Dual Control of Energy Consumption in China: Evolution and Optimizations

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Abstract

This paper examines the evolution and optimizations of China's dual control system for energy consumption, a pivotal policy framework implemented to address the country's growing energy intensity and environmental challenges. As the world's largest energy producer and consumer with a coal-reliant energy structure, China faced unprecedented energy consumption growth between 2002-2005, prompting a fundamental shift in energy policy from supply-focused strategies to demand-side management and efficiency measures. The dual control system, formally introduced during the 11th Five-Year Plan (2006-2010), establishes binding targets for both energy intensity reduction (energy consumption per unit of GDP) and total energy consumption control across all provinces. The system operates through three core mechanisms: target allocation among regional governments, comprehensive assessment and evaluation procedures, and accountability measures integrated into the target responsibility system for government officials. The paper analyzes four key complementary systems that have emerged around dual control: (1) Energy efficiency standards with advanced, access, and limited values for different industries, updated in 2021 and 2023 editions; (2) Energy conservation review mechanisms for fixed asset investment projects, requiring mandatory approval before construction; (3) Energy Performance Contracting (EPC) ; and (4) Energy consumption rights trading pilots launched in four provinces in 2016, though recently phased out to avoid overlapping with carbon markets. The system has undergone significant reforms to enhance flexibility, including special treatment mechanisms for major national projects, exclusion of energy used as raw materials from total consumption caps, and exclusion of newly added renewable energy from consumption controls. Despite remarkable achievements, the system faces key challenges: difficulties in reasonable target allocation across diverse regions, mismatches between administrative cycles and market dynamics, insufficient precision in implementation methods, and inadequate internal drivers for enterprise emission reduction. The research concludes by examining China's strategic transition from dual control of energy consumption to dual control of carbon emissions, scheduled for full implementation during the 15th Five-Year Plan period, representing a fundamental evolution toward more comprehensive climate governance while maintaining the system's core accountability mechanisms.

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1. Introduction

1.1 Factors Shaping China's Energy Policy

China's energy policy is influenced by unique factors, such as its status as the world's largest producer and consumer of energy, its position as the top emitter of CO2, and its coal-reliant energy structure. China's economic growth and urbanization, along with regional variations in energy resources and demand, pose challenges. China is a global leader in the deployment of renewable energy but also faces external pressures stemming from its export partners' emission reduction targets and carbon-intensity-related import restrictions. Key energy-intensive industries account for 60 percent of gross final energy consumption.[1] It is said that the government of an energy-importing developing country (such as China) faces three main energy policy options: one focused on energy supply, a second emphasizing energy efficiency and conservation, and a third prioritizing both energy efficiency and environmental protection. In practice, governments tend to shift from one approach to another over time. Research shows that the period from 2001 to 2004 marked a transition from the first to the second option, that is, "security of supply still ranks first, but with a change of emphasis from supply-side measures to demand control, followed by economic efficiency."[2]

1.2 Development of Energy Efficiency Policies in China

China's energy supply has long been under strain. Since 1979, China has carried out energy conservation on a nationwide scale.

In the 9th Five-Year Plan (1996–2000), it was proposed to "implement a comprehensive conservation strategy."[3] During this period, the trend of energy consumption growing more slowly than the economy continued.[4] In response to economic growth — especially the expansion of the heavy industrial sector, which led to a rapid increase in total energy consumption and increasingly severe environmental pollution — China adopted a policy during the 10th Five-Year Plan (2001–2005) of eliminating outdated production capacity in energy-intensive and high-pollution industries such as coal, electric power, petroleum and chemicals, iron and steel, nonferrous metals, building materials, machinery, light industry, and textiles.[5] However, due to a new round of investment-driven economic growth, China's energy demand rose sharply. Since 2002, the growth rate of China's energy consumption has exceeded that of GDP. Over the following four years, China's GDP growth rate (at constant 2000 prices) was 9.1 percent, 10.0 percent, 10.1 percent, and 9.9 percent, respectively, while the annual growth rate of energy consumption reached 9.9 percent, 15.3 percent, 15.2 percent, and 12.7 percent, respectively. Energy consumption elasticity exceeded 1 for four consecutive years, reversing the historical trend in which China's energy consumption elasticity had remained below 1. From 2001 to 2005, China's energy intensity rose from 4.21 tons of standard coal per 10,000 RMB to 4.77 tons of standard coal per 10,000 RMB.[6]

In order to meet the challenge of rising energy consumption, in October 2005 the Fifth Plenary Session of the 16th CPC Central Committee adopted the "Proposal of the CPC Central Committee on the Formulation of the 11th Five-Year Plan for National Economic and Social Development," which, for the first time, designated resource conservation as a fundamental national policy.[7] It emphasized that the

1 International Renewable Energy Agency, "China's Route to Carbon Neutrality: Perspectives and the Role of Renewables," July 2022, https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2022/Jul/IRENA_China_Carbon_Neutral_2022.pdf?rev=8ab20715805140dcb8ff28f1c064b94d. See also Xiaoping Zhang, "China's Energy Policy: Towards Energy Transition," in *Climate and Energy Law and Policy in the EU and East Asia*, ed. Stefan E. Weishaar, Eunjung Kim, and Fitsum G. Tiche (Edward Elgar Publishing, 2023), 70–102.

2 Michael Meidan, Philip Andrews-Speed, and Ma Xin, "Shaping China's Energy Policy: Actors and Processes," *Journal of Contemporary China* 18, no. 61 (2009): 591–616.

3 "Outline of the 9th Five-Year Plan for National Economic and Social Development and Vision 2010 of the People's Republic of China" (中华人民共和国国民经济和社会发展'九五'计划和2010年远景目标纲要)," https://www.ndrc.gov.cn/fggz/fzzlgh/gjfzgh/200709/P020191029595686994247.pdf.

4 Xudong Zhao, *Chronicle of Energy Conservation in China* (中国节能大事记) (China Standard Press, 2022), preface, 2–3.

5 Hong Hu, Implementation, Evolution and Prospect of Energy Conservation Policy (节能政策的实施、演进和展望) (China Development Press, 2019), 21–22.

6 Guiyang Zhuang, "China's Energy Demand and Policy Measures under the Constraint of the Target of Reducing Energy Intensity by 20% During the 11th Five-Year Plan Period ('十一五'期间能源强度下降20%目标约束下我国的能源需求及政策措施)," *Economic Reference Research* 77 (2006): 5–15.

7 "Proposal of the CPC Central Committee on the Formulation of the 11th Five-Year Plan for National Economic and Social Development (中共中央关于制定国民经济和社会发展第十一个五年规划的建议)," September 19, 2005, https://www.gov.cn/govweb/ztzl/2005-10/19/content_79386.htm.

principle of accelerating the transformation of economic growth must be upheld in formulating the 11th Five-Year Plan, and that energy consumption per unit of GDP should be reduced by about 20 percent compared to the end of the 10th Five-Year Plan. This marked the beginning of the implementation of "dual control" of energy consumption in China.

1.3 Brief Overview of the Development of "Dual Control" of Energy Consumption in China

In March 2006, the Fourth Session of the Tenth National People's Congress approved the "Outline of the 11th Five-Year Plan for the Development of the National Economy and Society," which set the main energy consumption control target for the 11th Five-Year Plan period as "reducing consumption per unit of GDP by about 20 percent."[8] The plan emphasized that "the binding targets specified in this plan, which have legal effect, shall be incorporated into the comprehensive evaluation of economic and social development and performance appraisal of all regions and departments … The target of reducing consumption per unit of gross domestic product (GDP) shall … be decomposed and assigned among all provinces, autonomous regions and municipalities directly under the central government."[9]

In March 2011, the Fourth Session of the 11th National People's Congress adopted the "Outline of the 12th Five-Year Plan for National Economic and Social Development of the People's Republic of China," which introduced the binding intensity target of "reducing energy consumption per unit of GDP by 16 percent."[10] It also proposed in principle the goal of controlling the total amount of energy consumption in a reasonable manner.

In March 2016, the Fourth Session of the 12th National People's Congress adopted the "Outline of the 13th Five-Year Plan for National Economic and Social Development of the People's Republic of China," which proposed reducing energy consumption per unit of GDP by 15 percent and capping total energy consumption at 5 billion tons of standard coal.[11] Beginning with the 13th Five-Year Plan period, China fully implemented the "dual-control" system of energy consumption.

In March 2021, the Fourth Session of the 13th National People's Congress adopted the "Outline of the 14th Five-Year Plan for National Economic and Social Development and the Vision 2035 of the People's Republic of China," which proposed "reducing energy consumption per unit of GDP by 13.5 percent."[12] While the 14th Five-Year Plan does not explicitly include a target for controlling the total amount of energy consumption, it does state the intention to "improve the dual-control system for the total amount and intensity of energy consumption, and focus on controlling the consumption of fossil energy."[13]

8 "Outline of the 11th Five-Year Plan for National Economic and Social Development of the People's Republic of China (中华人民共和国国民经济和社会发展第十一个五年规划纲要)," March 13, 2006, https://www.gov.cn/gongbao/content/2006/content_268766.htm.

9 "Outline of the 11th Five-Year Plan."

10 "Outline of the 12th Five-Year Plan for National Economic and Social Development of the People's Republic of China (中华人民共和国国民经济和社会发展第十二个五年规划纲要)," March 16, 2011, https://www.gov.cn/zhuanti/2011-03/16/content_2623428.htm.

11 "Outline of the 13th Five-Year Plan for National Economic and Social Development of the People's Republic of China (中华人民共和国国民经济和社会发展第十三个五年规划纲要)," March 17, 2016, https://www.gov.cn/xinwen/2016-03/17/content_5054992.htm.

12 "Outline of the 14th Five-Year Plan and the Vision 2035 of the People's Republic of China (中华人民共和国国民经济和社会发展第十四个五年规划纲要)," March 13, 2021, https://www.gov.cn/xinwen/2021-03/13/content_5592681.htm.

13 "Outline of the 14th Five-Year Plan." In September, the National Development and Reform Commission (NDRC) issued the "Plan for Improving the Dual Control of Energy Consumption Intensity and Total Amount (完善能源消费强度和总量双控制度方案)," FGHZ No. 1310, 2021, https://www.gov.cn/zhengce/zhengceku/2021-09/17/content_5637960.htm. According to this document, "China continues to take the reduction of energy consumption intensity as a binding indicator in the five-year plan for national economic and social development, sets the total amount of energy consumption at a reasonable level, and decomposes and assigns the five-year goal of dual control of energy consumption to all provinces (autonomous regions and municipalities directly under the Central Government)." A senior official from NDRC explained later that this means taking the reduction of energy consumption intensity as a binding target for economic and social development, and the total energy consumption as a guiding target. See "Official from NDRC Meets the Press on the 'Plan for Improving the Dual Control of Energy Consumption Intensity and Total Amount,'" September 17, 2021, https://www.ndrc.gov.cn/xxgk/jd/jd/202109/t20210917_1296922_ext.html.

1.4 Central–Local Dynamics in the Implementation of Energy Consumption Policies

The adoption of China's dual-control system marked a pivotal shift in the country's energy governance — signaling a deliberate attempt to reconcile not only environmental imperatives but also growing concerns over energy security with the developmental demands of local economies. However, the formulation and evolution of this policy cannot be fully understood without examining the conditions that necessitated its creation and the central – local interplay that shaped China's response.

As noted above, there was an unexpected surge in industrial energy intensity between 2002 and 2005, largely driven by heavy investment from local governments in energy-intensive sectors such as steel and cement.[14] This growth was tied to local governments' incentives to promote extensive development through investment-led strategies, particularly in sectors perceived as economically strategic, offering local officials both economic gains and career advancement. Local governments often provided favorable conditions to businesses to stimulate growth, even when this undermined national environmental goals.[15] The central government, by contrast, prioritized strict energy intensity reduction due to domestic concerns such as environmental pollution and energy security, as well as international obligations.[16]

China's energy policy implementation mechanisms have shifted significantly over the past decades. During the 1980s and 1990s, energy-saving policies were enforced primarily by various national ministries. However, by 2000, many of these ministries had been dismantled as part of administrative restructuring carried out by the central government during China's transition toward a market-oriented economy. In the wake of this institutional shift, local governments assumed the primary role in implementing energy conservation measures, operating under the framework of the "target responsibility system."[17] A central feature of the dual-control system is the integration of energy consumption targets into this system. This institutional embedding transmits policy pressure downward through administrative hierarchies, aligning local implementation more closely with national policy objectives.

The dual-control approach is designed to address the problem that a sole focus on intensity reduction allows local governments to increase energy use if economic growth outpaces it, leading to rising overall consumption and carbon leakage, as developed provinces relocate energy-intensive industries to inland areas. Dual control counters local governments' economic incentives to prioritize GDP growth through energy-intensive sectors, which conflict with national goals. By integrating both targets into the target responsibility system, dual control increases accountability for local officials, aligning their incentives with national objectives.[18]

2. How Does the Dual Control of Energy Consumption Work?

The energy consumption "dual-control" system is implemented through three components: target allocation, assessment and evaluation, and accountability mechanisms.

14 Nan Zhou, Mark D. Levine, and Lynn Price, "Overview of Current Energy-Efficiency Policies in China," Energy Policy 38 (2010): 6439–6452.

15 Na Zhang, Jinqian Deng, Fayyza Ahmad, and Muhammad Umar Draz, "Local Government Competition and Regional Green Development in China: The Mediating Role of Environmental Regulation," *International Journal of Environmental Research and Public Health* 17 (2020): 1–22.

16 Kevin Lo, "Governing Energy Consumption in China: A Comprehensive Assessment of the Energy Conservation Target Responsibility System," *Energy Transitions* 4 (2020): 57–67.

17 Xiaofan Zhao, Huimin Li, Liang Wu, and Ye Qi, "Implementation of Energy-Saving Policies in China: How Local Governments Assisted Industrial Enterprises in Achieving Energy-Saving Targets," *Energy Policy* 66 (2014): 170–184.

18 Kevin Lo, "Governing Energy Consumption in China: A Comprehensive Assessment of the Energy Conservation Target Responsibility System," *Energy Transitions* 4 (2020): 57–67.

2.1 Decomposition of the "Dual-Control" Target for Energy Consumption

We take the 11th Five-Year Plan as an example to illustrate the allocation of energy consumption intensity control targets. In September 2006, the State Council approved the "Plan for Allocating the Targets for Reducing Energy Consumption per Unit of GDP in All Regions during the 11th Five-Year Plan Period," which distributed the energy intensity reduction targets among provinces, autonomous regions, and municipalities directly under the central government.[19] The principles guiding the regional allocation of the energy intensity reduction targets were as follows:

1. For regions that had already explicitly proposed to reduce energy consumption by more than 20 percent during the 11th Five-Year Plan period, their own targets were recognized.

2. For regions whose proposed targets were below 20 percent or who had not set any targets, their reduction targets were determined based on ensuring the fulfillment of the national energy consumption control objectives. This determination considered factors such as the level of economic development, industrial structure, energy consumption per unit of GDP, total energy consumption, per capita energy consumption, and the degree of energy self-sufficiency.

19 State Council, "Official Reply to the Plan for Allocating the Targets for Reducing Energy Consumption per Unit of GDP in All Regions during the 11th Five-Year Plan Period (关于十一五'期间各地区单生产总值能源消耗降低指标计划的批复)," GH No. 94, September 17, 2006, https://www.gov.cn/zhengce/zhengceku/2008-03/28/content_2834.htm.

Table 1: Targets for reducing energy consumption per unit of GDP in different regions during the 11th Five-Year Plan

Region	Baseline of 2005 (tons of standard coal/10,000 RMB)	Target for 2010 (tons of standard coal/10,000 RMB)	Decrease (percent)
National	1.22	0.98	20
Beijing	0.80	0.64	20
Tianjin	1.11	0.89	20
Hebei	1.96	1.57	20
Shanxi	2.95	2.21	25
Inner Mongolia	2.48	1.86	25
Liaoning	1.83	1.46	20
Jilin	1.65	1.16	30
Heilongjiang	1.46	1.17	20
Shanghai	0.88	0.70	20
Jiangsu	0.92	0.74	20
Zhejiang	0.90	0.72	20
Anhui	1.21	0.97	20
Fujian	0.94	0.79	16
Jiangxi	1.06	0.85	20
Shandong	1.28	1.00	22
Henan	1.38	1.10	20
Hubei	1.51	1.21	20
Hunan	1.40	1.12	20
Guangdong	0.79	0.66	16
Guangxi	1.22	1.04	15
Hainan	0.92	0.81	12
Chongqing	1.42	1.14	20
Sichuan	1.53	1.22	20
Guizhou	3.25	2.60	20
Yunnan	1.73	1.44	17
Xizang	1.45	1.28	12
Shaanxi	1.48	1.18	20
Gansu	2.26	1.81	20
Qinghai	3.07	2.55	17
Ningxia	4.14	3.31	20
Xinjiang	2.11	1.69	20

2.2 Assessment and Evaluation Mechanism for Dual Control of Energy Consumption

In November 2007, the State Council issued the "Notice on Approving the Implementation Plan and Methods for the Statistics, Monitoring, and Assessment of Energy Conservation and Emission Reduction."[20]

2.2.1 Statistical System of Energy Consumption Per Unit GDP

Energy consumption per unit of GDP is calculated by dividing total energy consumption by GDP. Therefore, the key to measuring energy consumption per unit of GDP lies in accurately accounting for total energy consumption, which involves energy production, circulation, and consumption.

In terms of energy production, the main tasks were to improve the statistical system for energy production by industrial enterprises above the designated size,[21] and to expand the statistical catalogs of small - and medium-sized energy products needed for energy accounting. At the same time, a statistical system for the production of coal, electricity, and other energy products by industrial enterprises below the designated size was to be established.

For energy circulation, the primary objective was to develop a statistical system to track interprovincial energy inflows and outflows. For energy consumption, the main content of the working plan was as follows: improving the existing statistical system for energy procurement, consumption, inventory, and processing among enterprises above the designated size; expanding the statistical catalogs to cover renewable energy, low-calorie fuels, industrial waste, and similar sources; and adding statistical indicators for waste heat recovery.

Furthermore, the plan aimed to establish a statistical system based on goals for energy consumption among enterprises below the designated size; to create a survey system for energy consumption in agriculture, forestry, animal husbandry, fishery, the construction industry, the tertiary sector, and the residential sector; to develop and improve the energy consumption statistics system for major buildings; and to establish and enhance statistical systems for energy efficiency and renewable energy.

2.2.2 Monitoring System of Energy Consumption Per Unit GDP

The main purpose of establishing the monitoring system was to supervise and assess the quality of energy consumption data reported by localities and key enterprises.

The monitoring system consists of two parts. The first part involves monitoring the progress of energy conservation and consumption reduction at the national level, in various regions, in major energy-consuming industries, and in key energy-consuming enterprises. It also includes monitoring resource recycling and the construction progress of key energy conservation projects. The second part focuses on monitoring the data quality of regional energy consumption per unit of GDP and its rate of reduction. This includes verifying whether the reported GDP figures are reasonable by using reverse indicators, such as total GDP and growth-related metrics, and assessing whether the growth rate of energy consumption is commensurate with the output growth rates of different industries and aligned with

20 State Council, "Notice on Approving the Implementation Plan and Methods for Statistics, Monitoring and Assessment of Energy Conservation and Emission Reduction (批准节能减排统计监测及考核实施方案和办法的通知)," November 17, 2007, https://www.gov.cn/gongbao/content/2008/content_848836.htm.

21 "Above designated size" is a term used in the Chinese statistical system. Enterprises "above the designated size" are surveyed comprehensively, while enterprises below the size are surveyed by sampling and estimation. "Designated size" is a changing standard. Prior to 2011, "above designated size" industrial enterprises were defined as those with main business income of 5 million yuan or more per year; since 2011, they have been defined as those with annual main business income of 20 million yuan or more.

22 State Council, "Notice on Approving the Implementation Plan and Methods for Statistics, Monitoring and Assessment of Energy Conservation and Emission Reduction (批准节能减排统计监测及考核实施方案和办法的通知)," November 17, 2007, https://www.gov.cn/gongbao/content/2008/content_848836.htm.

national targets.[22]

2.2.3 Assessment System of Energy Consumption Per Unit GDP

The subjects of the assessment are the provincial people's governments and approximately 1,000 key energy-consuming enterprises, with the assessment itself focusing on the fulfillment of energy conservation targets and the implementation of energy conservation measures. The energy conservation targets are based on those approved by the State Council, and the completion rates are calculated using regional energy consumption data verified by the National Bureau of Statistics and enterprise-level data confirmed by provincial authorities. This component carries a maximum score of 40 points. The indicator for energy conservation measures evaluates the extent to which each region and key enterprise has implemented required conservation actions, with a maximum score of 60 points. Together, the two components total 100 points.[23]

2.3 Target Accountability System for Dual Control of Energy Consumption

The State Council has stipulated a number of incentives and disincentives related to the achievement of "dual-control" targets, including:

- Upon approval by the State Council, the evaluation and assessment results of energy conservation targets in various regions are submitted to the relevant cadre management departments as an important basis for the comprehensive assessment of provincial leadership teams and leading cadres. The accountability system and the "one-vote veto" mechanism are applied.[24]
- Provincial people's governments that meet or exceed their targets are to be commended and rewarded. For those that fail to meet their targets, leading cadres are ineligible for annual rewards and honorary titles, and the State will suspend approval for new energy-consuming projects in the region.
- Provincial people's governments that fail to meet their targets must, within one month of the release of the assessment results, submit a written report to the State Council outlining rectification measures within a specified time frame. This report must also be copied to the National Development and Reform Commission (NDRC). If rectification is not carried out, the relevant supervisory departments shall hold responsible individuals accountable in accordance with applicable regulations.[25]

3. Major Improvements in the Dual Control of Energy Consumption

Since 2006, a series of reforms have been implemented to enhance the flexibility of the dual-control system and improve its compatibility with other policy objectives.

3.1 Special Treatment for Energy Consumption for Major Projects

There is an inherent tension between the dual control of energy consumption and short-term economic growth. In recent years, concerns have been raised in various regions—often through proposals by deputies to the National People's Congress—regarding the separate treatment of energy consumption targets for major projects.[26] In response, the NDRC introduced a special system for handling energy consumption quotas for major projects. Under this system, eligible major projects receive separate energy quotas that are excluded from the calculation of

23
State Council, ""Notice on Approving the Implementation Plan and Methods for Statistics, Monitoring and Assessment of Energy Conservation and Emission Reduction (批准节能减排统计监测及考核实施方案和办法的通知)," November 17, 2007, https://www.gov.cn/gongbao/content/2008/content_848836.htm.

24
The "one-vote veto" refers to a system in which government officials are deemed overall unqualified if they fail to complete any one item or specific task among a set of prescribed responsibilities.

25
State Council, "Notice on Approving the Implementation Plan and Methods for Statistics, Monitoring and Assessment of Energy Conservation and Emission Reduction (批准节能减排统计监测及考核实施方案和办法的通知)," November 17, 2007, https://www.gov.cn/gongbao/content/2008/content_848836.htm.

26
See, for example, "Reply of the NDRC to the Suggestion No. 6284 of the Fifth Session of the 13th National People's Congress (国家发展改革委员会对十三届全国人大五次会议第6284号建议的答复)," July 12, 2022, https://www.ndrc.gov.cn/xxgk/jianyitianfuwen/qgrddbjyfwgk/202301/t20230113_1346546.html; "Reply of the NDRC to the Suggestion No. 9042 of the Fourth Session of the 13th National People's Congress (国家发展改革委员会对十三届全国人大四次会议第9042号建议的答复)," August 31, 2021, https://www.ndrc.gov.cn/xxgk/jianyitianfuwen/qgrddbjyfwgk/202112/t20211216_1308021.html; "Reply of the NDRC to the Suggestion No. 2481 of the Fourth Session of the 13th National People's Congress (国家发展改革委员会对十三届全国人大四次会议第2481号建议的答复)," August 30, 2021, https://www.ndrc.gov.cn/xxgk/jianyitianfuwen/qgrddbjyfwgk/202112/t20211220_1308681.html; "Reply of the NDRC to the Suggestion No. 9432 of the Fourth Session of the 13th National People's Congress (国家发展改革委员会对第十三届全国人大四次会议第9432号建议的答复)," August 16, 2021, https://www.ndrc.gov.cn/xxgk/jianyitianfuwen/qgrddbjyfwgk/202112/t20211213_1307514.html; "Reply of the NDRC to the Suggestion No. 7340 of the Second Session of the 13th National People's Congress (国家发展改革委员会对十三届全国人大第二次会议7340号建议的答复)," July 18, 2019, https://www.ndrc.gov.cn/xxgk/jianyitianfuwen/qgrddbjyfwgk/202107/t20210708_1289547.html.

total energy consumption and energy intensity for the province in which the project is located. This reform addresses the contradiction between dual-control constraints and the siting of major projects, improves the dual-control framework, and increases the flexibility of total energy consumption management.

According to the "Implementation Plan for the Separated Treatment of Energy Consumption Quota for Major National Projects during the 14th Five-Year Plan," issued by the NDRC in September 2022, the following categories of projects qualify for separate treatment of energy consumption quotas:

- Major projects that help mitigate major risks and safeguard national security (including those ensuring energy supply security)
- Major industrial projects that advance industrial development and the modernization of the industrial chain
- New infrastructure projects that enhance the quality and pace of the digital economy and promote the digital transformation of the economy and society
- Major infrastructure projects that contribute to border consolidation, border security, and the development of key border areas
- New international air transportation projects
- Major projects that support the goal of halting the rise in carbon emissions and initiating a sustained decline, in line with national carbon peaking and neutrality targets[27]

3.2 Energy Used as Raw Materials Excluded from the Cap on Total Energy Consumption

In 2021, the Central Economic Work Conference of the Communist Party of China (CPC) proposed that energy used as raw materials should be excluded from the cap on total energy consumption.[28] Energy used as raw materials refers to energy not consumed as fuel, but instead used as feedstock in the production of nonenergy products, such as petroleum used to manufacture plastics or fertilizers. This reform was driven by two main factors.

First, in recent years, the share of energy used as raw materials has steadily increased, significantly affecting the accuracy of dual-control assessments. For a long time, this share remained between 1 and 2 percent, but over the past decade, it has grown to around 7 percent of total energy consumption, rendering traditional statistical methods inadequate. Second, the exclusion of energy used as raw materials aligns with internationally recognized practices. Energy statistics compiled by major countries, as well as by the United Nations Statistics Division, the International Energy Agency, and the Intergovernmental Panel on Climate Change, distinguish between "energy use" and "nonenergy use."[29]

In October 2022, the NDRC and the National Bureau of Statistics (NBS) issued the "Notice on Further Improving the Work of Excluding Energy Used as Raw Material Energy Use from the Control of Total Energy Consumption." The notice stipulates that energy used as raw materials will be excluded from total energy consumption when evaluating the energy conservation performance of provincial governments under the 14th Five-Year Plan. Based on this adjusted total, each region's reduction in energy consumption intensity is calculated. When calculating energy intensity, energy used as raw materials is subtracted from total energy consumption, while gross regional product remains unadjusted. Likewise, when calculating the rate of reduction in energy intensity, the energy used as raw materials

27 NDRC, "Implementation Plan for the Separated Treatment of Energy Consumption Quota for Major National Projects during the 14th Five-Year Plan ('十四五'国家重大项目能耗单列实施方案)," September 8, 2022, http://www.ferro-alloys.cn/News/Details/314144.

28 Xinhua News Agency, "The Central Economic Work Conference Was Held in Beijing, and Xi Jinping and Li Keqiang Delivered Important Speeches (中央经济工作会议在北京举行 习近平李克强作重要讲话)," December 10, 2021, https://www.gov.cn/xinwen/2021-12/10/content_5659796.htm.

29 Yang Gu, "Understanding 'Excluding Energy Used as Raw Materials' Correctly (莫误读'原料用能扣减'本意)," *Economic Daily News*, November 4, 2022, 5.

is excluded from both the base year and target year figures.[30]

3.3 Newly Added Renewable Energy Excluded from the Cap on Total Energy Consumption

In September 2021, the Central Economic Work Conference of the Communist Party of China proposed that energy used as raw materials should no longer be included in total energy consumption control; it also recommended that the addition of renewable energy be similarly excluded.[31] This imparts broader significance to the dual-control system as a mechanism for advancing the energy transition, allowing it to more accurately reflect the actual patterns of energy use, promote the development of renewable energy, and support efforts to achieve carbon neutrality on schedule.[32]

In August 2022, the NDRC, the National Bureau of Statistics (NBS), and the National Energy Administration jointly issued the "Notice on Further Improving the Relevant Work of Excluding Newly Added Renewable Energy from Total Energy Consumption Control," stipulating that newly added renewable energy will not be included in total energy consumption. Currently, newly added renewable energy includes wind, solar, hydropower, biomass, geothermal, and other renewable power sources. Using each region's 2020 renewable energy power consumption as a baseline, the annual increase in renewable energy consumption during the 14th Five-Year Plan period—compared with the previous year—will be deducted from both national and local total energy consumption assessments. Renewable Energy Green Power Certificates will serve as proof of renewable energy consumption.[33]

4. Relevant Systems Formed Around Dual Control

The dual-control system for energy consumption is a command-and-control policy tool, supported by a range of complementary systems developed to facilitate its implementation.

4.1 System of Energy Efficiency Standards

Energy-efficiency standards play a dual role: for existing projects, they accelerate the phase-out of outdated technologies, processes, and equipment by setting benchmarks that are technically sound and scientifically justified; for new projects, strict industry access standards guide enterprises toward adopting advanced technologies and processes to improve energy efficiency.

In 2023, the NDRC and the General Administration of Market Supervision reported that, as of March 2023, China had issued 108 national mandatory standards for energy consumption, 66 national mandatory energy efficiency standards, and 190 national voluntary energy efficiency standards. They also called for the comprehensive updating of all mandatory energy consumption standards across various sectors. Mandatory energy consumption standards for key industries are categorized into advanced values, access values, and limited values. Advanced values reflect the leading level of energy efficiency in the same industry, either domestically or internationally. In principle, they should correspond to the energy efficiency level of the top 5 percent of the industry. Access values are minimum threshold value that new and expanded projects must meet and, in principle, should

30 NDRC and National Bureau of Statistics, "Notice on Further Improving the Relevant Work of Excluding Energy Used as Raw Materials from Total Energy Consumption Control (关于进一步做好原料用能不纳入能源消费总量控制有关工作的通知)," FGHZ No. 803, November 1, 2022, https://www.ndrc.gov.cn/xwdt/tzgg/202211/t20221101_1340643.html

31 Xinhua News Agency, "The Central Economic Work Conference Was Held in Beijing, and Xi Jinping and Li Keqiang Delivered Important Speeches (中央经济工作会议在北京举行 习近平李克强作重要讲话)," December 10, 2021, https://www.gov.cn/xinwen/2021-12/10/content_5659796.htm.

32 NDRC, "Policy Interpretation of 'The Notice on Further Improving the Work Related to the Exclusion of the Newly-Added Renewable Energy from Total Energy Consumption Control' (政策解读——国家发展改革委、国家统计局、国家能源局联合印发《关于进一步做好新增可再生能源不纳入能源消费总量控制有关工作的通知》)," November 16, 2022, https://www.ndrc.gov.cn/xxgk/jd/jd/202211/t20221116_1341436.html.

33 NDRC, NBS, and National Energy Administration, "Notice on Further Improving the Work Related to the Exclusion of the Newly Added Renewable Energy from Total Energy Consumption (关于进一步做好新增可再生能源不纳入能源消费总量控制有关工作的通知)," FGYX No. 1258, August 15, 2022, https://www.ndrc.gov.cn/xxgk/zcfb/tz/202211/t20221116_1341323.html.

represent the energy efficiency level of the top 20 percent of the industry. Limited values are the minimum efficiency standards existing enterprises must achieve. These are designed to support the phased elimination of a portion of outdated, energy-intensive production capacity—around 20 percent—through energy-saving retrofits and upgrades.[34]

In November 2021, the NDRC and other relevant ministries jointly issued the "Energy Efficiency Benchmark Levels and Compliance Thresholds in Key Areas of Energy-Consuming Industries (2021 Edition)." This policy mandates that renovation, upgrading, and phase-out be implemented in batches within a specified time frame, based on defined energy-efficiency benchmarks and compliance thresholds. For projects requiring technological transformation, each region must set a time limit for renovation, upgrading, or phase-out—generally not exceeding three years—along with an annual plan for implementation. Projects must upgrade their energy efficiency to meet or exceed the compliance thresholds within the designated period, with efforts made to achieve the benchmark level. Projects that fail to complete the required transformation on schedule will be phased out.[35]

In 2023, the NDRC and other relevant ministries jointly issued the "Energy Efficiency Benchmark Levels and Compliance Thresholds in Key Areas of Energy-Consuming Industries (2023 Edition)." Compared with the 2021 edition, the updated version introduces three main changes. First, it expands energy efficiency constraints to eleven additional sectors. Second, it incorporates dynamic adjustments, raising benchmark and threshold values in many sectors. Third, it introduces differentiated requirements for project transformation standards and timelines based on energy efficiency levels, in order to ensure supply chain stability and the smooth functioning of the national economy.[36]

4.2 Energy Conservation Review of Fixed Asset Investment Projects

In China, fixed asset investment projects are subject to approval or filing by the relevant government authorities.[37] The energy conservation review of such projects incorporates considerations of energy consumption, energy efficiency levels, and energy conservation measures as part of the approval and filing process. Before submitting a feasibility study report for a government investment project, a construction unit must obtain an energy conservation review opinion issued by the energy conservation review authority. For enterprise investment projects, the construction unit must obtain this review opinion from the relevant authority before starting construction. Projects that have not undergone an energy conservation review, or that have failed to pass it, may not be initiated by the construction unit; projects already completed may not be put into production or use.[38]

4.3 Energy Performance Contracting (EPC)

With the support of Global Environment Facility (GEF) grants and World Bank loans and technologies, China began demonstrating and promoting the "energy performance contracting" (EPC) model in Beijing, Liaoning, and Shandong in 1998.[39] The total output value of the energy conservation service industry increased from 1.767 billion RMB at the end of 2003 to 356.742 billion RMB by the end of 2016, with an average annual growth rate of 54.67 percent.[40]

Two main policy drivers have fueled the rapid development of EPC in China. The

34 NDRC and General Administration of Market Supervision, "Notice on Further Strengthening the Upgrading and Application of Energy Conservation Standards (关于进一步加强节能标准更新升级和应用实施的通知)," FGHZG No. 269, March 8, 2023, https://www.ndrc.gov.cn/xxgk/zcfb/ghxwj/202303/t20230317_1351321.html.

35 NDRC, Ministry of Industry and Information Technology, Ministry of Ecological Environment, State Administration of Market Supervision, and National Energy Administration, "Notice on Issuing 'Energy Efficiency Benchmark Levels and Compliance Thresholds in Key Areas of Energy-Consuming Industries (关于发布〈高耗能行业重点领域能效标杆水平和基准水平（2021年版）〉的通知)," FGCY No. 1609, November 15, 2021, https://www.ndrc.gov.cn/xwdt/ztzl/ghnhyjnjdgzsj/zcwj/202201/t20220110_1311632.html.

36 NDRC, Ministry of Industry and Information Technology, Ministry of Ecological Environment, State Administration of Market Supervision, and National Energy Administration, "Notice on Issuing 'Energy Efficiency Benchmark Levels and Compliance Thresholds in Key Areas of Energy-Consuming Industries (2023 Edition) (关于发布〈工业重点领域能效标杆水平和基准水平(2023年版)〉的通知)," FGCY No. 723, June 6, 2023, https://www.gov.cn/zhengce/zhengceku/202307/content_6890009.htm.

37 State Council, "Regulations on the Administration of Approval and Filing of Enterprise Investment Projects (企业投资项目核准和备案管理条例)," Decree No. 673 of the State Council, December 14, 2016, https://www.gov.cn/zhengce/202203/content_3338182.htm.

38 NDRC, "Measures for Energy Conservation Review of Fixed Assets Investment Projects (固定资产投资项目节能审查办法)," Decree No. 2 of NDRC, March 28, 2023, https://www.gov.cn/zhengce/2023-04/06/content_5750368.htm.

39 Research Team of Foreign Investment Department, NDRC, "Current Status and Suggestions of Energy Performance Contract in China (中国合同能源管理产业发展现状和建议)," *China Science and Technology Investment* 8 (2009): 56–58.

40 Yande Dai, Xiaoliang Sun, and Juemin Wang, "China Energy Conservation Service Industry: Starting from Scratch (中国节能服务产业：从无到有、从弱到强)," *Energy of China* 5 (2017): 34–37.

first is the introduction of various incentive policies based on financial subsidies. The second is that energy conservation targets set in the Five-Year Plans have created strong demand for EPC projects, particularly under the pressure of the dual-control system for energy consumption. In addition, EPC is frequently used as a tool for achieving emission reduction goals outlined in the Five-Year Plans, which in turn has further promoted the adoption of EPC.[41]

4.4 Energy Consumption Rights Trading

When both the intensity and total amount of energy consumption are constrained, the energy consumption right—or the right to use energy—becomes scarce, creating the possibility for trading. In 2016, the NDRC issued the "Pilot Program of Compensated Use and Trading System for Energy Consumption Right," which launched pilot projects for compensated use and trading of energy consumption rights in Zhejiang, Fujian, Henan, and Sichuan. Pilot areas were required to set city-level energy consumption control targets based on national targets, considering factors such as local economic and social development, industrial structure and layout, energy conservation potential, and resource endowment. Initial allocations of energy consumption rights had to remain within the "ceiling" of the region's total energy consumption control target. For key energy-consuming entities, rights within their quotas were allocated mostly free of charge, while energy use beyond the quota had to be paid for. The trading participants were generally energy-consuming units within the pilot areas, and these entities could buy and sell energy consumption rights on the market. Unused or unsold rights could not be carried over to the next year.[42] However, in view of the development of the national carbon market, China has recently decided to gradually phase out the energy consumption rights market to avoid imposing overlapping compliance obligations on enterprises.[43]

5. Conclusions

5.1 Remarkable Results of the Dual-Control System of Energy Consumption

Under the dual-control policy on energy consumption, China has maintained rapid economic growth over the past decade while effectively controlling both the total volume and intensity of energy consumption. Energy utilization efficiency has continued to improve. In 2020, energy consumption per 10,000 RMB of GDP stood at 0.571 tons of standard coal, representing a 42 percent reduction compared to 2005.[44] The structure of energy consumption has also been steadily optimized. Coal accounted for 56 percent of total energy consumption in 2020—a decrease of 15.5 percentage points from 2005. Meanwhile, the share of nonfossil fuels in total energy consumption rose to 15.9 percent, an increase of 6.5 percentage points from 2012.[45] Significant achievements have also been made in energy conservation across key sectors. According to data from the Ministry of Industry and Information Technology, by 2022 the comprehensive energy consumption of products in key industries (such as steel, cement clinker, and flat glass) had declined by more than 9 percent compared to a decade earlier.[46]

When evaluating China's energy efficiency improvements, the International Energy Agency noted that "China's progress in implementing mandatory energy efficiency policies over the past decade has made it the world's energy efficiency

41 Yuanrong Zhou, Meredydd Evans, Sha Yu, Xiaolian Sun, and Juemin Wang, "Linkage Between Policy and Business Innovation in the Development of China's Energy Performance Contracting Market," *Energy Policy* 140 (2020): 1–34.

42 NDRC, "Letter on Carrying Out Pilot Program of Compensated Use and Trading System for Energy Consumption Right (关于开展用能源有偿使用和交易试点工作的函)," FGHZ No. 1659, July 28, 2016, https://www.ndrc.gov.cn/xxgk/zcfb/tz/201609/t20160921_963200.html.

43 General Office of the CPC Central Committee and General Office of the State Council, "Opinions on Improving the Market-Based Allocation System for Resources and Environmental Factors (关于健全资源环境要素市场化配置体系的意见)," May 14, 2025, https://www.gov.cn/zhengce/202505/content_7025725.htm.

44 "'Dual Control' of Energy Consumption: An In-Depth Analysis (深度解读能耗'双控')," September 30, 2021, https://cj.sina.com.cn/articles/view/5115326071/130e5ae7702001h886.

45 China Economic Information Network, *CEInet Statistics Database*, December 31, 2021, https://ceidata.cei.cn/db/.

46 Ministry of Industry and Information Technology, "MIIT Held a Series of Press Conferences (the Fourth) on 'Development of Industry and Information Industry in the New Era' (工信部举办'新时代工业和信息化发展'系列发布会(第四场))," July 3, 2023, http://www.scio.gov.cn/xwfb/bwxwfb/gbwfbh/gyhxxhb/202307/t20230703_720573_m.html.

heavyweight."[47] Some studies, however, have pointed out that command-and-control policies can lead to a loss of allocative efficiency. Relying heavily on such policies for energy conservation is neither efficient nor sustainable in the long term. It is therefore necessary to implement market-oriented policies and measures that incentivize and encourage industrial enterprises to conserve energy by improving efficiency and adopting more energy-saving technologies.[48]

5.2 Key Challenges to Dual Control of Energy Consumption

5.2.1 Difficulty in Allocating Targets Locally in Line with National Objectives

Governments at all levels consider various factors—such as development level, resource endowment, strategic positioning, industrial structure, and regional energy consumption—when allocating the energy consumption "dual-control" targets, and often adopt a differentiated and classified assessment approach across regions. Nevertheless, China's vast territory and significant regional disparities mean that the allocation of targets inevitably faces a degree of the "one-size-fits-all" problem, making it difficult to fully adapt to local conditions.[49]

5.2.2 Mismatch Between Administrative Cycle and Market Cycle

Under the current target assessment method, the central government sets five-year goals for each province based on the national plan. Each province, in turn, sets annual targets for its subordinate cities, and lower-level governments—such as districts and counties—may even establish quarterly or monthly assessment goals, transmitting this pressure down to key enterprises within their jurisdictions. However, enterprise production must follow the internal logic of the market: when market conditions are favorable, full-capacity production is required; when conditions deteriorate, production may be reduced or even stopped. In the short term, key indicators such as total energy consumption and energy intensity often fluctuate significantly, making it difficult to achieve the steady downward trend mandated by administrative directives. Although some flexible assessment methods have been introduced, a fundamental tension remains between the planned nature of administrative targets and the market-driven operations of enterprises.[50]

5.2.3 Insufficient Precision in Means of Implementation

The dual-control work on energy consumption should primarily focus on two aspects: addressing the illegal use of energy and low efficiency in existing projects, and ensuring the assessment of energy consumption for new projects in a reasonable and effective manner. However, at present, energy conservation supervision and energy audits of existing projects remain relatively superficial and are not conducted in sufficient depth. Similarly, the evaluation and analysis of newly added projects lack sufficient detail. The forecasting, early warning, and assessment mechanisms for energy consumption are also not rigorous enough, resulting in overly crude implementation methods.[51]

47 International Energy Agency, "E4 Country Profile: Energy Efficiency in China," February 12, 2021, https://www.iea.org/articles/e4-country-profile-energy-efficiency-in-china.

48 Shuai Shao, Zhenbing Yang, Lili Yang, and Shuang Ma, "Can China's Energy Intensity Constraint Policy Promote Total Factor Energy Efficiency? Evidence from the Industrial Sector," *The Energy Journal* 40, no. 4 (2019): 101–127.

49 Xiaowei Xuan, "From 'the Amount and Intensity Control of Energy Consumption' to 'the Amount and Intensity Control of Carbon Emission': Challenges and Strategy ('能耗双控'到'碳双控': 挑战与对策)," *Urban and Environmental Studies 3* (2022): 42–55.

50 Xiaowei Xuan, "From 'the Amount and Intensity Control of Energy Consumption' to 'the Amount and Intensity Control of Carbon Emission': Challenges and Strategy ('能耗双控'到'碳双控': 挑战与对策)," *Urban and Environmental Studies* 3 (2022): 42–55.

51 Yang Zhao, "Research on the Implementation Policy of Dual Control of Energy Consumption in Baotou City (包头市能耗双控执行政策问题研究)" (master's thesis, Inner Mongolia University, 2022), 23–24.

5.2.4 Insufficient Internal Drivers for Enterprises to Reduce Emissions

After entering a new normal in the Chinese economy, the macroeconomic situation has led to a decrease in corporate profit margins and a weak willingness to invest in energy conservation. At the same time, the governments' financial support policies for energy conservation have significantly decreased, and the market-oriented investment and financing mechanisms for energy conservation are not yet sound, further weakening the enthusiasm of enterprises to invest in energy conservation.[52]

5.3 From Dual Control of Energy Consumption to Dual Control of Carbon Emissions

In order to overcome the limitations of the dual control of energy consumption and promote green, high-quality development, China has recently proposed a transition from dual control of energy consumption to dual control of carbon emissions.

5.3.1 The Decision-Making Process and Rationale for the Shift from Dual Control of Energy Consumption to Dual Control of Carbon Emissions

In 2020, China set the goal of striving to "have carbon emissions peak before 2030 and achieve carbon neutrality before 2060."[53] In March 2021, the Fourth Session of the 13th National People's Congress adopted the "Outline of the 14th Five-Year Plan for National Economic and Social Development and Vision 2035," which called for "implementing a system with carbon intensity control as the main focus and total carbon emission control as a supplement, and for supporting local areas, key industries, and key enterprises with necessary measures to take the lead in peaking carbon emissions."[54] In December 2021, the Central Economic Work Conference proposed to "create conditions to transform from dual control of energy consumption to dual control of the total amount and intensity of carbon emissions as early as possible."[55] In October 2022, the report of the 20th National Congress of the CPC emphasized that "we should improve the control of total energy consumption and intensity, focus on controlling fossil energy consumption, and gradually shift to the dual-control system of the total amount and intensity of carbon emissions."[56] In July 2023, the second meeting of the Central Commission for Comprehensively Deepening Reform approved the "Opinions on Promoting the Gradual Shift from Dual Control of Energy Consumption to Dual Control of Carbon Emissions."[57] And in July 2024, the State Council issued the "Work Plan for Accelerating the Construction of a Carbon Emission Dual-Control System," which proposes incorporating carbon emission indicators into planning, allocating dual-control targets , establishing a comprehensive assessment and evaluation system for achieving peak carbon emissions and carbon neutrality, promoting carbon budget management systems at the provincial and municipal levels, improving carbon accounting mechanisms in key industries and sectors, and accelerating the development of a carbon footprint management system, among other measures.[58]

The shift from dual control of energy consumption to dual control of carbon emissions marks a strategic transition. This shift is driven by two main factors. First, the dual control of energy consumption has limited effectiveness in reducing

52 Ran Liu, Xuming Wang, Gao Yue, Weiping Yu, and Hao Jiang, "Study on the Mechanism of 'Dual Control' of Total Energy Consumption and Intensity in the 13th Five-Year Plan ('十三五'能源消耗总量和强度'双控'机制研究)," *Energy and Environment 6* (2017): 2–7.

53 Xi Jinping, "Statement by H. E. Jinping Xi, President of the People's Republic of China, at the General Debate of the 75th Session of the United Nations General Assembly," September 22, 2020, https://www.fmprc.gov.cn/eng/topics_665678/2020zt/kjgzbdfyyq/202009/t20200922_701134.html.

54 Outline of the 14th Five-Year Plan and the Vision 2035 of the People's Republic of China (中华人民共和国国民经济和社会发展第十四个五年规划纲要)," March 13, 2021, https://www.gov.cn/xinwen/2021-03/13/content_5592681.htm.

55 Xinhua News Agency, "The Central Economic Work Conference Was Held in Beijing, and Xi Jinping and Li Keqiang Delivered Important Speeches (中央经济工作会议在北京举行 习近平李克强作重要讲话)," December 10, 2021, https://www.gov.cn/xinwen/2021-12/10/content_5659796.htm.

56 Xi Jinping, "Holding High the Great Banner of Socialism with Chinese Characteristics and Strive in Unity to Build a Modern Socialist Country in All Respects: Report to the 20th National Congress of the Communist Party of China (高举中国特色社会主义伟大旗帜 为全面建设社会主义现代化国家而团结奋斗——在中国共产党第二十次全国代表大会上的报告)," October 16, 2022, https://www.gov.cn/xinwen/2022-10/25/content_5721685.htm.

57 Xinhua News Agency, "Xi Jinping Chairs the Second Meeting of the Central Commission for Comprehensively Deepening Reform, Emphasizing the Importance of Building a Higher-Level Open Economy System and Promoting the Gradual Shift from Dual Control of Energy Consumption to Dual Control of Carbon Emissions (习近平主持召开重要全面深化改革委员会第二次会议强调：建设更高水平开放型经济新体制 推动能耗双控逐步转向碳排放双控)," July 11, 2023, https://www.gov.cn/yaowen/liebiao/202307/content_6891167.htm.

58 State Council, "Work Plan for Accelerating the Construction of a Carbon Emission Dual Control System (加快构建碳排放双控制度体系工作方案)," GBF No. 39, July 30, 2024, https://www.gov.cn/zhengce/content/202408/content_6966079.htm.

carbon emissions from nonenergy sectors. Currently, carbon emissions from energy-related activities in China account for 88 percent of total emissions and represent the primary source. However, carbon emissions also arise from industrial processes, land use, waste, and other sources — collectively accounting for the remaining 12 percent. The dual-control system focused solely on energy consumption has little impact on emissions from these nonenergy sectors. Establishing total carbon emissions and carbon intensity as binding targets is therefore essential to achieving the "30/60" goals. Second, the dual control of carbon emissions is conducive to promoting the innovative development of green technologies.[59]

5.3.2 Timetable for Shifting from "Dual Control" of Energy Consumption to "Dual Control" of Carbon Emissions

The "Opinions on Promoting the Gradual Shift from Dual Control of Energy Consumption to Dual Control of Carbon Emissions," adopted at the second meeting of the Central Commission for Comprehensively Deepening Reform, have not yet been officially released. However, implementation plans issued by a county-level government generally reflect its main contents. During the 14th Five-Year Plan period, efforts will focus on consolidating the foundations for statistics and accounting, standardization and measurement, and regulation and management, in order to create the necessary conditions for establishing a dual-control system for carbon emissions. During the 15th Five-Year Plan period, this "dual-control" system will be implemented nationwide. Policy tools for energy conservation will be expanded, and related statistical, evaluation, and assessment systems will be improved.[60]

5.4 Inspirations from China

China's dual-control system of energy consumption is a mechanism that rapidly translates ambitious energy conservation targets into practical actions and measurable policy outcomes through administrative directives. Initially motivated by the need to reverse the rapid rise in energy intensity, the system quickly evolved to encompass broader goals of promoting the energy transition and combating climate change. The strength of the dual-control system lies in its ability to mobilize swift, nationwide action through target-based accountability. However, its weakness lies in the efficiency losses associated with uniform, top-down implementation. In response to these challenges, the system has undergone a series of important reforms and refinements aimed at increasing its flexibility.

This evolutionary process has revealed several inherent tensions, including

- the relationship between development and emission reduction, i.e., how to promote a comprehensive green and low-carbon transition while meeting economic development needs and ensuring energy security.
- the relationship between the whole and the parts, i.e., how to allocate national energy conservation and emission reduction targets among regions, adopt differentiated approaches based on local conditions, and preserve flexibility in total energy management.
- the relationship between incentives and constraints, i.e., while strong constraints help establish institutional discipline, excessive emphasis on enforcement may weaken the intrinsic motivation of actors to adopt energy conservation and emission reduction measures. A more effective policy mix must strike a balance between these dynamics.

59 Dian Xie, Yajing Gao, Xinbo Lu, Tianyang Liu, Liang Zhao, and Yong Zhao, "Research on the Implementation Path of the Transformation from 'Dual Control' of Energy Consumption to 'Dual Control' of Carbon Emissions (能耗'双控'向碳排放'双控'转变的实施路径研究)," *Integrated Intelligent Energy* 7 (2022): 73–80.

60 Development and Reform Bureau of the People's Government of Gulang County, Wuwei City, Gansu Province, "Interpretation of the 'Opinions Promoting the Gradual Shift from Dual Control of Energy Consumption to Dual Control of Carbon Emissions' and the Implementation Plan of Gulang County (《关于推动能耗双控逐步转向碳排放双控的意见》解读及我县贯彻落实意见)," December 14, 2023, https://www.gulang.gov.cn/art/2023/12/14/art_10442_1192524.html.

Successfully navigating these tensions is critical to the continued effectiveness and legitimacy of the dual-control system. As China shifts from energy-saving imperatives to broader climate commitments, the system's core strength remains its ability to rapidly translate national targets into administrative action. However, its ongoing effectiveness will depend on how well it adapts to the complexities of a transition to a low-carbon economy. Addressing these tensions is essential to ensure that the dual-control framework not only curbs fossil energy use but also accelerates structural decarbonization across sectors. In this context, the system's continued evolution will be pivotal in aligning China's development model with its carbon neutrality goals.

References

China Economic Information Network. *CEInet Statistics Database*. December 31, 2021. https://ceidata.cei.cn/db/.

Dai, Yande, Xiaoliang Sun, and Juemin Wang. "China Energy Conservation Service Industry: Starting from Scratch (中国节能服务产业：从无到有、从弱到强)." *Energy of China* 5 (2017): 34–37.

Development and Reform Bureau of the People's Government of Gulang County, Wuwei City, Gansu Province. "Interpretation of the 'Opinions Promoting the Gradual Shift from Dual Control of Energy Consumption to Dual Control of Carbon Emissions' and the Implementation Plan of Gulang County (《关于推动能耗双控逐步转向碳排放双控的意见》解读及我县贯彻落实意见)." Accessed December 14, 2023. https://www.gulang.gov.cn/art/2023/12/14/art_10442_1192524.html. 2023.

"'Dual Control' of Energy Consumption: An In-Depth Analysis (深度解读能耗'双控')," September 30, 2021, https://cj.sina.com.cn/articles/view/5115326071/130e5ae7702001h886.

General Office of the CPC Central Committee and General Office of the State Council. "Opinions on Improving the Market-Based Allocation System for Resources and Environmental Factors (关于健全资源环境要素市场化配置体系的意见)." Accessed May 14, 2025. https://www.gov.cn/zhengce/202505/content_7025725.htm. 2025.

Gu, Yang. "Understanding 'Excluding Energy Used as Raw Materials' Correctly (莫误读'原料用能扣减'本意)." *Economic Daily News*, November 4, 2022, 5.

Hu, Hong. Implementation, Evolution and Prospect of Energy Conservation Policy (节能政策的实施、演进和展望). China Development Press, 2019.

International Energy Agency. "E4 Country Profile: Energy Efficiency in China." February 12, 2021. https://www.iea.org/articles/e4-country-profile-energy-efficiency-in-china.

International Renewable Energy Agency. "China's Route to Carbon Neutrality: Perspectives and the Role of Renewables." July 2022. https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2022/Jul/IRENA_China_Carbon_Neutral_2022.pdf?rev=8ab20715805140dcb8ff28f1c064b94d.

Lo, Kevin. "Governing Energy Consumption in China: A Comprehensive Assessment of the Energy Conservation Target Responsibility System." *Energy Transitions* 4 (2020): 57–67.

Liu, Ran, Xuming Wang, Gao Yue, Weiping Yu, and Hao Jiang. "Study on the Mechanism of 'Dual Control' of Total Energy Consumption and Intensity in the

13th Five Year Plan (“十一五” 能源消耗总量和强度”双控”机制研究).” *Energy and Environment* 6 (2017): 2–7.

Meidan, Michael, Philip Andrews-Speed, and Ma Xin. “Shaping China’s Energy Policy: Actors and Processes.” *Journal of Contemporary China* 18, no. 61 (2009): 591–616.

NDRC. “Letter on Carry Out Pilot Program of Compensated Use and Trading System for Energy Consumption Right (关于开展用能源有偿使用和交易试点工作的函).” FGHZ No. 1659. July 28, 2016. https://www.ndrc.gov.cn/xxgk/zcfb/tz/201609/t20160921_963200.html.

NDRC. “Implementation Plan for the Separated Treatment of Energy Consumption Quota for Major National Projects during the 14th Five-Year Plan (“十四五”国家重大项目能耗单列实施方案).” September 8, 2022. http://www.ferro-alloys.cn/News/Details/314144.

NDRC. “Measures for Energy Conservation Review of Fixed Assets Investment Projects (固定资产投资项目节能审查办法).” Decree No. 2 of NDRC. March 28, 2023. https://www.gov.cn/zhengce/2023-04/06/content_5750368.htm.

NDRC. “Official from NDRC Meets the Press on the ‘Plan for Improving the Dual Control of Energy Consumption Intensity and Total Amount.’” September 17, 2021, https://www.ndrc.gov.cn/xxgk/jd/jd/202109/t20210917_1296922_ext.html.

NDRC. “Plan for Improving the Dual Control of Energy Consumption Intensity and Total Amount (完善能源消费强度和总量双控制度方案),” FGHZ No. 1310, 2021, https://www.gov.cn/zhengce/zhengceku/2021-09/17/content_5637960.htm.

NDRC. “Policy Interpretation of ‘The Notice on Further Improving the Work Related to the Exclusion of the Newly Added Renewable Energy from Total Energy Consumption Control’ (政策解读——国家发展改革委、国家统计局、国家能源局联合印发《关于进一步做好新增可再生能源不纳入能源消费总量控制有关工作的通知》).” November 16, 2022. https://www.ndrc.gov.cn/xxgk/jd/jd/202211/t20221116_1341436.html.

NDRC. “Reply of the NDRC to the Suggestion No. 7340 of the Second Session of the 13th National People’s Congress (国家发展改革委员会对十三届全国人大第二次会议7340号建议的答复).” July 18, 2019. https://www.ndrc.gov.cn/xxgk/jianyitianfuwen/qgrddbjyfwgk/202107/t20210708_1289547.html.

NDRC. “Reply of the NDRC to the Suggestion No. 9432 of the Fourth Session of the 13th National People’s Congress (国家发展改革委员会对第十三届全国人大四次会议第9432号建议的答复).” August 16, 2021. https://www.ndrc.gov.cn/xxgk/jianyitianfuwen/qgrddbjyfwgk/202112/t20211213_1307514.html.

NDRC. “Reply of the NDRC to the Suggestion No. 2481 of the Fourth Session of the 13th National People’s Congress (国家发展改革委员会对十三届全国人大四次会议第2481号建议的答复).” August 30, 2021. https://www.ndrc.gov.cn/xxgk/jianyitianfuwen/qgrddbjyfwgk/202112/t20211220_1308681.html.

NDRC. “Reply of the NDRC to the Suggestion No. 9042 of the Fourth Session of the 13th National People’s Congress (国家发展改革委员会对十三届全国人大四次会议第9042号建议的答复).” August 31, 2021. https://www.ndrc.gov.cn/xxgk/jianyitianfuwen/qgrddbjyfwgk/202112/t20211216_1308021.html.

NDRC. “Reply of the NDRC to the Suggestion No. 6284 of the Fifth Session of the 13th National People’s Congress (国家发展改革委员会对十三届全国人大五次会议第6284号建议的答复).” July 12, 2022. https://www.ndrc.gov.cn/xxgk/

jianyitianfuwen/qgrddbjyfwgk/202301/t20230113_1346546.html.

NDRC. "Implementation Plan for the Separated Treatment of Energy Consumption Quota for Major National Projects during the 14th Five-Year Plan ('十四五'国家重大项目能耗单列实施方案)." September 8, 2022. http://www.ferro-alloys.cn/News/Details/314144.

NDRC and General Administration of Market Supervision. "Notice on Further Strengthening the Upgrading and Application of Energy Conservation Standards (关于进一步加强节能标准更新升级和应用实施的通知)." FGHZG No. 269. March 8, 2023. https://www.ndrc.gov.cn/xxgk/zcfb/ghxwj/202303/t20230317_1351321.html.

NDRC and National Bureau of Statistics. "Notice on Further Improving the Relevant Work of Excluding Energy Used as Raw Materials from Total Energy Consumption Control (关于进一步做好原料用能不纳入能源消费总量控制有关工作的通知)." FGHZ No. 803. November 1, 2022. https://www.ndrc.gov.cn/xwdt/tzgg/202211/t20221101_1340643.html.

NDRC, Ministry of Industry and Information Technology, Ministry of Ecological Environment, State Administration of Market Supervision, and National Energy Administration. "Notice on Issuing 'Energy Efficiency Benchmark Levels and Basic Levels in Key Areas of Energy-Consuming Industries (2021 Edition)' (关于发布《高耗能行业重点领域能效标杆水平和基准水平（2021年版）》的通知)." FGCY No. 1609. November 15, 2021. https://www.ndrc.gov.cn/xwdt/ztzl/ghnhyjnjdgzsj/zcwj/202201/t20220110_1311632.html.

NDRC, Ministry of Industry and Information Technology, Ministry of Ecological Environment, State Administration of Market Supervision, and National Energy Administration. "Notice on Issuing 'Energy Efficiency Benchmark Levels and Basic Levels in Key Areas of Energy-Consuming Industries (2023 Edition)' (关于发布《工业重点领域能效标杆水平和基准水平(2023年版)》的通知)." FGCY No. 723. June 6, 2023. https://www.gov.cn/zhengce/zhengceku/202307/content_6890009.htm.

NDRC, NBS, and National Energy Administration. "Notice on Further Improving the Work Related to the Exclusion of the Newly Added Renewable Energy from Total Energy Consumption (关于进一步做好新增可再生能源不纳入能源消费总量控制有关工作的通知)." FGYX No. 1258. August 15, 2022. https://www.ndrc.gov.cn/xxgk/zcfb/tz/202211/t20221116_1341323.html.

"Outline of the 9th Five-Year Plan for National Economic and Social Development and Vision 2010 of the People's Republic of China." https://www.ndrc.gov.cn/fggz/fzzlgh/gjfzgh/200709/P020191029595686994247.pdf.

"Outline of the 11th Five-Year Plan for National Economic and Social Development of the People's Republic of China." March 13, 2006. https://www.gov.cn/gongbao/content/2006/content_268766.htm.

"Outline of the 12th Five-Year Plan for National Economic and Social Development of the People's Republic of China." March 16, 2011. https://www.gov.cn/zhuanti/2011-03/16/content_2623428.htm.

"Outline of the 13th Five-Year Plan for National Economic and Social Development of the People's Republic of China." March 17, 2016. https://www.gov.cn/xinwen/2016-03/17/content_5054992.htm.

"Outline of the 14th Five-Year Plan for National Economic and Social Development and Vision 2035 for the People's Republic of China." March 13, 2021. https://

www.gov.cn/xinwen/2021-03/13/content_5592681.htm.

"Proposal of the CPC Central Committee on the Formulation of the 11th Five-Year Plan for National Economic and Social Development (中共中央关于制定国民经济和社会发展第十一个五年规划的建议)," September 19, 2005, https://www.gov.cn/govweb/ztzl/2005-10/19/content_79386.htm.

Research Team of Foreign Investment Department, NDRC. "Current Status and Suggestions of Energy Performance Contract in China (中国合同能源管理产业发展现状和建议)." *China Science and Technology Investment* 8 (2009): 56–58.

Shao, Shuai, Zhenbing Yang, Lili Yang, and Shuang Ma. "Can China's Energy Intensity Constraint Policy Promote Total Factor Energy Efficiency? Evidence from the Industrial Sector." *The Energy Journal* 40, no. 4 (2019): 101–127.

State Council. "Notice on Approving the Implementation Plan and Methods for Statistics, Monitoring and Assessment of Energy Conservation and Emission Reduction (批准节能减排统计监测及考核实施方案和办法的通知)." November 17, 2007.

State Council. "Official Reply to the Plan for Allocating the Targets for Reducing Energy Consumption per Unit of GDP in All Regions during the 11th Five-Year Plan Period (关于'十一五'期间各地区单位生产总值能源消耗降低指标计划的批复)." GH No. 94. September 17, 2006, https://www.gov.cn/zhengce/zhengceku/2008-03/28/content_2834.htm.

State Council. "Regulations on the Administration of Approval and Filing of Enterprise Investment Projects (企业投资项目核准和备案管理条例)." Decree No. 673 of the State Council. December 14, 2016. https://www.gov.cn/zhengce/202203/content_3338182.htm.

State Council. "Work Plan for Accelerating the Construction of a Carbon Emission Dual-Control System (加快构建碳排放双控制度体系工作方案)." GBF No. 39. July 30, 2024. https://www.gov.cn/zhengce/content/202408/content_6966079.htm.

Xi, Jinping. *"Holding High the Great Banner of Socialism with Chinese Characteristics and Strive in Unity to Build a Modern Socialist Country in All Respects — Report to the 20th National Congress of the Communist Party of China* (高举中国特色社会主义伟大旗帜 为全面建设社会主义现代化国家而团结奋斗——在中国共产党第二十次全国代表大会上的报告)." October 16, 2022. https://www.gov.cn/xinwen/2022-10/25/content_5721685.htm.

Xi, Jinping. "Statement by H. E. Jinping Xi, President of the People's Republic of China, at the General Debate of the 75th Session of the United Nations General Assembly," September 22, 2020, https://www.fmprc.gov.cn/eng/topics_665678/2020zt/kjgzbdfyyq/202009/t20200922_701134.html.

Xie, Dian, Yajing Gao, Xinbo Lu, Tianyang Liu, Liang Zhao, and Yong Zhao. "Research on the Implementation Path of the Transformation from 'Dual Control' of Energy Consumption to 'Dual Control' of Carbon Emissions (能耗"双控"向碳排放"双控"转变的实施路径研究)." *Integrated Intelligent Energy* 7 (2022): 73–80.

Xinhua News Agency. "The Central Economic Work Conference Was Held in Beijing, and Xi Jinping and Li Keqiang Delivered Important Speeches (中央经济工作会议在北京举行 习近平李克强作重要讲话)."December 10, 2021. https://www.gov.cn/xinwen/2021-12/10/content_5659796.htm.

Xinhua News Agency. "Jinping Xi Chairs the Second Meeting of the Central Commission for Comprehensively Deepening Reform, Emphasizing the

Importance of Building a Higher-Level Open Economy System and Promoting the Gradual Shift from Dual Control of Energy Consumption to Dual Control of Carbon Emissions (习近平主持召开重要全面深化改革委员会第二次会议强调：建设更高水平开放型经济新体制 推动能耗双控逐步转向碳排放双控)." July 11, 2023. https://www.gov.cn/yaowen/liebiao/202307/content_6891167.htm.

Xuan, Xiaowei. "From 'The Amount and Intensity Control of Energy Consumption' to 'The Amount and Intensity Control of Carbon Emission': Challenges and Strategy ("能耗双控"到"碳双控": 挑战与对策)." *Urban and Environmental Studies* 3 (2022): 42–55.

Zhang, Na, Jinqian Deng, Fayyza Ahmad, and Muhammad Umar Draz. "Local Government Competition and Regional Green Development in China: The Mediating Role of Environmental Regulation." *International Journal of Environmental Research and Public Health* 17 (2020): 1–22.

Zhang, Xiaoping. "China's Energy Policy: Towards Energy Transition." In *Climate and Energy Law and Policy in the EU and East Asia*, edited by Stefan E. Weishaar, Eunjung Kim, and Fitsum G. Tiche, 70–102. Edward Elgar Publishing, 2023.

Zhao, Xudong. *Chronicle of Energy Conservation in China* (中国节能大事记). China Standard Press, 2022.

Zhao, Xiaofan, Huimin Li, Liang Wu, and Ye Qi. "Implementation of Energy-Saving Policies in China: How Local Governments Assisted Industrial Enterprises in Achieving Energy-Saving Targets." *Energy Policy* 66 (2014): 170–184.

Zhao, Yang. Research on the Implementation Policy of Dual Control of Energy Consumption in Baotou City (包头市能耗双控执行政策问题研究). Master's thesis, Inner Mongolia University, 2022.

Zhou, Nan, Mark D. Levine, and Lynn Price, "Overview of Current Energy-Efficiency Policies in China," *Energy Policy* 38 (2010): 6439–6452

Zhou, Yuanrong, Meredydd Evans, Sha Yu, Xiaolian Sun, and Juemin Wang. "Linkage between Policy and Business Innovation in the Development of China's Energy Performance Contracting Market." *Energy Policy* 140 (2020): 1–34.

Zhuang, Guiyang. "China's Energy Demand and Policy Measures under the Constraint of the Target of Reducing Energy Intensity by 20% During the 11th Five-Year Plan Period ('十一五'期间能源强度下降20%目标约束下我国的能源需求及政策措施)." *Economic Reference Research* 77 (2006): 5–15.