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How Does China's Energy Law Respond to Nationally Determined Contributions— From the Perspective of Normative Coordination

Xiangdi Kong

China University of Petroleum (East China), Qingdao, China
964493566@qq.com

Abstract. Against the background of the transformation of the global climate governance system, this study systematically examines the institutional practice of China's Energy Law in aligning with the goals of Nationally Determined Contributions (NDCs) using the normative coordination theory as the analytical framework. The research shows that the Energy Law has established a strategic orientation for low-carbon transformation through the reconstruction of value goals, and constructed a legal framework to undertake NDC commitments by means of innovative mechanisms such as the dual control system for carbon emissions and the mandatory renewable energy consumption system. However, in practice, it still faces coordination dilemmas such as insufficient coordination among energy-specific laws, imperfect carbon emission monitoring and verification systems, and the impact of changes in international rules. To this end, it is necessary to promote the systematic revision of the energy legal system, strengthen the operational rules of key systems, enhance the ability to adapt to international rules, and improve the funding and technical guarantee mechanisms, ultimately realizing the transformation of NDC goals from international commitments to domestic governance effectiveness.

Keywords: Nationally Determined Contributions, Energy Law, Normative Coordination, Dual Control of Carbon Emissions

1. The dilemma of domestic legalization of ndcs and the hub value of energy law

Nationally Determined Contributions (NDCs), as the core of the implementation system of the Paris Agreement, mark the shift of the global climate governance structure from the "top-down" model of the Kyoto Protocol to a new "bottom-up" paradigm [1]. However, NDCs inherently contain a tension from their inception: they are both voluntary climate action commitments made by various countries, featuring the flexibility of international "soft law"; and they bear the "hard constraints" required to promote the global achievement of temperature control goals, whose effectiveness ultimately depends on the effective transformation and strong support of the domestic legal and policy systems of each contracting party [2]. How to effectively transform international political commitments into domestic binding and enforceable legal systems has become a key challenge in current global climate governance [3]. For China, which has made the solemn commitment of "dual

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carbon" goals, promoting the domestic legalization of NDC goals and building a corresponding legal norm system is not only an inherent requirement for fulfilling international responsibilities but also an inevitable choice for realizing its own green and low-carbon transformation of the economy and society.

Academic circles have conducted extensive discussions on the connection between NDCs and domestic laws. Existing studies either focus on interpreting the international legal attributes and compliance mechanisms of NDCs under the Paris Agreement [4] or analyze the paths and challenges for China to achieve the "dual carbon" goals from the macro policy level [5]. These studies have laid an important foundation, but most fail to delve into the internal legal norms and systematically analyze how the basic laws in the energy sector, the main source of carbon emissions, specifically undertake and implement the quantitative requirements and governance concepts of NDCs. In fact, energy activities account for the highest proportion of greenhouse gas emissions, so energy rule of law thus occupies a fundamental position in the legal response system to climate change. The Energy Law of the People's Republic of China (hereinafter referred to as the Energy Law), which was formally implemented in 2024, has filled the long-term gap in the basic laws in China's energy sector and provided a crucial legal fulcrum and institutional hub for systematically responding to NDC goals. The law for the first time explicitly incorporates "promoting the green and low-carbon transformation of the economy and society" and "actively and steadily advancing carbon peaking and carbon neutrality" into its legislative purposes, marking a major shift in the value goals of China's energy rule of law and a legal confirmation of the national "1+N" policy system [6].

Then, through what mechanisms does the Energy Law internalize and promote the achievement of NDC goals? How does it coordinate with existing energy-specific laws, environmental regulations, and various policy tools to form governance synergy? Answering these questions urgently requires a more integrated theoretical perspective.

2. Normative coordination: the theoretical framework for the energy law to respond to ndcs

Transforming Nationally Determined Contributions (NDCs) from international commitments into domestic governance effectiveness is essentially a complex process of norm integration and reconstruction. Traditional single legislation or policy adjustment is difficult to cope with this systematic challenge. Therefore, this paper introduces the "Normative Coordination" theory to provide a systematic analytical perspective for interpreting how the Energy Law responds to NDCs.

2.1. Theoretical connotation and multi-level structure of normative coordination

"Normative Coordination" refers to a dynamic process in which legal norms and policy tools from different sources, levels, and functions form an organically structured and functionally complementary system through value adjustment, institutional embedding, and procedural connection to achieve a comprehensive governance goal [7]. Its core lies in overcoming conflicts, alienation, and fragmentation among norms, and stimulating their synergistic effects through conscious institutional design, thereby achieving the overall governance efficiency of "1+1 > 2". This concept draws on the theoretical essence of "collaborative governance" and "holistic governance" and focuses on the internal structure and interactive relationship of the legal norm system [8].

Normative coordination presents three interrelated levels in practice:

First, value concept coordination. This is the highest level of coordination, requiring the highest legislative purposes and basic principles of various departmental laws and policy fields to be

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inherently consistent with macro strategic goals (such as the temperature control goals in NDCs). It solves the "directional" problem of the norm system and provides a legitimate basis and ultimate value guidance for specific institutional design.

Second, institutional tool coordination. This is the core level of coordination, referring to the mutually supportive relationship between various specific legal systems to achieve common value goals. For example, the carbon emission rights trading system, energy efficiency labeling system, and renewable energy quota system need to be coordinated in terms of incentive orientation for emission reduction entities, data accounting basis, and regulatory rhythm to avoid offsetting policy effects or bringing unnecessary compliance costs to market entities.

Third, implementation mechanism coordination. This is the operational level of coordination, emphasizing the supporting and linkage of laws and policies in implementation, supervision, evaluation, accountability, and other links. It involves the division of responsibilities among different government departments, information sharing, joint law enforcement, and the establishment of judicial guarantee mechanisms, which is the key to ensuring that institutional coordination in texts is transformed into governance effectiveness in reality.

2.2. Coordination needs of ndcs as "traction norms"

NDCs are not ordinary international documents. Under the "Ratcheting Mechanism" of the Paris Agreement, they continuously strengthen emission reduction ambitions through the global stocktake (GST) every five years, thus generating a continuous "traction" effect on the domestic legal systems of contracting parties [9]. This "traction" is specifically embodied in three major coordination needs for the domestic legal system:

First, in terms of value goals, it requires establishing the priority of low-carbon transformation. The quantitative emission reduction goals of NDCs essentially transform the global temperature control, a scientific goal, into national political and legal goals. It requires laws and regulations in traditional high-carbon sectors such as energy, transportation, industry, and construction to elevate "emission reduction" and "low-carbon" from marginal and encouraging considerations to core and binding value criteria, and even need to rebalance with traditional values such as "energy security" and "economic development" under specific circumstances [10].

Second, in terms of institutional tools, it requires providing clear and operable paths for achievement. The goals of NDCs are ambitious, but their realization depends on the precise design and coordinated operation of a series of micro-institutions. This requires the domestic legal system to provide a "policy toolbox" including market-incentive tools (such as carbon emission rights trading, green power trading), command-and-control tools (such as energy efficiency standards, carbon emission intensity standards), and promotion and guarantee tools (such as green technology research and development subsidies, just transition funds), and ensure that these tools work in the same direction in rule design [11].

Third, in terms of implementation mechanisms, it requires establishing a transparent and reliable supervision and assessment system. According to the "enhanced transparency framework" established under Article 13 of the Paris Agreement, contracting parties are required to regularly report information such as emission reduction progress. This forces the country to establish a matching and solid monitoring, reporting, and verification (MRV) system, standardized statistical accounting methods, strict legal responsibilities, and regular internal assessment mechanisms to ensure that the process of achieving NDC goals is measurable, reportable, verifiable, and its results are trustworthy [12].

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The "normative coordination" framework provides a three-dimensional perspective for analyzing the role of the Energy Law: it must first achieve value coordination with NDC goals; second, it must serve as a core hub to promote institutional coordination with subordinate energy-specific laws and related policies; finally, it must ensure the effective operation of the coordinated norm system by constructing or authorizing the construction of a series of implementation mechanisms.

3. Value coordination and institutional creation: normative practice of the energy law in responding to ndcs

The promulgation of the Energy Law has provided a solid legal basis for China to fulfill its Nationally Determined Contributions (NDCs) commitments. Through the fundamental adjustment of value goals and the systematic creation of key institutions, the law has shown the characteristics of in-depth coordination with NDC goals in practice.

3.1. Strategic coordination of value goals: establishing the legislative purpose of green and low-carbon development

The Energy Law has achieved in-depth coordination with NDC goals at the level of legislative purpose. Article 1 of the law clearly incorporates "promoting the green and low-carbon transformation and sustainable development of the economy and society, and actively and steadily advancing carbon peaking and carbon neutrality" into its legislative purposes [13]. This provision marks a major shift in the value goals of China's energy legislation, from traditionally focusing on ensuring energy supply security to a new paradigm of coordinating energy security and low-carbon development [14].

This value reconstruction is not only reflected in the legislative purpose but also permeates the specific principles. Article 3 of the Energy Law stipulates: "Energy work shall adhere to the leadership of the Communist Party of China, implement the new development philosophy and the overall national security concept, and coordinate development and security". Writing the "new development philosophy" which includes the connotation of green development into the law provides a fundamental guideline for implementing NDC goals in the energy sector [15].

This strategic coordination of value goals provides a superior legal basis for the "greening" revision and improvement of the entire energy legal system, enabling NDC goals to be truly transformed from international commitments and domestic policies into binding legal norms.

3.2. Instrumental coordination of key institutions: building the legal pillars supporting NDC implementation

3.2.1. Dual control system for carbon emissions: a revolutionary shift from "controlling energy" to "controlling carbon"

Article 5 of the Energy Law stipulates: "The state establishes a new mechanism for the comprehensive transformation from dual control of total energy consumption and intensity to dual control of total carbon emissions and intensity, and accelerates the construction of a system for the dual control of total carbon emissions and intensity". The establishment of this "dual control system for carbon emissions" is the most direct and critical institutional innovation to achieve the quantitative emission reduction goals of NDCs.

This system has realized the paradigm shift from the traditional "dual control of energy consumption" to "dual control of carbon consumption", more accurately targeting the core goal of

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greenhouse gas emission reduction, and avoiding the unreasonable constraints that simply controlling energy consumption may have on economic development [16]. Especially in the new energy pattern where the proportion of renewable energy is gradually increasing, carbon emission control can more scientifically reflect emission reduction effects than energy consumption control, which is conducive to avoiding unreasonable restrictions on the development of regions rich in renewable energy.

3.2.2. Mandatory renewable energy consumption system: ensuring the target of non-fossil energy proportion

To support the non-fossil energy proportion target in NDCs, Article 23 of the Energy Law stipulates: "Power supply enterprises, electricity sales enterprises, and electricity users shall bear the responsibility for renewable energy power consumption in accordance with national regulations". This clause provides rigid legal guarantees for the development of renewable energy by setting minimum proportion targets on the consumption side.

This institutional design is connected with the Renewable Energy Law but has important developments. Compared with Article 14 of the Renewable Energy Law, which stipulates that power grid enterprises shall fully purchase renewable energy power generation, the Energy Law expands the subjects of consumption responsibility to power supply enterprises, electricity sales enterprises, and electricity users, and the consumption principle has changed from full purchase to setting minimum proportion targets [17]. This change better adapts to the needs of power marketization reform, and provides an institutional guarantee for completing the non-fossil energy target in NDCs by establishing a more diversified responsibility subject and a more flexible renewable energy consumption mechanism.

3.2.3. Linkage between energy market and carbon emission rights trading system

Article 6 of the Energy Law stipulates: "The state establishes a unified, open, competitive, and orderly energy market system", providing an institutional basis for the coordinated development of energy markets and carbon markets. Although the Energy Law does not directly stipulate the carbon emission rights trading system, the energy market system it establishes provides infrastructure and market environment for the operation of the carbon emission rights trading market. In the future, supporting legislation is needed to further clarify the specific implementation rules of the carbon emission rights trading system in the energy sector, and realize effective coordination between energy markets and carbon markets in terms of regulatory agencies, data accounting, trading rules, etc. [18].

3.2.4. Scientific and technological innovation support system: providing technical paths for NDC achievement

The Energy Law sets up a special chapter (Chapter 6) on "energy science and technology innovation", systematically stipulating the energy science and technology innovation system, key fields, and safeguard measures.

This institutional arrangement provides technical momentum and cost reduction paths for the long-term achievement of NDC goals. By focusing on supporting the development of low-carbon energy technologies such as renewable energy, safe utilization of nuclear energy, hydrogen energy, and energy storage, the Energy Law provides technical support for ensuring China's energy supply

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security and economic competitiveness while achieving NDC goals. This institutional design oriented towards scientific and technological innovation reflects that the Energy Law not only focuses on the current achievement of NDC goals but also focuses on the long-term technical needs of low-carbon transformation.

3.3. Coordination guarantee of implementation mechanisms: ensuring the implementation of NDC goals

The Energy Law ensures that various systems can work together to guarantee the achievement of NDC goals through the design of a series of implementation mechanisms. The law stipulates that the energy competent department of the State Council, together with relevant departments, shall be responsible for energy supervision and management in accordance with their respective functions and divisions of responsibilities, clarifying the mechanism for coordinated supervision between the energy competent department and other relevant departments.

Especially in terms of dual control of carbon emissions, Article 5 of the Energy Law provides a legal basis for coordination between the energy sector and the ecological environment department in carbon emission management. The establishment of this cross-departmental coordination mechanism is of great significance for solving the coordination problems caused by the traditional separation of energy management and carbon emission management into different departments.

4. From text to practice: realistic dilemmas faced by normative coordination

The promulgation of the Energy Law has provided important institutional guarantees for the achievement of NDC goals. However, in the process from legal text to governance practice, normative coordination still faces multiple realistic dilemmas. These dilemmas are mainly reflected in three aspects: institutional gaps, implementation gaps, and external shocks, which restrict the actual effectiveness of the Energy Law in responding to NDCs.

4.1. Institutional gaps: insufficient internal coordination in the energy legal system

There are significant institutional gaps between the Energy Law and existing energy-specific laws. China's energy legislation has long adopted a "decentralized legislation" model. Each specific law was formulated in different periods, with large differences in legislative concepts and institutional focuses. For example, the Electricity Law and the Coal Law were formulated earlier, and their legislative purposes focus on "ensuring supply security" and "regulating development and utilization", lacking clear value guidance for green and low-carbon development. This difference in value goals leads to incoordination in specific institutional design, such as the lack of purpose statements involving "low carbon", "carbon peaking and carbon neutrality", and "responding to climate change" in energy-specific laws such as the Renewable Energy Law.

Another institutional gap is reflected in the decentralization of regulatory responsibilities. Although the Energy Law stipulates the coordinated supervision mechanism between the energy competent department and other relevant departments, under the current system, functions such as energy management, climate change response, and ecological environment protection belong to different departments, and external coordination between the energy regulatory system and the environmental regulatory system still faces challenges. This institutional obstacle makes the collaborative governance mechanism designed by the Energy Law face many resistances in the implementation process.

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4.2. Implementation gaps: challenges in the operationalization of key systems

Several key systems established by the Energy Law have significant implementation gaps at the operational level. The most representative is the "dual control system for carbon emissions". Although this system has achieved a major shift from "controlling energy" to "controlling carbon" at the legislative level, its specific implementation still faces various challenges.

First is the issue of scientificity and fairness in indicator allocation. The decomposition of total carbon emissions and intensity indicators needs to comprehensively consider factors such as regional development stages, industrial structure, and resource endowments, but there is currently a lack of clear allocation rules and methodological guidance. Some local experiences can be used for reference, such as the Shanghai Measures for the Administration of Carbon Emissions (Trial) stipulating that the total carbon emission quota control target shall be jointly determined by the national binding indicators for controlling greenhouse gas emissions, the city's economic growth target, and the total energy consumption target, but no unified standard has been formed [19].

Second is the imperfection of the monitoring, reporting, and verification (MRV) system. Accurate carbon emission data is the basis for the effective operation of the dual control system, but the current enterprise-level carbon emission monitoring, reporting, and verification system is not sound, and there is no unified standard, measurement, and certification system for carbon emissions [20]. The data quality is uneven, which is difficult to support refined carbon emission management.

4.3. External shocks: adaptability pressure from changes in international rules

The continuous evolution of global climate governance rules has brought external adaptability pressure to the implementation of the Energy Law. The most representative is the implementation of the EU Carbon Border Adjustment Mechanism (CBAM) [21]. CBAM requires imported products to bear carbon costs equivalent to those of products within the EU, which has a direct impact on China's exports of high-carbon products and puts forward higher requirements for domestic carbon emission accounting and carbon pricing mechanisms.

The international cooperation mechanism under Article 6 of the Paris Agreement also brings new challenges in rule adaptation. This clause allows countries to achieve emission reduction goals through international cooperation, involving accounting, certification, and trading rules for internationally transferred mitigation outcomes (ITMOs) [22]. As a potential supplier and purchaser of ITMOs, China needs to establish domestic legal systems connected with them, but the current Energy Law and related regulations have not fully responded to this.

In addition, the global trend of green supply chain restructuring also exerts pressure on China's energy and climate governance system. Major developed countries have implemented systems such as green procurement and carbon footprint labeling, requiring transparency and low carbonization of the whole life cycle carbon content of products. This external pressure requires China to accelerate the establishment of carbon accounting standards and certification systems in line with international standards, but the current system still has obvious deficiencies in this regard.

5. Conclusions and prospects: moving towards a path of energy rule of law with in-depth coordination

Through a systematic analysis of the normative coordination practice and realistic dilemmas of the Energy Law in responding to Nationally Determined Contributions (NDCs), this paper draws the following conclusions and proposes corresponding improvement paths on this basis.

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First, through value reconstruction and institutional innovation, the Energy Law has initially constructed a normative framework for responding to NDCs. The law explicitly incorporates "promoting the green and low-carbon transformation of the economy and society" and "actively and steadily advancing carbon peaking and carbon neutrality" into its legislative purposes, realizing the strategic coordination of value goals. At the institutional level, the design of key systems such as the dual control system for carbon emissions, the mandatory renewable energy consumption system, and the energy science and technology innovation system provides important legal pillars for the achievement of NDC goals. This indicates that China's energy rule of law is transforming from the traditional stage of ensuring energy supply security to a new stage of coordinating security and emission reduction.

However, normative coordination still faces multiple realistic dilemmas. On the one hand, there are institutional gaps within the energy legal system, and the Energy Law is not coordinated with specific laws such as the Electricity Law and the Coal Law in terms of legislative concepts and specific systems. On the other hand, there are gaps in the implementation of key systems, and the operational details such as indicator allocation and monitoring verification of the dual control system for carbon emissions need to be improved. In addition, external shocks brought by changes in international rules such as the EU Carbon Border Adjustment Mechanism (CBAM) restrict the full play of the implementation effectiveness of the Energy Law.

To promote in-depth coordination between the Energy Law and NDC goals, this paper proposes the following improvement paths:

First, promote systematic coordination of the legal system. Under the leadership of the Energy Law, we should accelerate the revision of energy-specific laws such as the Electricity Law, the Coal Law, and the Renewable Energy Law, eliminate normative conflicts, and form an energy legal system supporting NDC goals. In particular, in the purpose clauses, expressions such as "responding to climate change" and "promoting low-carbon transformation" should be added to achieve the unification of value goals. At the same time, we should strengthen the coordination between energy regulations and environmental regulations, and promote in-depth connection between "pollution reduction" and "carbon reduction" norms.

Second, strengthen refined coordination of key systems. We should formulate supporting implementation rules for key systems of the Energy Law as soon as possible, especially the specific implementation plan for the dual control system for carbon emissions. This includes establishing a scientific indicator allocation methodology, improving the monitoring, reporting, and verification (MRV) system, clarifying the assessment standards for renewable energy consumption responsibilities, and punishment measures for unfulfilled responsibilities. At the same time, we should pay attention to the positive role of market mechanisms, and reduce emission reduction costs and improve institutional effectiveness through market-oriented means such as carbon emission rights trading and green power trading.

Third, enhance open coordination of the legal system. We should pay close attention to the latest developments in global climate governance rules and enhance the ability of the energy and climate legal system to adapt to international rules. In particular, we should respond to the challenges brought by international rules such as the EU Carbon Border Adjustment Mechanism (CBAM) and establish carbon accounting standards and certification systems in line with international standards. At the same time, we should actively participate in the formulation of international rules such as the implementation rules of Article 6 of the Paris Agreement and play a greater role in international climate governance.

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In conclusion, achieving NDC goals is a long-term and arduous task, which requires continuously improving the energy rule of law system, strengthening normative coordination, promoting the Energy Law from text to practice, and truly playing its fundamental role in China's response to climate change and promotion of energy revolution.

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