting the real energy revolution.

There are regional differences in the changes in Chinese energy efficiency, which are also reflected in the different levels of carbon emissions. The improvement of energy efficiency has indeed had a positive influence on the environment. Regarding power generation, the Chinese government has implemented four policies. The first is to reduce thermal coal use in power plants and increase natural gas use, leading to a continuous decrease in oil power generation and a rapid increase in other fuels. This trend is clearly evident in the central, eastern and southern parts of China but is less obvious in the northern part. The second is to advocate energy-saving and emission reduction technology in power plants, such as the use of smoke and gas desulphurization etc. The third is to encourage the building of power plants over 600,000 kilowatts (kW) in scale, to replace small and low efficiency generating units. The fourth is to impose incentives like emissions taxation. Increased energy efficiency and energy-mix change reduced carbon emissions by 10.7% and 10.41% respectively from 2004 to 2010. The transport sector has played the most important role in reducing greenhouse gases.

The authorities responsible for different types of transportation (sea, air, road and railway) have issued various laws to improve efficiency and decrease emissions. These laws are less effective in the eastern region due to its denser population than in the central and western regions, and in particular more effective in the central region than the western region whose transportation infrastructure is less developed.

The greatest overall improvement in energy efficiency has been in power generation, and less improvement has been made in mining, chemical, steel, iron and non-metal industries. In the Twelfth FYP, China aimed to achieve an 8% decrease in sulphur dioxide emissions, 10% in nitrogen monoxide and 17% in carbon intensity compared with 2010. Of all the areas of energy consumption, transportation has the greatest potential for emissions

reduction. According to official data these aims were fulfilled: 18.0% decrease in sulphur dioxide; 18.6% decrease in nitrogen monoxide; 20% decrease in carbon intensity^①.

① http://news.xinhuanet.com/local/2016-02/19/c_128732113.htm

The Chinese government plans three phases for future energy development. Up to 2030, energy consumption will be mainly derived from fossil fuels with new and renewable energy sources playing an increasingly close second. From 2030 to 2050, consumption will be split evenly between fossil fuels and renewable energy sources. After 2050, renewable energy will prevail while fossil energy will play a secondary role. To fulfil this grand plan, optimizing energy structure, improving energy efficiency and advocating clean energy use will be key strategies of the Chinese government.

For many years now, China has faced three types of structural conflicts in energy development, namely the conflict between sustainable energy needs and severe shortage of resources per capita, the long-term conflict between coal-oriented energy and low carbon development, and the conflict between the high energy intensity of fossil fuel usage and the more

demanding requirements of the ecological environment. The Twelfth FYP was considered as an important phase for the Chinese government to adjust economic development patterns. These conflicts will be more prominent in the process of economic transition in which “the market plays the decisive role”, as stated in the proclamation of the Third Plenary Session of the 18th Central Committee.

The Twelfth FYP of Chinese Energy Development issued on January 1, 2013 confirmed the key goals and gave priority to clean energy use and increased energy efficiency: energy intensity was planned to be reduced by 16% from 2010 to 2015. Energy consumption was planned to be 400 million tons of standard coal, 366 millions of which was for self-supply. Power consumption was planned to be 6150 billion kilowatt hours (kWh). Energy efficiency was planned to increase by 38%. The proportion of non-fossil fuels in primary energy was planned to grow to 11.4%, with natural gas accounting for 7.5%. Carbon emissions were planned to be reduced by 17% compared with 2005, and pollutant emissions to fall by 10%.

It was hard for China to achieve its ambitious increase of renewable energy production by 2015, for most of the renewable energy is used in power generation. As a result, 11.4% growth in renewables requires an increase of 200% in alternative sources such as nuclear, wind power, bioenergy and solar energy. The planned 16% decrease in energy not only required local governments' efficient enforcement of the central government policies but also for GDP growth to remain around 8%. In the near future, coal will still dominate, representing approximately half of the Chinese energy structure. Environmental profits from the energy policy will depend on the implementation of the policy. However, it was reported that China's solar and wind energy capacity increased by 74% and 34%, respectively, in 2015^①.

① <https://cleantechnica.com/2016/03/06/china-renewable-growth-soars-fossil-fuel-use-declines/>

The supply of China's petroleum and natural gas has, for a long time, been insufficient to meet consumption demands. China became a net importer of refined oil products in 1993 and of crude oil in 1996. Since the 1990s, Chinese enterprises have followed the Going Out strategy and proactively developed a global plan in order to fulfil the requirements of "making full use of two kinds of resources and two markets" imposed by the central government. Over 100 international cooperation projects in oil and gas have been carried out in thirty-three countries, broadly organized into five large international oil and gas cooperation zones. A preliminary import and export trading system was built for petroleum, LNG, natural gas, coal and uranium. Transportation is mainly by oil tankers, assisted by pipelines and railway freight. Multiple financial measures like spot, futures and long-term purchase agreements exist in international markets. Chinese state-owned energy companies have greatly increased their international competitiveness.

There have been fundamental changes in the formulation of China's external energy policy. Changes can be seen in the official energy security policy issued by the government, in the economic activities of energy companies and in their involvement in international cooperation. The change in the conception of energy safety has caused a series of multilateral trends in energy cooperation. It has helped that Chinese energy companies play an important part in external energy cooperation, and have abandoned the formality that "government takes the lead and paves the way for enterprises".

To some extent, China's active foreign energy policy guarantees its own energy safety, undertakes the responsibility of safeguarding global energy safety, and eases some geopolitical conflicts, all of which exert a positive influence. However, the more the Going Out Policy is implemented, the more risks China has to face. This can have a negative effect on diplomatic relations, tagging the "energy" label on the normal bilateral relationships and intensifying speculation about "resource plundering" by China. After twenty

years of international energy cooperation, China has repositioned its foreign energy policy, and this reposition is based on China's facing up to its position and significance in the global energy order for the first time.

Considering the issues surrounding oil, gas, and national safety, China's foreign energy policy will continue its global energy policy based on the principle of emphasizing relations with Central Asia and Russia, increasing investment in the Middle East, strengthening cooperation in Africa, boosting South America and consolidating developments in the Asia-Pacific region.

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