




Reality and perfection of China's addressing climate change legislation in post-Paris Agreement era

Xiaobin Pan¹ · Bowen Yang² 

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Abstract

When taking an active part in international climate governance, the Chinese government places emphasis in the legislation on addressing climate change, which is the key process to make climate change policy propelled actively. This article aims to explore how to establish China's climate change legislation system in the post-Paris era, to achieve China's goal of "carbon peak and carbon neutralization," and better fulfill the emission reduction obligations under the Paris Agreement. Drawing on approaches suggested by the Dawes Matrix, to explain a climate law system which is based on "three integrated layers" in China, this article proposes the core layer of policy-oriented integrated climate change law, the most significant layer for the legislation on mitigation and adaptation, the supportive layer involving safeguard system related to various administration regulations, department measures and local legislation, as well as relevant guide policies of climate change.

Keywords Climate change law · National determined contribution · Mitigation legislation · Adaptation legislation · Safeguard measures · Legal system

Abbreviations

GHG	Greenhouse Gas Emission
NDC	National Determined Contribution
COP	Conference of the Parties
GDP	Gross Domestic Product
SWEA	Strength-Weakness-Emulate-Avoid
NPC	National People's Congress
EU	European Union
WTO	World Trade Organization
FYP	Five-Year Plan

✉ Bowen Yang
15222508254@163.com

¹ Law School, Tianjin University of Finance and Economics, Tianjin 300222, China

² College of Humanities and Social Development, Nanjing Agricultural University, Nanjing 210095, Jiangsu, China

NDRC National Development and Reform Commission

CDM Clean Development Mechanism

1 Introduction

In recent years, with the high-speed development of economy and rapid-growing demand of energy, China, whose greenhouse gas emissions amount has already exceeded the volume of the USA, became the worldwide greatest (GHG) emitter. In the transformation of China's economic structure, the reduction of thermal power generation scale and the rapid increase of clean energy industry, China's GHG emissions have reached a peak since 2015 and then began to show a slowdown trend (British, 2018). The total GHG emission amount of China accounted for 27.6% of the world's total emission in 2017. China's GHG emissions of energy use increased by 1.6% in 2017, half the 10-year average growth of 3.2% (Qian, 2015).

The key knowledge gaps coming out of the literature review, are the dual pressures caused by climate change and rising GHG emissions, the urgent issue that Chinese decision-makers must envisage is how to deal with the relationship between the socioeconomic developments and the addressing climate change (Yang et al., 2021). In view of the climate change issue itself and its global impacts, no one can solve climate change independently, whereas all members of the international community should jointly cope with it. The Kyoto Protocol that has been regarded as the milestone explicitly sets up quantified emission reduction obligation for industrialized countries and established the "Three Kyoto Mechanism" based on flexible design as the supplementary to emission reduction actions. However, since 2012, the "top-down" Kyoto mechanism has almost been stagnant and a new post-2020 international emission reduction mechanism was expected by international community to be created on COP 21 held in 2015. Fortunately, Paris Agreement came into effect in 2016, which formally confirmed the national determined contribution (NDC) based on "Bottom-top" path for each nation to fulfill its obligations of addressing climate change. The specific choices of contribution are left to the contracting parties of different levels to make commitments as per their own stages of development.

As a big emerging developing country, China is facing increasing pressure from the international community to reduce GHG emissions. In the NDC document submitted before the Paris conference, the Chinese government solemnly promised to lower carbon dioxide emissions per unit of GDP by 60% to 65% from the 2005 level and to achieve the peaking of carbon dioxide emissions around 2030 and make the best efforts to peak early (Mehran & Chang, 2018). In consideration of the fact that there is no effective method in the existing Environmental Law to regulate the important source of environmental pollution-GHG emissions (Chen, 2009), establishing a climate change legal system to effectively control GHG emissions in China has become the key importance.

2 Method and structure

2.1 Mythology

The internal and external comparative research method has been applied to China's climate change legislation. By comparing the experience of the climate change legislation system in developed countries and developing countries, the characteristics of climate change legislation in various countries in the world were compared (Thomas & Janoski, 1991). By comparing the advantages and disadvantages of these countries in climate change legislation, and the content that China can learn from and avoid, this study will comprehensively, systematically and accurately analyze and demonstrate the challenges and difficulties faced by China in formulating climate change legislation through the "Dawes Matrix," to formulate corresponding legislative strategies and legal plans according to the research results. This article will establish SWEA model and then drawing on approaches suggested by internal and external comparative method to analyze the factors related to mitigation, adaptation, carbon market, climate finance, and other factors in China's climate change legislation (Mehling & Michael, 2015). China's climate change legislative strategy and planning should be an organic combination of "multi-level" and "stability." Combining the internal analysis of China's effective implementation of its emission reduction obligations under the Paris Agreement with the external analysis of the effectiveness of climate governance in other countries, a structured balanced system analysis system has been formed (Manga et al., 2018). Compared with other analytical methods, internal and external comparative research methods have obvious structural and systematic characteristics from the beginning. In terms of structure, on the one hand, the internal and external comparative research method is to construct the SWEA structure matrix and give different analysis meanings to different areas of the matrix. On the other hand, the main theoretical basis of SWEA analysis also emphasizes the analysis of China's climate change legislative dilemma and future direction from the perspective of structural analysis.

2.2 Analytical structure

This article demonstrates the legal path for building China's climate change legal system. Specifically, the first part of the article summarizes China's legislative process for addressing climate change, and the second part compares the legal practices of the main participants in addressing climate change. The fourth part proposes the dilemma of China's climate change legislation, for example, climate change legislation falls behind policy implementation, the legal content system needs to be improved, the legislative level should be raised to national law, etc. In the fifth part, the article proposes the legal path to building a climate change law system of China in terms of basic principles, specific rules of mitigation and adaptation to climate change.

3 Climate change legislation in China

In 2009, the "Resolution on Actively Addressing Climate Change" was adopted by Standing Committee of the National People's Congress (Ma, 2016), in which strengthening the relevant legislation on addressing climate change was put forward as an important task to improve legal system of China. The resolution pointed out the working direction for

Table 1 List of related Climate Change Legislation in China

Legal hierarchy	Title	Articles and relevant Contents
National Laws	Resolution on Actively Addressing Climate Change (The NPC Standing Committee, 2009)	In the resolution, strengthening the relevant legislation to address climate change has been put forward as an important task to format and perfect Chinese characteristic legal system
	Renewable Energy law (Amended in 2009)	Art.7 is related to definite cap control system Art 16 is related to mandatory access system Art 19 is related to categories of classified tariff system Art 20 is provision of compensation system Chapter 6 provides the economic incentive system (including special funds, preferential loans, tax preferences, etc.)
	Energy Conservation Law (Amended in 2016)	The Legislation focuses on saving energy and improving the efficiency of energy utilization, and lays down in detail the measures of various industries and other bodies in energy conservation, which plays a certain role in mitigating climate change
	Prevention and Control of Atmospheric Pollution Law (Revised in 2015)	Art.2 is related to coordinated control of atmospheric pollutants such as PM, SO ₂ , NO _x , VOCs, and GHGs
	Electricity Law (Revised in 2015)	Mitigation measures related to electricity production and use
	Coal Law (Revised in 2016)	Mitigation measures related to Coal mining and use
	Water Law (Revised in 2016)	Mitigation and Adaptation measures related to Water
	Forest Law (Revised in 2009)	Mitigation and Adaptation measures related to Forest
	Marine Environment Protection Law (Revised in 2016)	Mitigation and Adaptation measures related to Ocean
	Cleaner Production Promotion Law (Revised in 2012)	Mitigation measures related to Cleaner Production
Circular Economy Promotion Law (2008)	Mitigation measures related to Circular Economy	
Department Measures	Interim Measures for the management of GHG voluntary emission reduction transactions (National Development and Reform Commission, 2012)	Mitigation measures related to GHG voluntary emission trading
	Interim Measure for the Administration of Carbon Emission Trading (National Development and Reform Commission, 2014)	Mitigation measures related to GHG mandatory emission trading
Local legislations	Measure for Addressing Climate Change of Qinghai Province (2010)	This is China's first local government legislation on addressing climate change. Mitigation climate change in Qinghai Province
	Measure for Addressing Climate Change of Shanxi Province (2011)	Mitigation climate change in Shanxi Province

climate change legislation in China, that is, to improve existing laws and regulations, and to promulgate the basic law to deal with climate change as soon as possible. Nevertheless, the legal system of climate change lacks operability, although China currently lacks of a national-level climate change law. Other related legislations, such as the Energy Conservation Law (Su, 2005), and the Renewable Energy law (Grantham Research Institute on Climate Change & Environment of the London School of Economics and Political Science, 2018), still provided legal support for China to address climate change in specific aspects, and many provinces have already carried out local mitigation and adaptation legislation work (see details in Table 1).

4 Legislation practices of main participants on addressing climate change

Before Paris Agreement, the main countries in the world could be divided into the developed industrialized countries, which have already undertaken quantified emission reduction obligations, and the developing countries, which have not undertaken mandatory emission reduction obligations yet. After the conclusion of the Paris Agreement, no matter what kind of countries are required to submit their own NDC documents and fulfill their international legal obligations by emission reduction commitments (Yi, 2010). The legislation practices of the world emerged in different groups on climate change legislation can be reviewed and followed by China's legislators. Table 2 lists the legislative frameworks of major developed and developing countries in the world to deal with climate change. The selection criteria are the most apparent emission reduction targets of these countries, which can translate international legal obligations into domestic laws, form binding indicators, and these countries actively submit and implement INDC. This article selects these specific countries based on three criteria.

(1) National climate change legislation and policy basis.

Legislation can be a powerful tool to prevent policymakers from renegeing on policy commitments. The official incorporation of a country's general vision of tackling climate change into the country's overall framework laws and policies is particularly critical to promoting the country's implementation of ambitious climate change measures (for example, Germany and the EU have climate change legislation). Therefore, a national framework legislation usually indicates that the government has a high degree of recognition of climate change actions and strengthens the credibility of a country's commitment to future actions. In addition, in the context of climate change, legislation or policies containing quantitative emission reduction targets indicate commitment and forward-looking planning.

(2) Specific national measures based on sectoral, local, and type of emission reduction tools.

When a country's framework legislation and emission reduction targets are supplemented by laws or policies on low-carbon transformation in the whole economic field and based on the sectoral level, the implementation of its national policies is relatively strong.

(3) Transparent, inclusive, and effective legislation and policy formulation process.

A transparent, consistent, and effective legislative and policy implementation mechanism will enable a country to implement better the goal of independent national contribution at the domestic level, thus supporting the effectiveness of the policy.

4.1 Climate change legislation practice in developed countries

Developed countries, to fulfill their Kyoto international emission reduction obligations, have taken the lead in domestic climate change legislation, or made relevant legislative attempts, such as the United States Clean Energy and Security Act failed in 2009 (Judge, 2009). The climate change legislative form in developed countries predominantly uses comprehensive and decentralized legislation forms and is supported by the laws of other fields such as environment and energy. The main contents of the developed countries' legislations are focused on mitigation and simultaneously supplemented with the adaptation contents. Meanwhile, the legally binding emission reduction targets had been established in the developed countries' legislations, and the field of energy saving, energy efficiency improvement, renewable energy utilization, reduction in the use of market mechanisms, and sink under the mitigation path were highlighted as well.

The United Kingdom Climate Change Act (Sam et al., 2009) and the Countermeasures for Global Warming Law (2021) of Japan are the representatives of comprehensive legislation. The Climate Change Act (2008) is more comprehensive and substantial and contains emission reduction targets and a carbon budget, climate change commission, a trading mechanism, climate change impacts, and adaptation and other supplementary provisions. A comprehensive framework law is an essential tool to coordinate and advance climate action concerning both reducing GHG emissions and climate resilience.

The Countermeasures for Global Warming Law (2021) of Japan is a comprehensive framework of law, containing the purpose of the legislation, the allocation of responsibilities, the establishment of institutions, and some scattered specific institutions. Japan has made it clear in its laws that through artificial photosynthesis and other carbon capture, utilization and storage technologies, it will achieve disruptive innovations such as hydrogen society, and strive to achieve a "decarbonized society" by 2050.

The Framework Act on Low Carbon and Green Growth (Ministry of government legislation of the Republic of Korea, 2010) promulgated by the Republic of Korea seems like a "low carbon economy comprehensive law" that incorporates addressing climate change into the plan for national economic development and emphasizes more on the compatibility of addressing climate change measures with economic development. The Korean legislations embrace the contents on the realization of green growth and low carbon society, addressing climate change, energy target management and the GHG emission reduction, and adaptation countermeasures, showing that addressing climate change is fully integrated into a wide range of content institutions.

The law and regulation systems of the European Union and European countries, such as Germany, represent decentralized legislation. Legislations on energy efficiency, renewable energy, and GHG emission trading rather than a single comprehensive act are used in the European Union's law of addressing climate change.

The European Commission will propose the first European Climate Law. This will enshrine the 2050 climate neutrality objective in legislation. By June 2021, the Commission will also review and propose revising all relevant climate-related policy instruments to

Table 2 Framework Legislation in World

Country	Greenhouse gas mitigation framework law/policy	Adaptation framework law/policy	Total No. of laws
Australia	Carbon Farming Initiative Amendment Bill (2014)	None	9
European Union	EU Green Deal (2019) 2020 Climate and Energy Package (2009); 2030 framework for climate and energy policies (2014)	European Climate Law (2021)	27
France	Green Growth and Energy Transformation Act (2015)	National Adaptation Plan 2011–2015 (2011)	9
Germany	German Federal Law on Climate Protection (2019) (2021 Revise)	Germany Strategy for Adaptation to Climate Change (2008)	21
Japan	Countermeasures for Global Warming Law (2021)	Countermeasures for Global Warming Law (2021)	10
Philippines	Climate Change Act (2009)	Philippine Strategy on Climate Change Adaptation (2009)	15
Mexico	General Law on Climate Change (2012) (2018 Revise)	General Law on Climate Change (2012)	9
Russia	(2019)	None	9
South Korea	Framework Act on Low Carbon, Green Growth (2010)	National Strategic Plan for Climate Change Adaptation 2011–15 (2010)	12
UK	Climate Change Act (2008)	Climate Change Act (2008)	23
USA	None	Executive Order 13,653: Preparing the United States for the Impacts of Climate Change (2013)	9

ensure fair and effective carbon pricing throughout the economy. This new framework that will adopt in the next five years should promote more sustainable economy and society. Achieving climate neutrality will require overcoming severe challenges. It recognizes the need to put in place an enabling framework that benefits all Member States. It encompasses adequate instruments, incentives, support, and investments to ensure a cost-effective, just, socially balanced, and fair transition, considering different national circumstances in terms of starting points. The European Council acknowledges the need to ensure energy security and respect the Member States' right to decide on their energy mix and choose the most appropriate technologies. Some Member States have indicated that they use nuclear energy as part of their national energy mix. The climate neutrality objective needs to be achieved to preserve the EU's competitiveness, including by developing effective measures to tackle carbon leakage in a WTO compatible way. In this context, the European Council takes note of the Commission's intention to propose a carbon border adjustment mechanism concerning carbon-intensive sectors.

4.2 Climate change legislation practice in developing countries

The domestic climate change legislation in developing countries is divided into two categories according to different development stages. The legislative category appears in different

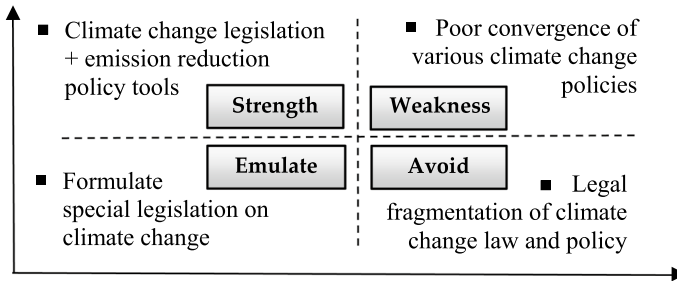


Fig. 1 Legislation system SWEA analysis model

countries, presenting two kinds of trends in the form of comprehensive and coordinated legislation.

As the emerging economies representative, Mexico passed climate-change law on April 19, 2012. It emphasizes the convergence of the domestic law of Mexico and the international climate legal obligation, containing many sweeping provisions to mitigate climate change, including a mandate to reduce emissions of carbon dioxide by 30% below business-as-usual levels by 2020, and by 50% below 2000 levels by 2050 (Erik, 2018). To establish a legal framework that regulates, promotes, enables, and orders the public policies of adaptation and mitigation to climate change implemented in this country, giving mandatory character through general and abstract rules. The law was used to ensure that the Mexican federal government action had a legal framework that made the policies adopted by climate change mandatory and continuous (Ivan, 2012).

As an archipelago state with a backward economy and vulnerable climate, the adaptation ability of the Philippines could be better and more easily affected by extreme weather disasters such as typhoons. Although the Climate Change Act 2009 promulgated by the Philippine is comprehensive legislation in form, it is substantially a framework legal instrument that puts more emphasis on organization building and climate change adaptation, such as the creation of the Climate Change Commission, Powers and Functions of the Commission, Framework Strategy and Program on Climate Change, National Climate Change Action Plan, Local Climate Change Action Plan, Role of Government Agencies (Republic of the Philippines Congress of the Philippines, 2018).

4.3 Insights of typical countries' climate change legislation to China's legal framework

The climate change legislation of these specific countries has both advantages and disadvantages. It has a significant reference value for analyzing the problems in China's climate change legislation and improving the system design. The Insights of climate change legislation in typical countries to China can be presented through the SWEA analysis model.

As shown in Fig. 1, on the one hand, from the perspective of advantages, to fulfill the emission reduction obligations of the Paris Agreement, many countries have confirmed their emission control objectives through legislation and administrative orders, implemented greenhouse gas emission control measures with energy conservation, energy efficiency improvement, development of non-fossil energy as the primary means, and supplemented by market mechanisms such as emission quotas and emission licensing

transactions, to reduce the emission reduction costs of the whole society (Pesonen & Horn, 2014). For example, the European Union, Germany, Japan, and Mexico have enactment of the National Climate Change Law. Therefore, from the perspective of emulation, China currently lacks climate change legislation. China can highlight the clean use of coal, the development of renewable energy, and the improvement of energy efficiency by learning from the EU and German climate change legislation.

On the other hand, from the point of view of disadvantages, everyone knows the truth that “more public lies and more ships are broken.” The scattered legal system will cause many problems. For example, the USA established many differentiated climate change policies and emission reduction tools, and the lack of unified legislation is not conducive to the formation of a comprehensive low-carbon development strategy and is not conducive to optimizing the energy structure. Therefore, China should avoid legal fragmentation of climate policy (Hoff et al., 2009). In essence, the implementation of China's carbon emission control strategy is a comprehensive and systematic project, and the implementation of China's greenhouse gas emission control strategy cannot be separated from the integration of climate policy and emission reduction tools, which inevitably requires the reform of China's decentralized low-carbon policy.

5 Dilemma in climate change legislation of China

Compared with the climate policies of the EU, Germany, Japan, and other developed countries, China needs more climate change legislation, and the existing legal system is required to fully ensure the implementation of the future carbon emission control strategy (Rajan, 2006). Compared with the fundamental law on climate change formulated by the Philippines, Mexico, and other developing countries, the efficacy of China's law and regulations on climate change is low. In order to catch up with the efforts of all other countries, addressing the climate change process in China has always been put in the central light and brought into the construction of the ecological civilization system as an essential part by the Chinese government. However, it cannot be ignored that climate change legislation is currently in the initial stage and the problems of the separation of legislation and policy implementation (Guest, 2010), the non-perfect legal system, and the lack of a higher-level law to support the lower-level legal system, are existing as well.

5.1 Climate change legislation falls behind policy implementation

China has finished fruitful works on the policy level of addressing climate change. The National Development and Reform Commission (NDRC) released the document National Climate Change Program 2007, which enabled China to be the first country to propose the addressing program among developing countries. China's Policies and Actions for Addressing Climate Change was released in 2007 by the State Council further elaborated explicitly on the strategies, targets, policies, and actions for China to address climate change. In 2009, the national emission reduction targets officially identified that by 2020 carbon dioxide emissions per unit of GDP would be lowered by 40% to 45% from the 2005 level.

In 2011, the State Council issued the Work Plan for Controlling GHG Emissions During the 12th FYP Period, which laid out the deployment of relevant work. All ministries and local governments subsequently issued their action plans or programs for controlling GHG

emissions (Gemmer et al., 2011). In 2013, the NDRC and other ministries jointly issued the National Strategy for Climate Adaptation, which clearly stated China's main objectives, essential tasks, regional differences, and safeguarding measures of climate change adaptation and provided guidance for the coordination and implementation of adaptation work. In 2014, the NDRC published the National Plan on Climate Change (2014–2020), illustrating the country's guiding principles, targets and requirements, policy guidance, essential tasks, and safeguarding measures in addressing climate change. Most of the provinces issued their plans on the provincial level, respectively, to address climate change and incorporate the work of addressing climate change into their plans for economic and social development. Each central ministry made its individual plan or program to tackle climate change. In 2015, the Chinese government submitted to the United Nations the Enhanced Actions on Climate Change: China's Intended Nationally Determined Contributions, in which it declared that China will achieve the peak of carbon dioxide emissions around 2030 and make the best efforts to peak early, and lower carbon dioxide emissions per unit of GDP by 60 percent to 65 percent from the 2005 level, which provides a medium to a long-term direction for China's work in combating climate change (National Development and Reform Commission, 2017).

After that, addressing climate change was still attached equal importance to both mitigation and adaptation in the 13th Five-Year Plan, in which it stressed that the government should take the initiative to control GHG emissions, implement emission reduction commitments, enhance the ability to adapt to climate change, and participate in Global Climate Governance in-depth, to make contributions (Yi, 2016). China has also used a mix of different policy instruments to reduce GHG emissions, and the effort to introduce a national GHG emission trading scheme at the end of 2017 was a significant step forward in mitigating global climate change (Frank et al., 2018).

Of course, the Chinese government also transferred to promote the legislation on addressing climate change and integrating legislation work with existing laws. In 2009, the NPC Standing Committee adopted the Resolution on Actively Addressing Climate Change to stress the effort to address climate change should be treated as essential task and incorporated into the national legislative work agenda. The Chinese decision maker has been deeply aware that it was necessary to build a legal system of addressing climate change. And they also recognized the legal instrument as an essential guarantee for the policy-making and implementation of addressing climate change, which also brought stability and predictability to China's efforts.

In 2011, the legislation drafting leading group on addressing climate change was set up by the National People's Congress Environmental Assets Commission, the National People's Congress Law Commission, the State Council Law Office and 17 ministries and commissions to draft a law on climate change. The NDRC had taken the lead in legislative research, legislative investigation, law articles drafting, and consulted various stakeholders extensively on legislation (National Development and Reform Commission, 2018). In 2012, the Chinese Academy of Social Sciences drafted the Climate Change Law of the People's Republic of China (draft proposal) and solicited public opinion (China Meteorological News Press, 2012). The national level of the particular law to address climate change has yet to be promulgated, and the reason is that the game between the various stakeholders is challenging to balance, which also makes China's response to climate change lack sufficient legal basis.

In March 2018, the Chinese government carried out a large-scale ministerial reform. The Department of Addressing Climate Change, originally subordinated to NDRC, was incorporated into the newly established Ministry of Ecology and Environment. The

specific implementation of the national work on addressing climate change was directly led by the Ministry of Ecology and Environment (Liang, 2018). According to the arrangement on Function Allocation, Internal Institutions, and Staffing of the Ministry of Ecology and Environment (Organization plan) announced on August 1, 2018, the Department of Addressing Climate Change is responsible for a comprehensive analysis of the climate change impacts on economic and social development, taking the lead in the implementation of the relevant work of UNFCCC and organizing the implementation of clean development mechanism (CDM) (Li, 2019). In the future, addressing climate change will be integrated into the national environmental protection strategy. It is foreseeable that China's legislation on addressing climate change will accelerate.

5.2 Legal content system needs to be improved

The legal systems of climate change in the EU, the USA, and Japan include mitigation and adaptation (Fig. 2). Among them, the climate change adaptation system mainly focuses on using market tools, such as carbon trading and carbon tax. The climate change mitigation system pays more attention to ecosystem service function and human society, and regulates behavior through command and control means. However, given China's existing laws and regulations to address climate change, it was found that although the rudiment of constructing a legal system has already existed, it still needs to be better (Fig. 3).

On one hand, in the field of mitigation legislation, the particular laws involving different energy sources such as Electricity law (Standing Committee of the National People's Congress, 2015) and Coal Law (Standing Committee of the National People's Congress, 2017), still could not meet the demand to mitigate climate change. In the field of industrial emission reduction, the Circular Economy Promotion Law and Cleaner Production Promotion Law relate closely to mitigating climate change, but the clauses are too general and lack of maneuverability. As to the aspects of increasing carbon sinks, China has enacted the Forest Law, the Grassland Law and the Water and Soil Conservation Law (Standing Committee of the National People's Congress, 2010). Even if these laws reflect their respective legislative purposes directly, they still have no guiding contents on the "land use change and forestry" which pitched for sinks directly.

On the other hand, in order to adapt to climate change, China has formed a legal system with environmental law, meteorological law, and so on, but the laws are still related to adaptation of climate change indirectly, which indicates that a new general guiding special law to the adaptation of climate change should be enacted. The rules and policies related to financial support and technology development in addressing climate change are still scattered. And the propaganda and education on addressing climate change and public participation still need to be improved in relevant institutional incentives. The Chinese government still relies on traditional command-and-control means, more than other tools such as market orientation, government responsibility, and social participation (Chen et al., 2007).

5.3 Legislative level should be raised to national law

Since 2009, some provinces have first attempted to make normative legal documents such as the Measures for Addressing Climate Change in Qinghai Province and Measures for Addressing Climate Change in Shanxi Province. According to the former one, Qinghai provincial governments at all levels would install and improve the policy system to promote

green development, accelerate the transformation of economic development mode, increase green investment, and establish and strengthen the concept of green production and consumption in the whole society (The People’s Government of Qinghai, 2010). The Shanxi’s legislation clarifies the main responsibility for climate change including the mitigation of climate change, adaptation of climate change, GHG emissions management, and safeguards means. The intensity of carbon dioxide emission per unit GDP was incorporated into the target responsibility system and assessment system of governments and enterprises at all levels, which has dramatically aroused the enthusiasm of governments and enterprises to save energy and reduce emissions (The People’s Government of Shanxi Province, 2011). However, the local legal documents mainly emphasized the obligations set for the lower level of government departments and the legalization of the assessment mechanism, which had limited function to the future national legislation addressing climate change. At the ministerial level of the Department responsible for addressing climate change, NDRC issued two legal documents: Interim Measures for the management of GHG voluntary emission reduction transactions (National Development and Reform Commission, 2012) and Interim Measures for the Administration of Carbon Emissions Trading (National Development and Reform Commission, 2014) in the year of 2012 and 2014. GHG emissions trading is a necessary mean to mitigate climate change via market tools. Therefore, although the department measures issued for a specific institution reflect the characteristic of making pilot measures, their implementation, owing to lack of enforcement power, still needs Lex’s superior support, which is also helpful in strengthening legal awareness of emissions trading enterprise (Zhe et al., 2018). In the end of 2017, China’s national carbon market was officially launched, but the Regulations on the Management of Carbon Emission Trading, which is at the level of administrative regulations, were still in the stage of draft demonstration and not included in the 2018 Legislative Work Plan of the State Council (General Office of the State Council of the People’s Republic of China, 2018).

In a word, local regulations and department measures promulgated by a specific system reflect the characteristics of China’s first-test legislation on particular fields, but they need systematic support from the Lex superior in the implementation process.

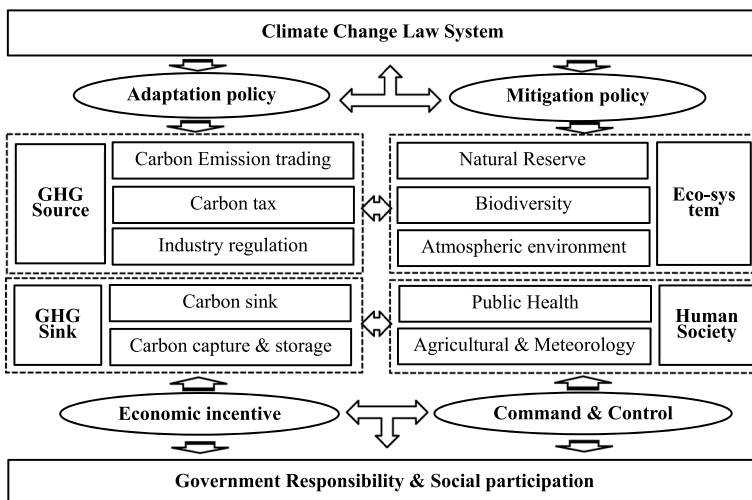


Fig. 2 Framework of Governance Tools of addressing Climate Change

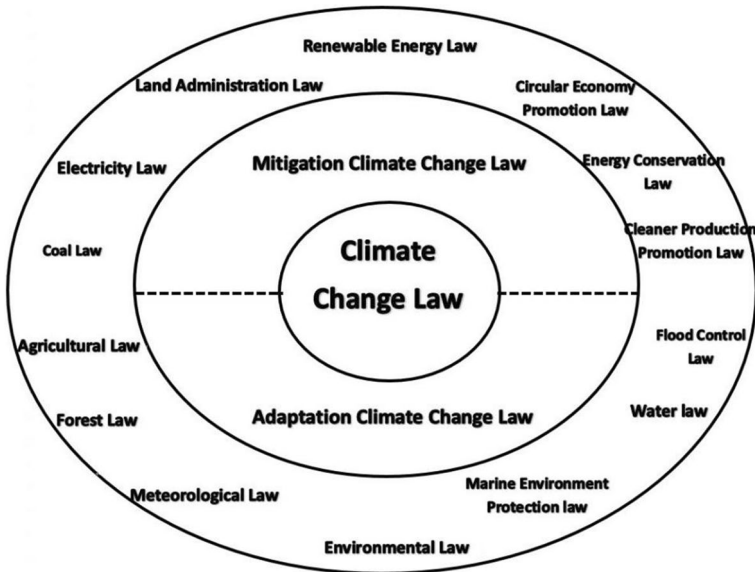


Fig. 3 Suggestions on the climate change legislation system

6 Legal path to build climate change law system of China

China can learn from the experience of the European Union, Germany, and other countries in the construction of the climate change legal system; according to the views of National Center for Climate Change Strategies, the Climate Change Law should be enacted as soon as possible, which will confirm the necessary institutional arrangements for addressing global climate change and developing low-carbon economy in a particular legal form, and provide legal guarantee for the development and utilization of new energy. The relevant laws and regulations for the development of low-carbon energy will be improved in China (Junfeng & Qimin, 2016). Considering the legislation practice of the world and China's experience, China should adopt a gradual and distributed legislative system to construct the legal system for addressing climate change, that is, to integrate the relevant laws based on the fundamental law, to formulate a special single law of mitigation and adaptation, and to incorporate and improve applicable administrative regulations, local legislation, department measures, and other safeguards system as support (Ji-Feng et al., 2012).

According to the theory of sustainable development and the concept of China's ecological civilization, China needs to solve the problems existing in climate change legislation falls behind policy implementation, the legal content system needs to be improved, legal level should be raised to national law China should build its core legal system from the basic principles and specific rules of dealing with climate change (Chang & Wang, 2010). The value of climate justice is the core value that runs through the whole legislation to deal with climate change.

6.1 The core: the establishment of climate change law

The core that guides and sustains laws is the steel framework for building China's addressing climate change law system. The Basic Law of Addressing Climate Change characterized by value orientated, principled, stable and framework should be the only law in the core (Jian, 2010). Once this law is established, it shall not be modified unless there is a significant change in the external environment. And the fundamental law should clarify four important contents: legislative purpose, basic principles, organizational structure, and strategic planning.

6.1.1 China's climate change law principle

It should be the fundamental criterion that reflects the legislative value and legislative purpose and generally guides the legal activities of climate change. Specifically, it includes the principle of the core national interests, the precautionary principle, the principle of equal emphasis on mitigation and adaptation, and the public participation principle (Duan & Miller, 2021). The principle of the core national interests is the primary principle, and when enacting any laws or participating in activities addressing climate change, it requires that any measures should have no harm on countries' core interests, take appropriate steps which are adaptive to China's current development stage and any advanced actions should be on the premise of safeguarding the people's right to subsistence and development. The precautionary principle is transplanted from the UNFCCC and fits well with domestic climate change legislation (Gonzales et al., 2023). This principle provides that scientific uncertainty should not be the excuse for addressing any measures, and the measures must also meet cost-effectiveness. The principle of equal emphasis on mitigation and adaptation reflects that China should make the balance between the mitigation and adaptation measures when addressing climate change (Duan et al., 2021). China cannot only pay attention to the mitigation legislation as the developed countries did or overemphasize adaptation legislation as some developing countries did as well. The principle of the public participation reflects that not only the government but also the enterprises and public should undertake, respectively, the responsibility to participate in addressing climate change, which emphasizes the diversity of the participants in climate law and provides support for setting the rights and obligations of different participants in the inferior law.

6.1.2 Organizational structure and strategic planning

They are two essentials' contents relating to the fundamental law of addressing climate change. Throughout the climate legislation in developed countries and developing countries, the primary content is to assign or create the national institution in charge of addressing climate change and clarify the powers and responsibilities of the institution and initiate the short-term, mid-term, and long-term strategic plan (Miranda, 2017). Currently, the work to address climate change is mainly pushed on the policy level, which forms the organization system that takes the State Council Leading Group on climate change as a decision maker, NDRC as the main implementing agencies, and the other ministries as joint participants. This kind of organizational system should be legalized to ensure the

stability of the organization structure, and incorporated into the innovation mechanism, set specialized addressing climate change advisory agencies in accordance with the law to provide supports to the decision-making and executive departments, just like the Climate Change Commission established by the Philippines under the Climate Change Act of 2009.

6.2 Enacting specialized law on mitigation and adaptation

The Specialized Law on Mitigation and Adaptation, which is the important parts of implementing the ideology of the fundamental law and legalizing the climate governance policy tools, is the brick of China's legal system building. Mitigation and adaptation, which have the consistency in nature, are the main ways to address climate change. Mitigation is to restrict the GHG emissions, and keep it within controllable scope, which is conducive to the national implementation of long-term adaptation to climate change (Ming, 2009), while adaptation is the positive response to the adverse effects of climate change, the reduction to their vulnerabilities, as well as helps the country provide more resources for mitigation. On the legislation level, although China's current laws and regulations are involved in the contents of mitigation and adaptation, more or less, the provisions are too scattered and the terms of the pertinence is not strong (Sjögersten et al., 2013). Therefore, the Chinese legislature should enact special legislations to adjust social relations in mitigation and adaptation and integrate the decentralized legal norms. The specific institutions and rules for implementing content involved in the two special legislations can be regulated in the more flexible form of administrative regulations and department rules issued by the executive department authorized by the fundamental law to address climate change.

6.2.1 Mitigation legislation

Climate change mitigation law is the special legislation that takes the control of the absolute and relative GHG emissions as the legislative goal; its core contents cover two important aspects on the source of emission reduction and sinks increase and involve laws in the field of energy, industry, environmental protection, and resource utilization.

The GHG emissions relating to the industry are also an important part of the new law. It covers emissions of industrial processes related to carbon dioxide, emissions from the chemical industry related to nitrogen oxides, and emissions from fluorinated gases related to the production of artificial GHGs (Hallding et al., 2009). The new law should absorb the relevant provisions in the current Circular Economy Promotion Law and Cleaner Production Promotion Law and integrate some relevant department measures and industrial standards for regulating specific industries. It is appropriate to provide principal contents for the provisions regulated for the specific industries in the new law, and the specific implementation details and standards can be specifically regulated and guided through regulations or normative documents issued by the Ministry of Ecology and Environment, the Ministry of science and technology as well as other government departments (Chmutina et al., 2012).

The content of increasing carbon sink is another essential part of the new law, which includes forest carbon sinks and soil carbon sequestration. The Forest Law, the Grassland Law, the Water and Soil Conservation, and other laws in China's current legal system relate closely to increasing carbon sink (Ke et al., 2009). The new law

should bring the related contents from legislation to form the chapter on carbon sinks, and considering China's geographical differences in different provinces and cities, the provisions on carbon sinks should not be too specific in the new law, which can be regulated in the form of department measures and local regulations by relative administrative departments of government and the local governments.

6.2.2 Adaptation legislation

The adaptation legislation is a special field which takes enhancing the ability on adaptation to climate change of human society and ecosystem as legislative goal; its core contents cover human society adaptation and the protection of ecological system, involving the law of agriculture, water resources, meteorological disaster prevention, and ecological protection, etc.

The main aspect of the adaptation legislation is protecting human society from the effects of climate change and improving its ability to adapt to climate change. Its contents involve agricultural production, water resources utilization, coastal zone protection, and meteorological disaster prevention (Tàbara et al., 2010). China's adaptation legislation should absorb the countermeasure provisions in current law such as Agriculture Law, Water Law, Marine Environment Protection Law, Meteorology Law, Law of Flood Control, Emergency Response Law, and regulations such as Anti-drought, meteorological disaster prevention, and natural disaster relief, to form separate chapter which regulates the contents on the adaptation of human beings to climate change (Zhang et al., 2017). In addition, since the adaptation legislation embodies the legalization of the government responsibility tool, and it relates to human lives and property safety, the legislation should clarify the authority and responsibility of the central ministries and local governments.

Protecting and improving the ecological environment and reducing the vulnerability of ecosystem to the climate change are important supplements to adaptation legislation. The adaptation law involves integrated environmental protection and biodiversity conservation. Currently, China has set up an ecological legal system that takes the "environmental law" as the core, all kinds of single-line pollution prevention and environmental protection laws as the backbone, and administrative regulations as a supplement (Pitcock & Jamie, 2009). The legal contents relating to climate change in the system should be absorbed in the new adaptation law and then form the ecological approach to adapt to climate change independent chapter, which emphasizes habitat and species protection instead of pollution control.

6.3 Constructing support system by administrative regulations, local legislation, and department measures

Administrative regulations, local legislation and department measures are the "cornerstones" of China's legal system for addressing climate change. Under the guidance of the Basic Law, the central government, central ministries, and local governments provide technical, financial, and capacity-building support for the effective implementation of climate change mitigation and adaptation laws (Aunan et al., 2004). After the enacting the basic law as well as the specific legislation on mitigation and adaptation, the central and local governments should formulate feasible rules to put climate law system into better implementation.

6.3.1 Capacity building related legislation

The capacity building in addressing climate change is also an important link to establishing the safeguard system in China. The core contents include:

- The collection and monitoring of GHG emission information at the national and industrial levels.
- The establishment of a climate change information system.
- The establishment of a risk assessment system for climate change.

On the level of legislation, since the capacity building is technical, to accomplish capacity building, it is more suitable to introduce targeted department measures jointly with the Ministry of Industry and Information Technology, the Ministry of Agriculture & Rural Affairs, and the China Meteorological Administration, as well as other departments, based on normative documents for making details of the provisions (Zijing et al., 2013).

6.3.2 Finance-related legislation

It is more critical to establish the climate change financial system. Either implementing the measures for climate change mitigation and adaptation or promoting technology and capacity building in the field of addressing climate change can only be done with the support of national finance as well as relevant public and private financial support (Yao et al., 2015). Although there is no relevant legislation in China currently, it also can issue the corresponding department measures through the Ministry of Finance and other departments in order to explicitly provide the funding sources, usage, and management on addressing climate change and introduce some relevant documents through the People's Bank of China to guide and encourage financial institutions to put more funds into the field of addressing climate change.

6.3.3 Local legislation

Local governments are the most direct participants in addressing climate change. It is necessary to guide and guarantee the local practice through legislation. China is a vast country with a wide range of climatic types. In addition, resident s' lifestyles and cultural practices are various in different climatic regions, so the impacts of climate change are different. The Climate Change Law at the national level is a basic and programmatic law, which focuses on the whole country and is inevitably difficult to take consideration of local reality. GHG emissions will depend significantly on how well it does with policy implementation of laws and regulations at the local and regional levels (Mo et al., 2016). Meanwhile, in addition to considering the local situation, we should also actively draw on the excellent experience of local legislation and pay attention to the convergence with national legislation.

7 Conclusion

This study aims to establish China's climate change legislation, to achieve China's carbon peak and carbon neutralization goals, and better fulfill the emission reduction obligations under the Paris Agreement. During the post-Paris Agreement era, with the submission

of NDC documents, climate change mitigation and adaptation will become an important international legal obligation for China. Obviously, some developed and developing countries have been in the forefront, and their legislative experience and focus could be used for reference by China's legislators and policy makers. With the rapid rise of China's economy, the work of mitigation and adaptation of climate change has become equally important. The legislative characteristics of the two types of countries focusing on mitigation and adaptation (Boyd & Ufimtseva, 2021), as well as the comprehensive legislative experience of other emerging countries, can be introduced for the perfection of the China's national legal system.

Would a legal system based on climate justice solve all climate change problems? Practice shows that there are still some dilemmas in China's existing legislation on addressing climate change, such as legislation lagging policy promotion, incomplete legal system construction, and the low level of legal origin. Central decision makers have discussed many times that the enactment of a climate change law with Chinese characteristics should be incorporated into the legislative planning. The relevant climate law texts have been formed and added to the argumentation (Ma et al., 2021). Of course, the construction of a legal system in China for addressing climate change is a complex systematic project. At present, the existing fragmented legislation situation cannot meet the needs to guarantee the stability and foreseeability in implementation of NDC documents. China ought to build a climate law system based on "three integrated layers" that including the core layer of integrated climate change law, the most significant layer of mitigation and adaptation legislation, the supportive layer involving safeguard system related to various administration regulations, department measures and local legislation.

This study only selected the experience of climate change legislation in some developed and developing countries as the analysis object. The further research will expand the sample of analysis, pay close attention to the global inventory mechanism of the Paris Agreement and the trend of climate change legislation in the world. In terms of research methods, future research will also further expand the use of research tools; for example, to analyze the effect assessment of the various countries' climate change legislation implementation through the empirical analysis method, further research will be more convincing and broaden the interdisciplinary nature and international perspective of climate change.

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Declarations

Conflict of interest The authors declare no conflict of interest.

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