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Climate neutrality in the EU and China: An analysis of the stringency of targets and the adaptiveness of the relevant legal frameworks

Haomiao Du[1] | Hao Zhang[2]

[1]Utrecht Centre for Water, Oceans and Sustainability Law, Utrecht University, Utrecht, The Netherlands

[2]Faculty of Law, The Chinese University of Hong Kong, Hong Kong

Correspondence
Hao Zhang, Faculty of Law, The Chinese University of Hong Kong, Hong Kong.
Email: haozhang@cuhk.edu.hk

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Abstract

The European Union (EU) and China have committed to achieving net-zero emissions by 2050 and 2060, respectively. To explore the legal nature of these objectives and how the legal frameworks support their delivery, this article assesses the stringency of objectives and the adaptiveness of relevant legal frameworks. The former compares the objectives' bindingness, scope, prescriptiveness and precision of such obligations and compliance mechanisms. The latter compares the dynamism of mitigation policies and the legal institutions and processes that promote decarbonization. The article concludes that the climate neutrality objective is enshrined in the EU's climate law framework with a high degree of stringency overall. By contrast, China mainly incorporates the targets into administrative measures, the cadre responsibility and evaluation system, lacking formal rules and robust enforcement. By accelerating legal reform to integrate carbon neutrality into relevant regulatory instruments and addressing implementation problems, China explores its distinctive pathway to delivering on the objective.

1 | INTRODUCTION

According to the Paris Agreement, scientific assessments have shown the necessity of net-zero emissions for stabilizing the global temperature rise well below 2°C.[1] Since 2018, the pursuit of net-zero emissions has become the rallying cry in domestic climate policies worldwide. By March 2022, 83 countries had communicated their net-zero objective, primarily by 2050.[2] In 2019, the European Union (EU) announced in the European Green Deal its long-term objective[3] of climate neutrality by 2050[4] and the short-term target of 55 percent emissions reduction by 2030, compared with the 1990 levels.[5] In 2020, the European Commission proposed a European Climate Law to transform political ambition into a legal obligation.[6] In July 2021, the Commission put forward a 'Fit for 55' legislative package, setting out how the Commission will reach its updated 2030 target in real terms.[7]

[1]J Rogelj et al, 'Zero Emission Targets as Long-term Global Goals for Climate Protection' (2015) 10 Environmental Research Letters, 105007.
[2]Climate Watch, 'Net-Zero Tracker'<https://www.climatewatchdata.org/net-zero-tracker>.
[3]In this article, the term 'objective' refers to the long-term goal of climate neutrality while the term 'target' refers to a quantified goal of carbon dioxide (CO_2) or greenhouse gas (GHG) emissions reduction. This differentiation is in line with the EU regulatory instruments as referred to in this article.
[4]Commission (EU) 'The European Green Deal' (Communication) COM(2019) 640 final, 11 December 2019 (European Green Deal).
[5]Commission (EU) 'Stepping up Europe's 2030 Climate Ambition: Investing in a Climate-Neutral Future for the Benefit of Our People' (Communication) COM(2020)562 final, 17 September 2020.
[6]Commission (EU) 'Amended Proposal for Establishing the Framework for Achieving Climate Neutrality and Amending Regulation (EU) 2018/1999' COM(2020) 563 final, 17 September 2020.
[7]Commission (EU) '"Fit for 55": Delivering the EU's 2030 Climate Target on the Way to Climate Neutrality' (Communication) COM(2021) 550 final, 14 July 2021.

Following the EU, an increasing number of countries in East Asia have announced their commitment to achieving climate or carbon[8] neutrality by 2050 or 2060. In September 2020, Chinese President Xi Jinping announced at the United Nations General Assembly that China is committed to achieving carbon neutrality before 2060.[9] An essential part of the carbon neutrality objective is to peak China's emissions before 2030, which is a step up from the previous pledge made by China in its nationally determined contribution (NDC) under the Paris Agreement, which aims to peak emissions 'around 2030'.[10] China's adoption of a carbon neutrality objective would constitute a significant contribution to achieving the objectives of the Paris Agreement. The fundamental shift these pledges represent for the organization of energy systems and the economy more generally generates essential questions for domestic legal systems.

Although extensive literature is available concerning the legal discussion of combating climate change at the domestic, regional and international levels, integrating the climate or carbon neutrality objective into regional and domestic legal and regulatory systems is a relatively recent trend, and the development of relevant regulatory instruments in many jurisdictions is gradually unfolding.[11] Among others, the EU and China undoubtedly play an influential role in realizing the 1.5°C goal of the Paris Agreement, due to their policy priorities related to promoting low-carbon development. However, the EU and China have demonstrated distinct legal and regulatory approaches to achieve the objective of climate or carbon neutrality, which have yet to be adequately addressed by the relevant legal scholarship. This article addresses this gap by reviewing and comparing the development of the legal frameworks for net-zero emissions in both jurisdictions.

This comparative study looks at two aspects: the stringency of targets and the adaptiveness of relevant legal frameworks. Distinctions in the legal nature and the scope of the long-term objective (together with the accompanying short-term targets) imply a different degree of stringency, which is a crucial determinant for the governance system to achieve the political ambition.[12] Meanwhile, from a dynamic perspective, the relevant legal and governance systems for climate or carbon neutrality in both jurisdictions present different stages of development and different styles of robustness and adaptiveness to tackle socio-economic disturbances and uncertainties in the coming decades until the realization of the long-term objective. Against this backdrop, this article explores the stringency of the climate or carbon neutrality objective and the adaptiveness of the relevant legal frameworks supporting the objective in the EU and China. Through a comparison, this article will suggest the improvements needed for China by learning from the EU's experience. Moreover, we reflect on the convergence and divergence of legal and regulatory approaches taken by the EU and China for achieving this objective and attempt to go beyond 'comparing and learning'[13] to reveal their distinct ways of achieving an ambitious political goal.

The structure of the article is as follows. Section 2 proposes an analytical framework for assessing how the climate and energy laws of a jurisdiction support the long-term objective of net-zero emissions. Sections 3 and 4 apply the analytical framework to the EU and China, respectively. Section 3 describes the EU's approach of legalizing the climate neutrality objective and assesses the stringency of the objective and the adaptiveness of the relevant legal system for continuously supporting the incorporation of such an objective. Section 4 examines the nature of the carbon neutrality objective in China and its supporting legal framework, if any. Section 5, following the elements in the analytical framework, compares the convergence and divergence of the approaches taken by the EU and China and critically discusses whether the current climate and energy legal frameworks of the EU and China enable the transformation into climate or carbon neutrality. Section 6 concludes on the extent to which China can learn from the EU and how China may find its distinctive pathway towards delivering on the objective. Section 6 also suggests possible directions for future research.

2 | ANALYTICAL FRAMEWORK

To assess how the climate and energy policy framework of a jurisdiction supports achieving the long-term goal of net-zero emissions, the general question to be answered is the ability of norms, regulations and guidelines to direct actors' behaviour towards a common political goal. A conventional argument is that the legal bindingness of an instrument can strengthen the credibility of commitments, as it establishes obligations and requires compliance.[14] Bodansky emphasizes that legal bindingness is merely one factor in assessing the significance of an instrument with legal commitments (such as the Paris Agreement), as accountability, transparency and precision can also make a significant difference.[15] Oberthür

[8]It is still not clear whether China's carbon neutrality target includes only CO_2 or all GHG emissions. 'Climate neutrality' refers to GHG-wide net-zero emissions, while 'carbon neutrality' refers to CO_2 net-zero emissions. For this reason, we refer to carbon neutrality as China's long-term climate goal in this article. Worth noting is that Mr Xie Zhenhua, China's special envoy for climate change affairs, clarified for the first time, at the Beijing Summit of the Global Wealth Management Forum in July 2021, that China's carbon neutrality commitment includes GHG emissions from all economic sectors, including CO_2 and other GHGs. 'Xie Zhenhua Explained in Detail the Formulation of a 1+N Policy System as a Timetable and Roadmap for Achieving China's Carbon Goals' (解振华详解制定1+政策体系作为实现双碳目标的时间表、路线图) (National Center for Climate Change Strategy and International Cooperation (NCSC), 21 July 2021)<http://www.ncsc.org.cn/xwdt/gnxw/202107/t20210727_851433.shtml>.

[9]'Xi Focus: Xi Announces China Aims to Achieve Carbon Neutrality before 2060' (XinhuaNet, 23 September 2020)<http://www.xinhuanet.com/english/2020-09/23/c_139388764.htm>.

[10]'Enhanced Actions on Climate Change: China's Intended Nationally Determined Contributions (China's NDC)'<https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/China%20First/China%27s%20First%20NDC%20Submission.pdf>.

[11]To date, 15 countries and the EU have incorporated a net-zero target in law. See Climate Watch (n 2).

[12]S Oberthür, 'Hard or Soft Governance? The EU's Climate and Energy Policy Framework for 2030' (2019) 7 Politics and Governance 17.

[13]A Averchenkova et al, 'Climate Policy in China, the European Union and the United States: Main Drivers and Prospects for the Future' (London School of Economics and Political Science, Grantham Research Institute on Climate Change and the Environment and Bruegel 2016)<https://www.bruegel.org/wp-content/uploads/2016/12/Averchenkova-et-al-2016.pdf>; C Arup and H Zhang, 'Lessons from Regulating Carbon Offset Markets' (2015) 4 Transnational Environmental Law 69.

[14]KW Abbott and D Snidal, 'Hard and Soft Law in International Governance' (2000) 54 International Organization 421.

[15]D Bodansky, 'The Legal Character of the Paris Agreement' (2016) 25 Review of European, Comparative and International Environmental Law 142.

expands the conceptualization of legal bindingness, proposing a *stringency* framework for assessing the EU's climate and energy policy framework for 2030. Specifically, he argues that 'the stringency of EU climate and energy governance along the soft-hard continuum [i]s a key determinant of its ability to achieve its ambition'.[16] The stringency of governance encompasses three elements, including the formal status of regulatory instruments, the nature, prescriptiveness and precision of obligations and accountability and effective implementation.[17] The assessment of stringency is helpful in a doctrinal analysis of existing regulatory instruments. It can reveal the evolution of the stringency of regulatory instruments on the same theme (e.g. multilateral environmental agreements on climate change).[18]

Meanwhile, given that climate or carbon neutrality is a long-term objective, the existing supporting policy framework should enjoy a certain degree of robustness and flexibility to tackle the uncertainties and socio-economic changes (e.g. a pandemic) in the coming decades until 2050 or 2060. In addition, considering the early stage of building the policy framework for carbon neutrality in China, the assessment of the policy framework needs to be through a future-looking lens—whether legal systems and institutions will continuously support the societal transformation towards carbon neutrality.[19] Therefore, it is essential to investigate the ability of the climate and energy policy framework to adapt to disturbances and shocks and the ability of legal processes and institutions to legalize desirable changes and innovations.[20]

In this sense, the theories of resilience thinking and adaptive law can complement the relatively static stringency assessment by providing a *dynamic* perspective for assessing the role of law in serving a long-term political goal.[21] Among multiple definitions of resilience,[22] Folke and colleagues posit resilience thinking as the dynamism of a system to not only absorb and adapt to shocks while retaining the equilibrium but also transform the society to a new system when the current ecological, social or economic structures become untenable.[23] Ruhl and colleagues translate resilience thinking into legal system resilience. They define adaptive law as 'the design of legal systems, institutions and instruments intended to facilitate flexibility, resilience and dynamism in the management of complex social–ecological systems'.[24] Some earlier studies generally regarded resilience as a positive quality of a legal system to withstand and resolve the trouble by being able to evolve and adapt.[25] While this view reflects the general appreciation of a resilient legal system to remain consistent in its structure and processes from a general point of view, scholars working in the areas of environmental and climate change law have increasingly leaned towards a more nuanced view of resilience as being descriptive rather than normative.[26] This nuanced view also includes the notion that a legal system might be too resilient to evolve (which does not necessarily reflect that being resilient is good or bad). The generalization of an overall legal system as being resilient or not carries the risk of ignoring the significant differences that could affect the resilience and adaptability of the subareas of law, such as constitutional law, criminal law and environmental and climate law.[27]

Indeed, to what extent resilience and adaptive capacity of a specific area of law are desirable depends on the processes and structure of the specific area of law and, more importantly, what specific issues and systems the particular legal discipline aims to address and deal with. Adaptiveness in the area of climate change law typically requires going beyond command-and-control regulatory models and adopting a polycentric approach.[28] The core elements of adaptive law include iterative learning and review, procedural mechanisms for bottom-up feedback and public–private decision-making interactions.[29] Simultaneously, flexibility and dynamism should be balanced against the legitimacy and stability of law.[30]

Considering the necessity of analysing both the existing policy framework and the adaptiveness of legal systems, institutions and processes in supporting the long-term objective, we select key elements from the theories of legal stringency and bindingness, and legal system resilience, and adapt them to a framework for analysing the stringency and adaptiveness of the legal framework for climate neutrality in the EU and carbon neutrality in China. The analytical framework is summarized in Table 1.

The investigation of the stringency of the objective consists of four parts. The first part is the formal status of key regulatory instruments, which reveals the legal bindingness of the climate or carbon neutrality objective. The second part is the scope of the

[16]Oberthür (n 12).
[17]ibid.
[18]S Oberthür and L Groen, 'Hardening and Softening of Multilateral Climate Governance towards the Paris Agreement' (2020) 22 Journal of Environmental Policy and Planning 801.
[19]J McDonald et al, 'Adaptation Pathways for Conservation Law and Policy' (2019) 10 Wiley Interdisciplinary Reviews: Climate Change e555.
[20]J McDonald, 'The Role of Law in Adapting to Climate Change' (2011) 2 Wiley Interdisciplinary Reviews: Climate Change 283.
[21]JB Ruhl, B Cosens and N Soininen, 'Resilience of Legal Systems: Toward Adaptive Governance' in M Ungar (ed), *Multisystemic Resilience* (Oxford University Press 2021) 509.
[22]There are three main ways of defining the resilience of a system: *engineering resilience* (see CS Holling, 'Resilience and Stability of Ecological Systems' (1973) 4 Annual Review of Ecology and Systematics 1); *ecological resilience* (see CS Holling, 'Engineering Resilience versus Ecological Resilience' in P Schulze (ed) *Engineering within Ecological Constraints* (National Academy of Engineering 1996) 31); and *social-ecological systems resilience* (see C Folke, 'Resilience: The Emergence of a Perspective for Social-Ecological Systems Analyses' (2016) 16 Global Environmental Change 253).
[23]C Folke et al, 'Resilience Thinking: Integrating Resilience, Adaptability and Transformability' (2010) 15 Ecology and Society 20.
[24]Ruhl et al (n 21) 521. Some scholars also describe adaptiveness as the reflexivity of law, which responds to the requirement of dynamism in socio-ecological systems by ensuring the capability of law to adapt to uncertainties. See AS Garmestani and MH Benson, 'A Framework for Resilience-based Governance of Social-Ecological Systems' (2013) 18 Ecology and Society 9.
[25]JC Neuman, 'Drought Proofing Water Law' (2003) 7 University of Denver Water Law Review 92; O Perez, 'Purity Lost: The Paradoxical Face of the New Transnational Legal Body' (2007) 33 Brooklyn Journal of International Law 1.
[26]TL Humby, 'Law and Resilience: Mapping the Literature' (2014) 4 Seattle Journal of Environmental Law 85; CA Arnold and LH Gunderson, 'Adaptive Law and Resilience' (2013) 43 Environmental Law Reporter: News and Analysis 10426.
[27]Humby (n 26); Arnold and Gunderson (n 26).
[28]BA Cosens, L Gunderson and B Chaffin, 'Introduction to the Special Feature: Practicing Panarchy: Assessing Legal Flexibility, Ecological Resilience, and Adaptive Governance in Regional Water Systems Experiencing Rapid Environmental Change' (2018) 23 Ecology and Society 4.
[29]Garmestani and Benson (n 24); BA Cosens et al, 'The Role of Law in Adaptive Governance' (2017) 22 Ecology and Society 30; DA DeCaro et al, 'Legal and Institutional Foundations of Adaptive Environmental Governance' (2017) 22 Ecology and Society 32.
[30]OO Green et al, 'EU Water Governance: Striking the Right Balance between Regulatory Flexibility and Enforcement?' (2017) 18 Ecology and Society 10; Cosens et al (n 28).

TABLE 1 Analytical framework

Stringency of the climate or carbon neutrality objective	Adaptiveness of the legal framework
The formal status of the objective	Dynamism of various mitigation approaches under the policy framework for climate or carbon neutrality: *priorities* and potential *interactions* in the long run.
Scope of the objective (short-term and long-term targets).	Legal institutions and processes that promote the adaptiveness or transformation of society to climate or carbon neutrality: iterative learning and review, planning and reporting, monitoring and so on.
The prescriptiveness and precision of substantive and procedural obligations established by these targets.	
Key factors affecting implementation effects, that is, enforcement agency and mechanisms for compliance.	

objective, that is, the long-term (2050/2060) and short-term (2030) targets set. The third part is the prescriptiveness and precision of substantive and procedural obligations established by these targets. The prescriptiveness is reflected in the wording of an obligation (e.g. 'shall', 'should' or 'strive to'), while precision is reflected in the elements of 'what', 'who' and 'by when' stated in a provision.[31] Both substantive and procedural obligations must be established to deliver on the long-term objective and the immediate target. The term substantive obligation refers to the 'obligation of result', which means achieving the long-term target of net-zero emissions or the immediate targets of certain emissions reduction or carbon removal by natural sinks in the context of this article. Among others, the targets of emissions reduction breaking down to each economic sector and the regulated emissions reduction—the full range of greenhouse gases (GHG) or merely carbon dioxide (CO_2)—are the main content related to substantive obligations. By contrast, procedural obligations refer to the 'obligation of conduct', which mainly relates to obligations of making climate and energy plans and assessing, reporting and monitoring the progress of emissions reduction in the context of this article. Fourth, the stringency of the target is also assessed based on the key factors affecting implementation effects, that is, enforcement agency and mechanisms for compliance, because setting targets without clearly stating the consequences will naturally weaken the stringency of the target and its credibility. We are aware that the emerging influence of the judiciary on climate change governance, in particular the increasing number of climate cases in the EU,[32] indicates the relevance of assessing the role of the judiciary in affecting the implementation and enforcement of climate targets. However, an in-depth analysis of this issue is beyond the scope of this article.

The assessment of the adaptiveness of the legal framework consists of two parts. The first part relates to the dynamism of various mitigation approaches under the current legal framework for climate or carbon neutrality. The dynamism is manifested by the potential *interactions* between different approaches (e.g. the composition and timeline in the portfolio of natural carbon sinks, renewable energy, and carbon capture and storage [CCS]) and the setting of *priorities* of action in different time periods, including funding, policy support, technological innovation and deployment. Ideally, integrations between mitigation approaches across sectors complement each other and collectively deliver on the objective and targets more robustly. The determination of prioritized policies, measures, funding and so on reflects the adaptiveness of the legal framework, mainly because the way of distributing limited resources can significantly determine the success of the transition.[33] The second part examines the availability of institutions and processes in the current legal system that promote the adaptiveness or transformation of society to climate or carbon neutrality. Typical elements of adaptive law will be examined, including iterative learning and reviewing, planning and reporting and monitoring.

The stringency assessment and the adaptiveness assessment in the analytical framework complement each other, as the former focuses on the status quo whereas the latter on the coming decades. Worth noting is that this analytical framework does not involve a normative choice between stringency and adaptiveness of law. One is not superior to the other, and the substantive goals of legal reform vary among subareas of law.[34] The element of 'delegation', that is, the implementation and enforcement of rules,[35] is the bridge to connect stringency and adaptiveness. Partly, it is because monitoring, reporting and periodical review represent procedural obligations that promote transparency and accountability in implementation and enforcement and therefore contribute to the stringency of an instrument. Meanwhile, the mechanisms are also required for adaptive law. In turn, the iterative and participatory procedures and transparency featured in an adaptive legal system will also contribute to remaining the stringency of law.

[31] Oberthür (n 12).

[32] C Heather et al, 'Judging Climate Change: The Role of the Judiciary in the Fight against Climate Change' (2020) 7 Oslo Law Review 168. The discussion also relates to a comparison between climate negotiation and adjudication on the effect of promoting implementation, see D Bodansky. 'The Role of the International Court of Justice in Addressing Climate Change: Some Preliminary Reflections' (2017) 49 Arizona State Law Journal 689.

[33] J Wenta, J McDonald and J McGee, 'Enhancing Resilience and Justice in Climate Adaptation Laws' (2018) 8 Transnational Environmental Law 89; S Klinsky and H Dowlatabadi, 'Conceptualizations of Justice in Climate Policy' (2009) 9 Climate Policy 88.

[34] RK Craig et al, 'Balancing Stability and Flexibility in Adaptive Governance: An Analysis of Tools Available in US Environmental Law' (2017) 22 Ecology and Society 1.

[35] ibid; Abbott and Snidal (n 14).

3 | THE EU'S CLIMATE NEUTRALITY OBJECTIVE AND ITS LEGAL FRAMEWORK

This section examines the EU's legal framework for climate neutrality by assessing the stringency of this objective and the adaptiveness of the legal framework based on the analytical framework developed in Section 2. Considering an enormous number of documents relevant for the EU's climate- and energy-related strategies, policies and actions, the examination below will focus on the recent evolution of the legal framework for realizing the EU's climate neutrality objective. It focuses in particular on the new European Climate Law[36] and the updates of the existing 2030 climate and energy framework. The 2030 framework includes EU-wide targets and policy objectives for the period from 2021 to 2030 set out in six key documents adopted in 2018: the Emissions Trading System (ETS) Directive,[37] the Effort-Sharing Regulation,[38] the Renewable Energy Directive,[39] the Energy Efficiency Directive,[40] the Land use, Land-use Change and Forestry (LULUCF) Regulation[41] and the Governance Regulation.[42]

3.1 | Stringency of the climate neutrality objective

In the EU, the formal status of the climate neutrality objective begins with a political commitment and is evolving into binding obligations for the Member States. The objective of climate neutrality appeared for the first time in November 2018 in the Communication from the Commission, which depicted a European strategic long-term vision for a climate-neutral economy.[43] In December 2019, the European Commission adopted the European Green Deal, which set out a long-term objective of reaching net-zero GHG emissions by 2050. To be consistent with the long-term objective, the Commission announced the immediate target of an EU-wide and economy-wide net GHG emissions reduction of at least 55 percent compared with 1990 levels by 2030, which was updated from the previous target of at least 40%.[44] The European Parliament endorsed the long-term objective by 2050 and the immediate target by 2030 in its resolutions.[45]

The abovementioned pledges were not binding until they were enshrined by law. The new Regulation on establishing a framework for achieving climate neutrality, known as the European Climate Law, functions as the framework instrument to legalize the objective of climate neutrality and the 2030 target of net emissions reduction in the EU.[46] The European Climate Law is in the form of 'regulation' to be 'binding in its entirety and directly applicable in all Member States'.[47]

Following the European Climate Law, the 'Fit for 55 legislative package' was put forward by the Commission in July 2021 to make its policies fit for achieving the target of 55 percent net GHG emissions reduction by 2030. The Fit for 55 package translates the updated 2030 climate target into binding targets for specific policy areas and economic sectors by revising existing legislation and new legislative proposals. According to the Treaty on the Functioning of the European Union (TFEU), the 'regulations' or 'directives' contained in the Fit for 55 package are also of binding nature.[48] Key documents contained in the Fit for 55 package are summarized in Table 2.

In addition to the key documents above, the Fit for 55 package also contains some specific legislative documents accompanying the ETS Directive (one directive and one decision regarding emissions from aviation[56] and a new regulation on the Carbon Border Adjustment Mechanism to prevent carbon leakage[57]) and new regulations addressing specific issues in non-ETS sectors (a new regulation on CO_2 emission standards for cars and vans[58] and a new regulation on Social Climate Fund[59]). All the complementary documents are in the binding forms of regulation, directive or decision.

The scope of the objective is an EU-wide, economy-wide and GHG-wide objective (which includes not only CO_2 but also other GHG emissions, in particular methane and nitrous oxide emissions[60]). Regarding the temporal scale, both the European Climate Law and the Fit for 55 legislative package address the objective of climate neutrality in two parts, that is, the long-term goal of net-zero emissions by 2050 and the short-term emissions reduction targets by 2030. The European Climate Law provides for overarching rules and procedures by setting out a long-term binding objective, intermediate targets and

[36]Parliament and Council Regulation 2021/1119 of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ('European Climate Law') [2021] OJ L243/1 (European Climate Law).
[37]Parliament and Council Directive (EU) 2018/410 of 14 March 2018 amending Directive 2003/87/EC to enhance cost-effective emission reductions and low-carbon investments, and Decision (EU) 2015/1814 [2018] OJ L76/3.
[38]Parliament and Council Regulation (EU) 2018/842 of 30 May 2018 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No 525/2013 [2018] OJ L156/26 (Effort-Sharing Regulation).
[39]Parliament and Council Directive (EU) 2018/2001 of 11 December 2018 on the promotion of the use of energy from renewable sources [2018] OJ L328/82 (Renewable Energy Directive).
[40]Parliament and Council Directive (EU) 2018/2002 of 11 December 2018 amending Directive 2012/27/EU on energy efficiency [2018] OJ L328/210 (Energy Efficiency Directive).
[41]Parliament and Council Regulation (EU) 2018/841 of 30 May 2018 on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry in the 2030 climate and energy framework, and amending Regulation (EU) No 525/2013 and Decision No 529/2013/EU [2018] OJ L156/1 (LULUCF Regulation).
[42]Parliament and Council Regulation (EU) 2018/1999 of 11 December 2018 on the Governance of the Energy Union and Climate Action [2018] OJ L328/1 (Governance Regulation).
[43]Commission (EU) 'A Clean Planet for All – A European Strategic Long-Term Vision for a Prosperous, Modern, Competitive and Climate Neutral Economy' (Communication) COM (2018) 773 final, 28 November 2018.
[44]Commission (EU) (n 5).
[45]Parliament Resolution of 14 March 2019 on climate change – a European strategic long-term vision for a prosperous, modern, competitive and climate-neutral economy in accordance with the Paris Agreement (2019/2582(RSP)) [2021] OJ C23/116; Parliament Resolution of 15 January 2020 on the European Green Deal (2019/2956(RSP)) [2021] OJ C270/2.
[46]European Climate Law (n 36) arts 2 and 4(1).
[47]ibid art 14.
[48]Consolidated versions of the Treaty on European Union and the Treaty on the Functioning of the European Union [2012] OJ C326/47 (TFEU) art 288.
[56]COM(2021) 552 final (n 51) and COM(2021) 567 final (n 52).
[57]Commission (EU) 'Proposal for a Regulation of the European Parliament and of the Council on establishing a carbon border adjustment mechanism' COM(2021) 564 final, 14 July 2021.
[58]Commission (EU) 'Proposal for a Regulation of the European Parliament and of the Council amending Regulation (EU)2019/631 as regards strengthening the CO2 emission performance standards for new passenger cars and new light commercial vehicles in line with the Union's increased climate ambition' COM(2021) 556 final, 14 July 2021.
[59]Commission (EU) 'Proposal for a Regulation of the European Parliament and of the Council on establishing a Social Climate Fund' COM(2021) 568 final, 14 July 2021.
[60]2019/2582(RSP) (n 45) paras 33–34.

TABLE 2 Key documents in the Fit for 55 legislative package

Regulatory instruments	Revisions in line with the 2030 target
Effort-sharing regulation[49]	Increasing the Union's emissions reduction target in non-ETS sectors to 40 percent (was 30 percent) in 2030; limited use of offsetting with allowances from EU ETS and GHG removals from LULUCF; setting up an additional voluntary reserve at the end of the period 2026–2030.
ETS directive[50]	A one-off reduction of the overall emission cap by 117 million allowances, increasing the annual rate of reduction to 4.2 percent (was 2.2 percent), phasing out free emission allowances for aviation,[51] aligning with the global Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA),[52] and including emissions from maritime transport for the first time.
Renewable energy directive[53]	Increasing the share of energy from renewable sources to 40 percent (was 32 percent) in the Union's gross final energy consumption in 2030; setting specific targets for renewable energy use in sectors of buildings, industry, heating and cooling, and transport; stronger sustainability criteria for bioenergy and applying the cascading principle to biomass use.
Energy efficiency directive[54]	An overall EU target of reducing at least 9 percent of final and primary consumption by 2030 compared with the projections of the 2020 Reference Scenario; introducing Energy Efficiency First Principle; obligations for and the exemplary role of the public sector to reduce energy consumptions.
LULUCF Regulation[55]	An overall EU target for net carbon removals by natural sinks 310 million tonnes of CO_2 equivalent emissions by 2030; reach net-zero emissions by 2035 in land use, forestry, and agriculture sector; setting binding national annual targets for net GHG removals from 2026 onwards.

[49]Commission (EU) 'Proposal for a Regulation of the European Parliament and of the Council amending Regulation (EU) 2018/842 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement' COM(2021) 555 final, 14 July 2021.
[50]Commission (EU) 'Proposal for a Directive of the European Parliament and of the Council amending Directive 2003/87/EC establishing a system for greenhouse gas emission allowance trading within the Union, Decision (EU) 2015/1814 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading scheme and Regulation (EU) 2015/757' COM(2021) 551 final, 14 July 2021.
[51]Commission (EU) 'Proposal for a Directive of the European Parliament and of the Council amending Directive 2003/87/EC as regards aviation's contribution to the Union's economy-wide emission reduction target and appropriately implementing a global market-based measure' COM(2021) 552 final, 14 July 2021.
[52]Commission (EU) 'Proposal for a Decision of the European Parliament and of the Council amending Directive 2003/87/EC as regards the notification of offsetting in respect of a global market-based measure for aircraft operators based in the Union' COM(2021) 567 final, 14 July 2021.
[53]Commission (EU) 'Proposal for a Directive of the European Parliament and of the Council amending Directive (EU) 2018/2001 of the European Parliament and of the Council, Regulation (EU) 2018/1999 of the European Parliament and of the Council and Directive 98/70/EC of the European Parliament and of the Council as regards the promotion of energy from renewable sources, and repealing Council Directive (EU) 2015/652' COM(2021) 557 final, 14 July 2021.
[54]Commission (EU) 'Proposal for a Directive of the European Parliament and of the Council on Energy Efficiency (recast)' COM(2021) 558 final, 14 July 2021.
[55]Commission (EU) 'Proposal for a Regulation of the European Parliament and of the Council amending Regulations (EU) 2018/841 as regards the scope, simplifying the compliance rules, setting out the targets of the Member States for 2030 and committing to the collective achievement of climate neutrality by 2035 in the land use, forestry and agriculture sector, and (EU) 2018/1999 as regards improvement in monitoring, reporting, tracking of progress and review' COM(2021) 554 final, 14 July 2021.

the obligations to assess the periodical progress and the consistency of measures with the binding objective.[61] In comparison, the revisions and proposals of regulatory instruments in the Fit for 55 package focus on delivering the immediate target by 2030 in real terms. The immediate target by 2030 is accompanied by many more detailed obligations (further discussed below), while the pathways to the 2050 objective still await periodical planning and assessments later based on the progress until 2030.

The substantive obligations under the European Climate Law and the legislative proposals included in the Fit for 55 package generally have a high degree of prescriptiveness. Both the 2050 objective and 2030 target are set out with the wording of 'shall' under Article 2 of the European Climate Law; the sectoral targets of emissions reduction or carbon removal in line with the 2030 targets (summarized in Table 1) are also phrased as 'shall' obligations. Meanwhile, certain flexibilities for compliance, such as banking and transferring emissions reduction or net removals between Member States (Article 5 of the Effort Sharing Regulation and Article 12 of the LULUCF Regulation), soften the prescriptiveness.[62] Compared with the current climate and energy policy framework adopted in 2018, more ambitious sectoral targets as proposed in the Fit for 55 package limit the flexibilities and strengthen the prescriptiveness of the updated 2030 target. The limited flexibilities are reflected in, for instance, the one-off reduction of emission cap allowance under the revised ETS Directive and also the revised Article 7 of the Effort Sharing Regulation. The revised Article 7 limits the use of LULUCF flexibility by separating it into two time

[61]European Climate Law (n 36); the objective, targets and the obligations are set out in art 2, art 4(1) and arts 6–7, respectively.

[62]Oberthür (n 12) 22. Oberthür argues that the flexibilities limit but not undercut the prescriptiveness of the current 2030 climate and energy framework modified in 2018.

periods of 2021–2025 and 2026–2030, each capped by a maximum amount of total net removals.

The precision (what, who and by when) of substantive obligations varies in different documents. As a framework regulation on climate change, the European Climate Law manifests a low degree of precision in specific targets and mandates. It leaves details to complementary legislation in policy areas of climate, energy, transport, buildings land use and forestry. The revised LULUCF Regulation is an example of high precision because it clearly defines the commitments and targets of GHG removals in three periods, expanding the applicable land accounting and reporting categories and sectors progressively.[63] In addition to the commitments and targets adopted at the Union level, an annual national target of net GHG removals is also required from 2026 onwards.[64]

The proposals for a revised Energy Efficiency Directive and a revised Renewable Energy Directive demonstrate a mixture of high and low prescriptiveness and precision. Both directives only stipulate 2030 targets at the Union level, and national targets remain indicative. The former counterbalances this by, inter alia, providing a formula for calculating Member States' energy efficiency contributions,[65] establishing a binding energy-first principle,[66] introducing specific binding obligations on the public sector,[67] and a binding energy savings obligation.[68] For the latter, new targets relating to mainstreaming renewable energy in buildings and industry sectors promote the precision of targets.[69] More substantial procedural obligations also counterbalance the lack of nationally binding targets in both directives under the Governance Regulation.[70]

Essential procedural obligations of planning, assessing, reporting and monitoring in the Governance Regulation and the European Climate Law demonstrate high prescriptiveness and precision. The Governance Regulation provides for standard rules for planning, reporting and monitoring the implementation of the strategies and measures designed to meet the EU's energy and climate objectives and targets consistent with the Paris Agreement. The 'shall' requirements for the Member States to make integrated national energy and climate plan every 10 years are highly prescriptive and precise.[71] Such a plan shall indicate national objectives, targets and contributions for dimensions including 'decarbonization', 'renewable energy' and 'energy efficiency'. Member States shall also report biennially about implementing the plan to the Commission and the UNFCCC[72] and establish national inventory systems to estimate GHG emissions by sources and removals by sinks.[73] The Governance Regulation also requires the Commission to monitor and assess Member States' progress towards the targets, objectives and contributions set in their national plans.[74] The European Climate Law also provides for clearly defined procedural obligations for the Commission to, among others, assess the Union's progress of implementing it and the consistency between the Union's and national measures with the climate neutrality objective.[75] The procedural obligations also include aligning the review of the operation of the European Climate Law with the global stocktake referred to in Article 14 of the Paris Agreement.[76]

To ensure compliance with the binding climate targets of emission reductions or removals, the provisions on compliance and consequences of noncompliance crucially affect the stringency and credibility of these targets. In general, the current climate and energy law regime already enjoy a high level of stringency for effective implementation and enforcement[77] and the revisions of the LULUCF further strengthen it. First, in general, a Member State's failure to comply with its obligations under EU law can trigger an infringement procedure launched by the Commission (and may involve the Court of Justice of the EU).[78] Second, the Governance Regulation mandates the Commission to monitor Member States' implementation of their obligatory targets. The Commission shall comprehensively review the national inventory data reported by the Member States for the compliance check under Article 14 of the LULUCF Regulation and Article 9 of the Effort Sharing Regulation.[79] Third, the consequences of noncompliance are available under the current Effort Sharing Regulation and a new penalty is added into the LULUCF Regulation. Article 9 of the Effort Sharing Regulation maintains a penalty of 8 percent of the gap between the annual emission allocation and the reviewed GHG emissions for a Member State in a specific year as well as a temporary prohibition from transferring its annual emission allocation to another Member State. If the Commission finds that a Member State has not made sufficient progress in meeting its specific obligations, it shall submit to the Committee a corrective action plan.[80] A new Article 13c of the LULUCF Regulation stipulates that the noncompliance with the binding national annual targets for net GHG removals from 2026 onwards will lead to a penalty of 8 percent of the gap between the assigned target and the net removals reported in the given year.

3.2 | Adaptiveness of the legal framework for climate neutrality in the EU

If the EU is to meet its long-term objective, the transition towards a climate-neutral economy in the EU will take approximately three decades. The dynamism of various mitigation approaches, including

[63]The new Article 4 in the proposal for revising the 2018 LULUCF Regulation (n 55) defines targets in three periods with a high degree of specificity. From 2031 onwards, the scope of the Regulation will be expanded to include non-CO_2 emissions from the agriculture sector, thus covering the whole land sector with one climate policy instrument.
[64]ibid.
[65]Energy Efficiency Directive (n 40) Annex I.
[66]ibid art 3.
[67]ibid arts 5–7.
[68]ibid art 8.
[69]Renewable Energy Directive (n 39) arts 15a and 22a.
[70]For a discussion on how the Governance Regulation mitigates the non-binding nature of national renewable energy targets, see A Monti and B Martinez Romera, 'Fifty Shades of Binding: Appraising the Enforcement Toolkit for the EU's 2030 Renewable Energy Targets' (2020) 29 Review of European, Comparative and International Environmental Law 221.
[71]Governance Regulation (n 42) art 3.
[72]ibid art 17.
[73]ibid art 37 and Annex V.
[74]ibid Chapter 5.
[75]European Climate Law (n 36) arts 6–7.
[76]ibid art 11.
[77]Monti and Martinez Romera (n 70) 223.
[78]TFEU (n 48) art 258.
[79]Governance Regulation (n 42) art 38.
[80]Effort Sharing Regulation (n 38) art 8.

possible interactions between strategies and measures and the setting of prioritized measures and actions in different time periods, indicates the extent to which the legal framework is adaptive.

As examined in Section 3.1, the joint effort predominantly includes a reformed EU ETS, increased GHG reduction targets in non-ETS sectors, the progressive integration of the land sector into climate policies and the more ambitious 2030 targets on energy efficiency and renewable energy. For a long time, the EU ETS has been criticized for not interacting with renewable energy and energy efficiency policies in a way that contributes to the achievement of EU's climate goals, particularly because superfluous emission allowances may impede coal phase-outs and the development of low-carbon technologies.[81] The revision of the ETS Directive responds to this via, among others, a one-off reduction of the overall emission cap by 117 million allowances and increasing annual rate of reduction to 4.2 percent. The increased ambition in ETS sectors is expected to have positive implications for renewable energy policies. Moreover, to increase emission reductions generated from road transport and building sectors, a new ETS for road transport and buildings in 2026 (Chapter IVa of the revised EU ETS Directive) will be combined with the continuous inclusion of those two sectors under the Effort Sharing Regulation. This combined approach seeks to incentivize fuel suppliers to decarbonize their product through a price signal, while still enabling national governments to take action, for example, by investing in infrastructure and promoting building renovation.

Regarding the priorities, 'just transition' can currently be considered an overarching principle that guides the EU's legal and institutional reform to be consistent with climate neutrality in a fair and equitable approach. In addition to a range of new initiatives (e.g. a new Just Transition Mechanism for the most vulnerable regions, industries and workers for the period 2021–2027), the new Regulation on Social Climate Fund contained in the Fit for 55 package, in the form of binding instrument, aims to address any social impacts arising from the establishment of a new ETS for road transport and building sectors by supporting vulnerable households, micro-enterprises and transport users. The establishment of new mechanisms and new funds at the outset of the journey towards climate neutrality demonstrates the EU's attitude of treating just transition as a prioritized policy area. These new mechanisms and funds can help ensure the societal transition in a desired direction and can also promote compliance with emission reduction targets set out to achieve climate neutrality.

In the portfolio of mitigation approaches, CCS is a special one, as it is supported in limited policy contexts and in the short term. On the one hand, CCS is treated as a priority area for commercial applications of breakthrough technologies in the European Green Deal.[82] On the other hand, it plays a supplementary role in contributing to climate neutrality, as the EU takes the standpoint that the selection of net-zero strategy should 'prioritize direct emission reductions and actions conserving and enhancing the EU's natural sinks and reservoirs and should only aim for the use of carbon removal technologies where no direct emission reduction options are available'.[83] In the short term and medium term (until 2030), CCS is expected to play a crucial role in blue hydrogen production, while in the long-term (2030–2050), the EU will instead develop renewable hydrogen produced by wind and solar energy to be compatible with the EU's climate neutrality objective.[84]

Another aspect of the adaptiveness of the legal framework relates to legal institutions and processes that facilitate the transformation of society. The adaptiveness of the climate and energy policy framework is prominently reflected in the processes of making plans, assessing the progress and measures and monitoring and reviewing emission reductions and GHG removals (as contained in the European Climate Law and the Governance Regulation). Transparent and regular reporting on Member State obligations coupled with robust compliance checks are fundamental elements that demonstrate the stringency of targets and enable adjusting plans, strategies and measures to socio-economic changes to ensure progress in delivering long-term commitments.

The European Climate Law is adaptive also because of the forward-looking and iterative approach to setting periodical targets. As the European Parliament stated in the early stages of the proposal on a new European Climate Law, 'it should be kept up to date, reflecting developments in the EU legal framework and the review cycle of the Paris Agreement'.[85] Paragraphs 3–6 of Article 4 of the European Climate Law lay down the procedure of setting a binding Union 2040 target, taking into account the results of periodical (every 5 years) assessments and reviews as referred to in Articles 6 and 7, as well as the outcomes of the global stocktake. The requirement of setting the 2040 target reflects the adaptiveness of this regulation to changing circumstances, as it would effectively bridge the implementation of the 2030 target and the projection of GHG emissions for the period 2030–2050. Meanwhile, the 2050 objective under the European Climate Law adds certainty and stability to the EU's climate policy framework, balancing flexibility and providing investment certainty.[86]

4 | CHINA'S CARBON NEUTRALITY OBJECTIVE AND ITS LEGAL FRAMEWORK

Despite some flexibility regarding how China's 2060 objective can be achieved based on the existing projections and forecasts, all the

[81] A Zaklan, J Wachsmuth and V Duscha, 'The EU ETS to 2030 and Beyond: Adjusting the Cap in Light of the 1.5°C Target and Current Energy Policies' (2011) 21 Climate Policy 778; A Löschel and O Schenker, 'On the Coherence of Economic Instruments: Climate, Renewables, and Energy Efficiency Policies' in I Parry, K Pittel and HRJ Vollebergh (eds), *Energy Tax and Regulatory Policy in Europe: Reform Priorities* (MIT Press 2017) 135, 155.

[82] European Green Deal (n 4) 8.

[83] 2019/2582(RSP) (n 45) para 13. See also European Climate Law (n 36) art 4(1): '[w]hen implementing the target referred to in the first subparagraph, the relevant Union institutions and the Member States shall prioritise swift and predictable emission reductions and, at the same time, enhance removals by natural sinks'.

[84] 'Blue hydrogen' refers to the production of 'decarbonized' hydrogen by applying CCS to the traditional route of making hydrogen via steam methane reforming. S van Renssen, 'The Hydrogen Solution?' (2020) 10 Nature Climate Change 799; Commission (EU) 'A Hydrogen Strategy for a Climate-Neutral Europe' (Communication) COM(2020) 301 final, 8 July 2020.

[85] 2019/2956(RSP) (n 45) para 12.

[86] D Torney and R O'Gorman, 'Adaptability versus Certainty in a Carbon Emissions Reduction regime: An Assessment of the EU's 2030 Climate and Energy Policy Framework' (2020) 29 Review of European, Comparative and International Environmental Law 167.

pathways point to four essential strategies. They include decarbonizing power generation through ramping up clean energy (i.e. nuclear and renewables); electrifying end-use such as transport, industry, heating and cooling; accelerating fuel switching to cut down coal consumption; and adopting carbon removal technologies such as CCS or offsetting through new forest growth.[87] These strategies are indispensable on their own, but they are also dependent on one another. As the biggest energy producer and consumer, especially of coal, China can only achieve the carbon neutrality target through structural changes to energy production and consumption and, more importantly, through phasing out fossil fuels.[88] Relative to other sectors, electricity provides more significant opportunities for emissions reduction in the short term due to the promotion of renewable energy generation and the increasing competitiveness of wind and solar power. Large-scale electrification of end-use sectors requires the decarbonization of electricity generation to create a critical enabling condition for fuel switching. Otherwise, the increased electricity demand is likely to be met by coal power and delay the process of retiring coal power plants. In addition, the current forecast and modelling suggest that coal and gas would still make up more than 10 percent of the electricity production under the carbon-neutral scenario by 2050.[89] The share of fossil fuel-based power generation needs to be paired with CCS to remove the CO_2 that would otherwise be released into the atmosphere. Deploying CCS provides an alternative that allows the continued use of fossil fuels in sectors where a complete phase-out is challenging or technically impractical.[90]

As discussed below, these four strategies, to some extent, have been incorporated into China's national policy and its regulatory system towards decarbonization. In September 2021, China's top leadership released the Working Guidance that provides the general guidelines, main targets and essential strategies to peak carbon emissions before 2030 and eventually achieve carbon neutrality by 2060.[91] The general guidelines contained in the Working Guidance emphasize the need to strengthen planning and policymaking towards carbon neutrality at the central government level and improve the monitoring of local actions and local accountability. These guidelines are consistent with the existing target allocation approach used since China's adoption of its first domestic climate target. The Working Guidance contains the near-term targets to be achieved by 2025 and 2030 with a sufficient level of specificity, and these targets are aligned with the goals and targets set by the existing planning documents, such as the 14th Five-Year Plan (FYP). The essential strategies in the Working Guidance focus on the decarbonization pathways for industrial structure adjustment and for specific sectors (energy, transport and urban–rural development), technological innovation (developing green technology and carbon sinks) and supporting systems (legal framework, monitoring, reporting and verification of emissions, supervisory system and policy support). Although the policy documents generally lack binding force, they provide the relevant content to understand the possible measures and instruments to be adopted in the future.

Still, these measures and instruments' stringency and formal status vary significantly in the Chinese context. Given the importance of the energy sector for China's decarbonization and the lack of a framework climate law in the country, the energy law system in China provides a concrete example to assess the adaptiveness of the relevant legal framework.

Worth noting is that some municipal governments have enacted local regulations to govern activities related to carbon neutrality,[92] echoing the encouragement by the Working Guidance to 'support localities with the favourable conditions … in taking the lead in carbon dioxide peaking'.[93] We recognize that the bottom-up approaches initiated by local governments will be an important supplement to the measures and systems from the national government. However, given that the Working Guidance emphasizes the need to strengthen policymaking and strategy formulation at higher levels of government, leverage institutional strengths to ensure implementation and hold party committees and governments responsible, this article only focuses on top-down measures and arrangements.

4.1 | Stringency of the carbon neutrality objective

As discussed in the analytical framework, the stringency of the target in a country's specific context is determined by the formal status of the target, its scope, how the targets are set and key factors affecting implementation. As China's first long-term climate goal, the carbon neutrality commitment provides an opportunity to align China's policies with the Paris Agreement's temperature goal. However, China's ambitious climate objective has been greeted by some commentators

[87] S Mallapaty, 'How China could be Carbon Neutral by Mid-century' (2020) 586 Nature 482; M Meidan, 'Unpacking China's 2060 Carbon Neutrality Pledge' (Oxford Institute of Energy Studies, December 2020)<https://www.oxfordenergy.org/wpcms/wp-content/uploads/2020/12/Unpacking-Chinas-carbon-neutrality-pledge.pdf>.

[88] Currently, China's economy is heavily dependent on fossil fuels which account for 85 percent of the energy mix in the country. China's power sector is a prime example of being fossil fuel-intensive, in which coal-fired power generation still accounts for 65 percent of the electricity supply and over 40 percent of China's CO_2 emissions. 'The Role of China's ETS in Power Sector Decarbonisation' (Tsinghua University and International Energy Agency 2021)<https://iea.blob.core.windows.net/assets/61d5f58d-4,702-42bd-a6b6-59be3008ecc9/The_Role_of_China_ETS_in_Power_Sector_Decarbonisation.pdf>.

[89] KJ Jiang, et al., 'Transition of the Chinese Economy in the Face of Deep Greenhouse Gas Emissions Cuts in the Future' (2021) 16 Asian Economic Policy Review 142; Institute of Climate Change and Sustainable Development, 'Launch of the Outcome of the Research on China's Long-term Low-carbon Development Strategy and Pathway' (Tsinghua University 2020)<https://www.efchina.org/News-en/Program-Updates-en/programupdate-lceg-20201020-en>.

[90] Asian Development Bank (ADB), 'Roadmap for Carbon Capture and Storage Demonstration and Deployment in the People's Republic of China' (ADB 2015)<https://www.adb.org/sites/default/files/publication/175347/roadmap-ccs-prc.pdf>.

[91] Working Guidance for Carbon Dioxide Peaking and Carbon Neutrality in Full and Faithful Implementation of the New Development Philosophy (中共中央 国务院关于完整准确全面贯彻新发展理念做好碳达峰碳中和工作的意见) (Central Committee of the Communist Party of China (CCCPC) and the State Council 2021)<http://www.gov.cn/zhengce/2021–10/24/content_5644613.htm>.

[92] For instance, Tianjin has adopted a local regulation to promote the realization of CO_2 peaking and carbon neutrality. Regulation to Promote Carbon Dioxide Peaking and Carbon Neutrality (天津市碳达峰碳中和促进条例) (adopted by the Standing Committee of Tianjin Municipal People's Congress on 27 September 2021). Shenzhen has issued a city-level policy design which seeks to achieve carbon neutrality. Work Plan for Constructing An Inclusive Low Carbon Development System (深圳碳普惠体系建设工作方案), Shenzhen Municipal People's Government Order No. (2021)92, 13 December 2021.

[93] CCCPC and State Council (n 91) para 34.

with caution, as they raise the concern that the pledge is not supported by any specific plans.[94] From a legal and regulatory point of view, the first main question is whether and how the carbon neutrality objective will be translated into legal obligations by the detailed breakdown of the climate targets in China. The second question is to what extent the objective can steer dramatic changes of China's energy portfolio in the years to come.

The cautious attitude towards China's carbon neutrality commitment is partly because of the objective's status, which is a political commitment rather than a legally binding commitment under China's domestic law. This explains the lack of details and specificity as to how China will meet the long-term carbon neutrality target, at least for the time being, although the Working Guidance issued by the CCCPC and State Council provides some framework guidelines in this regard. As China strived to recover from the COVID-19 pandemic, its GHG emissions in 2021 went up, driven by increased emissions from key emitting industries such as power generation.[95] An astonishing 38.4 GW of new coal-fired power plants was permitted in China in 2020 to boost economic growth, while the net capacity of coal power in the rest of the world decreased.[96] This has raised serious concerns about the stringency of China's carbon neutrality target and the feasibility of the mounting task to achieve massive emissions reductions in the country's carbon-intensive industries.

Currently, China's carbon neutrality objective is yet to be specified by a set of incremental targets from now to 2060. The goal to peak GHG emissions before 2030 is simply the first step of a long march. Since the announcement of China's first climate-related target in 2009 at the Copenhagen Climate Summit, the Chinese central government has relied on the FYPs to guide macroeconomic development and shape the specificity of law and policymaking in the area of climate mitigation. As the first FYP after the announcement of China's carbon neutrality commitment, the 14th FYP provides an initial example to measure how the long-term vision has already (or not) changed the policy directions in the short term. As a continuation of the previous FYPs, China's 14th FYP sets an 18 percent reduction target for CO_2 emissions intensity and a 13.5 percent reduction target for energy intensity.[97] Both are assessed against China's unit gross domestic product (GDP) from 2021 to 2025. Unfortunately, the 14th FYP does not contain any official lines defining whether China's carbon neutrality target includes only CO_2 or all GHG emissions nor does it include any absolute emissions reduction target or incremental targets in the short term or long term.[98] Several scholars have questioned the stringency of China's CO_2 intensity target because the targets proposed so far are less ambitious, and a moderate and higher GDP growth will still leave space for the continuing growth of CO_2 emissions while achieving the intensity target.[99]

Given that the 14th FYP has yet to incorporate any radical changes in China's emissions control pathways, it is very likely that the emission growth rate will slow down modestly in 2020–2025 and hopefully come to a halt in 2025–2030.[100] The 14th FYP includes formulating an action plan to peak China's emissions before 2030.[101] The action plan has been confirmed by Mr Xie Zhenhua, China's special envoy for climate change affairs, as an essential part of the central-level guidelines to help specify sector-based implementation plans.[102] It is expected that the action plan will detail the roadmap and timeline, together with the more detailed targets for China's energy sector instituted through the sector-specific plans, to ensure that the near-term target is attainable.[103]

The overall decentralized governance, especially in China's energy sector, has weakened the central government's capacity in managing the outcomes of the target system. It means that the Chinese central government must rely on provincial governments to deliver the desired results by breaking down the national target into provincial ones.[104] Within the provincial boundaries, government authorities at each administrative level are responsible for further distributing the assigned target by the higher-level government and allocating more specific targets among subordinate governments, relevant departments and selected high energy-consuming enterprises.[105] This target allocation structure, known as the 'three-level energy use management system',[106] has formed the basic framework for distributing China's climate goals by 2030 and 2060.

To achieve the desired goals, a centrally managed target system in the context of GHG emissions control and carbon neutrality in China needs to be paired with a robust enforcement system where implementation and verification of the allocated targets to the lower-level governments can be ascertained.[107] Penalties for noncompliance are also an essential aspect of the enforcement system to ensure robust implementation at the lower level, which will ultimately enhance the stringency of the target itself. Instead of legal obligations

[94]Mallapaty (n 87); Meidan (n 87).
[95]L Myllyvirta, 'China's Carbon Emissions Grow at Fastest Rate for more than a Decade' (Carbon Brief, 20 May 2021)<https://www.carbonbrief.org/analysis-chinas-carbon-emissions-grow-at-fastest-rate-for-more-than-a-decade>.
[96]'China Dominates 2020 Coal Plant Development. Aggressive Pursuit of Coal Puts 2060 Carbon-Neutral Goal at Risk' (Global Energy Monitor 2021)<https://globalenergymonitor.org/wp-content/uploads/2021/02/China-Dominates-2020-Coal-Development.pdf>.
[97]The 14th Five-Year Plan for the National Economic and Social Development of the People's Republic of China and the Outline of the Long-term Goals for 2035 (中华人民共和国国民经济和社会发展第十四个五年规划和2035年远景目标纲要) (State Council, 13 March 2021)<http://www.gov.cn/xinwen/2021-03/13/content_5592681.htm>(14th FYP).
[98]NCSC (n 8).
[99]ZX Zhang, 'In What Format and under What Timeframe would China Take on Climate Commitments? A Roadmap to 2050' (2011) 11 International Environmental Agreements: Politics, Law and Economics 245; JH Yuan, Y Hou and M Xu, 'China's 2020 Carbon Intensity Target: Consistency, Implementations, and Policy Implications' (2012) 16 Renewable and Sustainable Energy Reviews 4970; Y Li, YG Wei and D Zhang, 'Will China Achieve Its Ambitious Goal? Forecasting the CO_2 Emission Intensity of China towards 2030' (2020) 13 Energies 2924.
[100]L Myllyvirta et al, 'Political Economy of Climate and Clean Energy in China. Opportunities and Limits of International Influence on the Chinese Emissions Pathway' (Heinrich Böll Foundation 2020)<https://www.boell.de/sites/default/files/2021-01/Clean_Energy_in_China_endf.pdf>.
[101]14th FYP (n 97) Chapter 38, Section 4.
[102]NCSC (n 8).
[103]ibid.
[104]EA Cunningham, 'The State and the Firm: China's Energy Governance in Context' (Boston University 2015)<https://www.bu.edu/gdp/files/2017/07/Chinas-Energy-Working-Paper.pdf>.
[105]Comprehensive Workplan for Energy Conservation and Emissions Reduction during the 13th Five-Year Period ("十三五"节能减排综合工作方案), State Council Order No.(2016) 74, 20 December 2016, para 40.
[106]ibid; the three levels refer to the provincial, municipal and county level government.
[107]G Kostka, 'Command without Control: The Case of China's Environmental Target System' (2015) 10 Regulation and Governance 58.

or consequences, the central government has resorted to administrative mandates and penalties for China's carbon and energy intensity targets. During the 13th FYP period, the State Council explicitly stated that the binding targets are integral to the cadre responsibility and evaluation system. Under this system, the central government agencies assess the performance of the provincial leaders annually.[108] Repeated unsatisfactory results from the annual performance review may affect their promotion or even lead to penalties such as removal from the current position or redeployment to a remote area.[109] The provincial governments are held accountable for failing to achieve the assigned carbon and energy intensity reduction targets. The provincial leaders are also held accountable through 'nam[ing] and sham[ing] and having talks with central government officials'.[110] Depending on the severity of noncompliance by provincial authorities, the penalties may also include suspension of approval for high energy-consuming projects and reduction or suspension of financial support from the central government. For enterprises, the performance of target completion is to be incorporated into the social credit record system, which affects their abilities to loans and other financing means.[111] The state-owned enterprises and their managing personnel are subject to the same cadre management system and performance evaluation.[112]

In practice, however, these penalties have not been used vigorously due to two main reasons, leaving a big question about the bindingness of China's climate target. The first reason is that the targets are not ambitious, mainly because of their relative nature that leaves discretion and leeway to central policymakers in terms of putting constraints on emissions growth. The second reason is central government agencies' supervision and enforcement capacity to ensure targets assigned to lower-level governments are appropriately achieved. As China's GDP has maintained moderate growth in the past decade despite slowing down, accomplishing the targets by lower-level governments does not require a significant reduction of CO_2 from industrial processes.[113] China surpassed the carbon intensity target (an 18 percent reduction) during the 13th FYP.[114] The 14th FYP sets the target again at 18 percent, indicating a lack of ambition. The lack of ambition and relatively easy target accomplishment does not challenge or exert any pressure on the existing regulatory and institutional arrangements.

The existing literature has discussed the weakness of the monitoring and enforcement mechanisms under China's environmental target system,[115] although it was not publicly acknowledged until the Central Inspections on Environmental Protection (CIEP) openly criticized the National Energy Administration for its weak enforcement capacity to control the further expansion of China's coal-fired power generation capacity.[116] Under the carbon neutrality goal, the scope and stringency of the targets will have to be significantly enhanced from the existing ones, which will pose immense pressure on the existing regulatory and monitoring framework that is vulnerable to local influences. This explains that the Working Guidance issued by the CCCPC and State Council has called for 'reinforcement of local responsibility' and 'tightening oversight and assessment' through assigning the targets under the carbon neutrality goals greater weight in the assessment of local officials and ensuring that the implementation shall be subject to the CIEP.[117]

4.2 | Adaptiveness of the relevant legal framework

In the absence of a standalone climate law or energy law, the relevant legal framework underpinning China's pursuit of carbon neutrality consists of a group of loosely connected laws and regulations designed to facilitate renewable energy development, energy efficiency improvement and electrification. This section focuses on China's energy laws and the relevant legal system because they present a specific example for analysis. Energy sector decarbonization is at the centre stage of China's pursuit of peaking emissions and carbon neutrality.

Overall, the national energy laws in this area serve more as overarching guidelines because they often lack concrete or specific approaches or ideas for implementation.[118] For instance, the Renewable Energy Law (REL) has adopted four supporting mechanisms to promote the installation of renewable energy generation capacities.[119] While China has become a pioneer of the energy transition with more wind and solar power deployment than any other country, its legal and regulatory system governing renewable energy integration has yet to be fully developed.[120] China's Energy Conservation Law (ECL) is another salient example of national laws lacking sufficient details to guide implementation.[121] The ECL has laid down the legal basis for some key processes and systems essential for China's climate mitigation effort. These processes and systems include a national target system,[122] industrial energy efficiency standards to regulate investment,[123] promoting decarbonization in the transportation sector

[108]Comprehensive Workplan (n 105) para 41.
[109]Kostka (n 107).
[110]Comprehensive Workplan (n 105) para 41.
[111]ibid.
[112]ibid.
[113]Li et al (n 99); Myllyvirta et al (n 100).
[114]Ministry of Ecology and Environment: The 13th Five-Year Plan has Achieved Remarkable Results in Addressing Climate Change (生态环境部:"十三五"应对气候变化工作成效显著) (NDRC 2021)<https://www.ndrc.gov.cn/xwdt/ztzl/2021qgjnxcz/bmjncx/202108/t20210827_1294892.html?code=&state=123>.
[115]Kostka (n 107).
[116]CIEP's Feedback to the NEA on the Inspection Results (中央第六生态环境保护督察组向国家能源局反馈督察情况) (National Energy Administration (NEA) 2021)<http://www.nea.gov.cn/2021-01/29/c_139707466.htm>.
[117]CCCPC and State Council (n 91) para 34.
[118]AC Liu, 'China's Legal System: Sources of Law and Institutions Related to Climate Change' in XB He, H Zhang and A (eds), *Climate Change Law in China in Global Context* (Routledge 2020) 6.
[119]Renewable Energy Law of the People's Republic of China (中华人民共可再生能源法) (adopted by the Standing Committee of the National People's Congress in February 2005 and amended in 2009) arts 7 (renewable energy target) 14 (mandatory connection and priority access to the grid network), 19 (feed-in tariff) and 24 (cost-sharing mechanism).
[120]SF Zhang, P Andrews-Speed and ST Li, 'To What Extent will China's Ongoing Electricity Market Reforms Assist the Integration of Renewable Energy?' (2018) 114 Energy Policy 165.
[121]Energy Conservation Law of the People's Republic of China (中华人民共节约能源法) (adopted by the Standing Committee of the National People's Congress in October 1997 and amended in 2007 and 2018 respectively).
[122]ibid art 6.
[123]ibid art 13.

(e.g. through electric vehicles),[124] reducing indirect emissions,[125] data reporting by key energy users[126] and financing support required to support energy conservation and efficiency improvement.[127] However, these provisions merely offer general guidance, and implementation of the law requires more specific and detailed arrangements, approaches and ideas. Therefore, public regulators and policymakers at the central government level often use departmental rules and policies to supplement the national laws to provide specificity.

The lack of consistency in policymaking and lax enforcement has affected the legal framework's adaptive capacity to respond to the new processes and systems required by the carbon neutrality objective. China's REL and its supportive regulatory framework, which is central to China's pursuit of the carbon neutrality goal, provide a concrete example in this regard. Over the past decade, the implementation of feed-in tariffs in China has driven a steady and significant investment in wind and solar power generation.[128] Article 14 of the REL requires renewable energy generators to be given mandatory access to the grid.[129] Further, electricity generated from renewable energy is to be granted priority access to the grid.[130] Unfortunately, the rapid increase in renewable energy capacity has led to very high curtailment levels in some provinces of China in the mid-2010s, creating a significant problem for the decarbonization of China's power sector.[131] One of the fundamental causes of the curtailment problem is that, despite the repeated effort to reform the power sector, China's dispatch regulation is still yet to be updated to accommodate the changes in the power sector's fuel mix.[132] To ensure investment recovery for investors owning generation assets, the basic principle of dispatch regulation in China is so-called equal dispatch, which allocates the operating hours for baseload equally among generators in the same technological class.[133] Equal dispatch ensures fairness among generators in the same technological class towards investment recovery. Still, overall, it inhibits the low-carbon transformation of China's power sector and its improvement towards cost-effectiveness.

China's efforts to create a more resilient and adaptive energy legal system that can respond to changes are challenged by the historic focus in China on assuring adequate supplies of energy to support economic growth. This approach ensures investment recovery and regulated pricing rather than sector transformation or energy transition. Arnold and Gunderson's argument on how the legal regime is maladaptive due to its systematically narrow focus to advance stability and security of supply of single systems provides a valuable perspective to understand this phenomenon in China.[134] Resilience theory points out that too much focus on optimization is most likely to weaken the system itself over the long term, increasing its vulnerability to both internal and external shocks.[135] In China, the long-standing focus on sustainable energy supply, which is intrinsically related to economic development, has trumped other objectives and goals essential to the transformability of the energy system itself. The adaptiveness of the system of Chinese energy law ensures the energy system's fundamental role to ensure reliability, which is central to the primary goal of energy law. For the legal system to be adaptive, it is also necessary to recognize and embrace the diversification of the energy mix and to commit to low-carbon development and energy system transformation through more explicit goals for regulatory and institutional improvement. Nonetheless, the relevant Chinese laws have yet to incorporate these goals. As stated in the Working Guidance, the legal and regulatory arrangements incompatible with the need to achieve carbon neutrality are to be removed, including the specific examples discussed above related to China's renewable energy legal system.

In China, the extent to which the adaptive capacity of the energy law and system can be improved to facilitate the energy transformation is mainly uncertain under an energy governance system characterized by regulatory fragmentation. On the one hand, the provincial authorities and the energy State-owned enterprises are increasingly powerful to determine the outcomes of energy sector development. On the other hand, the National Energy Administration has been strained between enforcing national energy laws and regulations and being resisted and pushed back by provincial authorities against undesired new laws and regulations. The maladaptiveness of China's energy legal system is also due to the National Energy Administration's weak supervisory and enforcement capacity, as recognized by the CIEP.[136] The essential features of Chinese energy law and governance that are maladaptive can be categorized into the following: too much focus on the reliability of the energy sector under the prevailing goals of political and economic stability; fragmented governance and regulatory structure and arrangements, which make the Chinese energy law system resistant to change; and lack of adequate regulatory tools and robust supervision to steer lower-level governments towards a low-carbon energy transition.

5 | DISCUSSION

5.1 | Stringency of the climate or carbon objectives

A comparison of the EU's and Chinese carbon or climate neutrality targets highlights at least three significant differences in the stringency of the climate objective between the two jurisdictions. First, regarding the formal status of the objective, carbon neutrality remains a political commitment in China. By contrast, the objective of climate

[124] ibid art 45.
[125] ibid art 48.
[126] ibid art 53.
[127] ibid art 66.
[128] Zhang et al (n 120).
[129] Renewable Energy Law (n 119).
[130] ibid.
[131] NEA, 'Press Conference of NEA on Performance of China's Electricity Sector in 2017' (January 2018)<www.nea.gov.cn/2018-01/24/c_136921015.htm>.
[132] Regulatory Assistance Project, 'Issues in China Power Sector Reform: Generator Dispatch' (July 2016)<https://www.raponline.org/wp-content/uploads/2016/07/rap-kahrl-dupuy-wang-china-generator-dispatch-reform-july-2016.pdf>.
[133] ibid.
[134] Arnold and Gunderson (n 26) 10428–10,429.
[135] Humby (n 26) 108–109.
[136] NEA (n 116).

neutrality is already enshrined in the European Climate Law and other relevant legal instruments. EU law provides a certain degree of certainty and predictability to Member States and investors by setting clear near- and long-term targets,and establishing consequences for noncompliance. Given China's existing target management system, it is highly likely that the carbon neutrality target will be manoeuvred through the existing administrative establishment for target allocation and appraisal rather than being translated into legal obligations. In this sense, China may provide an alternative approach to realize a political ambition. However, the absence of a robust enforcement system, lack of effective accountability mechanism and the uncertainty over the future direction of China's economic transition increase the degree of unpredictability and uncertainty of the administrative measures pertaining to carbon neutrality.

Second, the EU and China differ in terms of the scope of the long-term objective and various short-term targets of emission reductions or removals. The EU clarifies that its climate targets include all primary GHG emissions. Accordingly, the EU has put in place a comprehensive legal framework, setting out specific targets in different sectors and policy areas, mainly in the form of binding obligations with a high degree of certainty and prescriptiveness (the main exceptions are the indicative national targets according to the Renewable Energy Directive and Renewable Energy Directive). Essential procedural obligations of planning, assessing, reporting and monitoring that are contained in, among others, the Governance Regulation and the European Climate Law are also highly prescriptive and precise. In comparison, China's carbon neutrality objective lacks specificity and incremental plans, which leads to uncertainty and unpredictability as to how the objective will be achieved. China has yet to announce officially whether its climate neutrality objective is GHG-wide or limited to CO_2. The scope of the objective will determine whether the agriculture sector and methane- or nitrogen-intensive industries will be included in China's regulatory framework. If it remains unresolved, the lack of details and clarity in China's carbon neutrality plan will significantly curtail the stringency of the objective and its binding effect on local governments to steer the decarbonization process.

Third, regarding compliance with the binding climate targets of emission reductions or removals, the procedural obligations on the Member States to make national inventory plans and to report their periodical progress and on the Commission to review Member States' national inventory plans and to monitor the progress of mitigation, as well as the penalties for noncompliance stipulated in the LULUCF Regulation and the Effort Sharing Regulation demonstrate a high degree of stringency. Compliance with directives is more challenging because of the different ways in which directives are transposed into national laws or the delays in the transposition by Member States.[137] In China, the approaches to implementing and enforcing climate targets are very different. The FYP remains the main policy instrument to institute the incremental target at the national level in a 5-year interval. Despite the well-established system and processes to distribute the national target across lower levels of government, monitoring target accomplishment at the local level still lacks rigidity. There is not yet an effective accountability system in China. Given China's political culture, the binding targets for GHG emission reductions are incorporated in cadre responsibility and evaluation, which provides the institutional and regulatory basis to enhance the stringency of the targets subject to more robust monitoring and enforcement.

5.2 | Adaptiveness of the relevant legal frameworks in the EU and China

Three significant differences can be found in the adaptiveness of the relevant legal and governance systems between the EU and China. First, regarding the interactions between different mitigation strategies and mechanisms, the EU's approach in which all relevant regulatory instruments were discussed and issued during the same period promotes their coherence. China's pursuit of carbon neutrality is likely to be supported by a group of loosely connected laws and regulations due to the lack of a standalone climate law or energy law. The general feature of its national laws in this area is that the provisions lack specific rules to guide implementation. Departmental rules and policies are often used to supplement national laws to provide specificity, but these rules and policies are often vulnerable to inconsistency and lax enforcement.

Second, concerning the setting of priorities among strategies, actions and funding, one clear priority is that the notion of just transition has been broadly integrated into the EU's policies for climate neutrality. Such a priority would help ensure that society's transformation occurs in the desired direction. As argued by Sikora, the European Green Deal is a good opportunity for the green transition. Still, the success of delivering the climate objective is firmly anchored in the concepts pertaining to the constitutional framework of the EU legal order, in particular, solidarity, fairness and a high level of environmental protection.[138] By contrast, the consideration for vulnerable groups or places and the emphasis on justness in green transition is absent in China's current legal and regulatory systems. In addition, China's efforts to create a more resilient energy legal system are challenged by existing legal institutions and processes resistant to energy decarbonization. The existing legal institutions and processes are prone to carbon lock-in and diminish the effort towards energy diversification and transition.

Third, regarding the legal institutions and processes that facilitate the transformation of society, the availability of a mechanism for updating immediate targets (for 2040) in the European Climate Law is a vital indicator of the capability of a legal system to reflect on progress and adjust periodical goals towards a long-term objective. Moreover, procedural obligations, including planning and reporting by Member States and monitoring and reviewing by the Commission, serve multiple functions. They are crucial for both stringency of

[137]Commission (EU) 'Monitoring the Application of European Union Law 2020 Annual Report' (Report) COM(2021) 432 final, 23 July 2021.

[138]A Sikora, 'European Green Deal – Legal and Financial Challenges of the Climate Change' (2021) 21 ERA Forum 681.

targets and the legal framework's adaptiveness. The procedural requirements simultaneously safeguard transparency in implementation, promote compliance and provide opportunities for fine-tuning the trajectory for achieving climate neutrality when disturbances arise. There is an evident difference that China has yet to formulate a detailed midterm target or develop procedural mechanisms which support establishing such targets. Worth noting is that China's reliance on the administrative system to formulate and allocate targets could fill such a gap. The lack of clear incremental targets or procedural requirements grants policymakers the flexibility to adjust target formulation and implementation based on socio-economic development. However, the flexibility may come at the expense of certainty to drive low-carbon and decarbonization investments, which may undermine China's trajectory towards carbon neutrality.

5.3 | Beyond the similarities and differences

In a comparative study, 'one does not gain much by simply listing the similarities and differences one discovers'.[139] Although the EU has developed a comprehensive legal framework underpinning climate neutrality, whereas China is still in its infant stage, it does not imply that the EU's legal framework should (or can) be transferred to China.[140] To answer the research questions of this article, it is more important to discover the extent to which the Chinese legal system (in a broad sense) will be able to find its proper degree of stringency and adaptiveness to deliver carbon neutrality effectively. We must be aware of the distinct legal and political contexts, which determine that China and the EU will not take the same approach to achieve a common goal. China's approaches of relying on the planning and guiding policies issued by the Communist Party and ensuring compliance by the cadre responsibility and evaluation system may not present a 'worse' institutional or regulatory system but rather diversified approaches of achieving an ambitious goal. This finding echoes the stringency theory that the manifestation of stringency includes more than the bindingness of regulatory instruments.[141] However, the effectiveness of those distinctive ways awaits future empirical evidence in the coming decades. If not too speculative, we can expect China to stick to its established target allocation system and assessment regime. However, its regulatory framework will need some significant changes to be compatible with the carbon neutrality objective.

What China can learn from the EU's experiences is twofold. Regarding stringency of the target, enhancing the target's specificity and a robust institutional setting to safeguard its enforcement is fundamental to enhance its stringency. For a more adaptive legal framework, it is important to tackle the regulatory fragmentation in the legal institutions and processes and prioritize areas essential to the energy transition (e.g. renewable energy integration). The enforcement capacity of Chinese central government agencies also needs to be enhanced to support the smooth implementation of measures and instruments on carbon neutrality.

Meanwhile, it is also important to note that the Fit for 55 legislative package and other climate policies in the EU are still in progress, which means that the assessment of stringency and adaptiveness in this article is provisional. The EU will face, for instance, its geopolitical challenges to energy security, which could (temporarily) disturb its adherence to the targets and subsequently require action for more affordable, secure and sustainable energy.[142]

6 | CONCLUSION

Through the lenses of stringency and adaptiveness, this article has reviewed the current legal frameworks for achieving net-zero emissions in the EU and China. The combined stringency and adaptiveness assessment provides a relatively complete picture, including both static and dynamic elements of the legal framework that either support or restrict the setting of the ultimate objective and the adjustment and implementation of immediate and/or sectoral targets.

This article reveals, first, that, to date, the EU is undoubtedly much more advanced than China in integrating climate or carbon neutrality into its climate and energy policy and governance framework. China's carbon neutrality objective remains a political commitment, albeit not necessarily less stringent. But it currently poses uncertainty and unpredictability regarding target achievement as it lacks specificity and a robust enforcement mechanism. This comparative study also shows that the EU and China are taking distinct pathways to the common goal of climate or carbon neutrality: The EU sets economy-wide substantive targets together with procedural obligations, which ensure implementation and adaptability, whereas China relies on the existing planning system and the administrative structure for target allocation, management and appraisal. Without enhancing the enforcement capacity of central government agencies to steer the decarbonization processes, China's approach remains maladaptive because it is vulnerable to the influences of regulatory fragmentation, local protectionism and vested interests.

Based on this article, we can expand our research in several directions. First, the judiciary's role in affecting the implementation and enforcement of climate targets certainly merits exploration. Second, public participation in the periodical review of climate targets and decision making can be elaborated upon, because they constitute essential factors that affect the adaptiveness of the legal systems on climate or carbon neutrality in both jurisdictions. Third, with new policies and instruments on climate or carbon neutrality unfolding in the EU and China, future research can examine the progress, revision and implementation mechanisms in more detail. A particular focus would

[139] K Zweigert, H Kötz, *Introduction to Comparative Law* (3rd edn, Oxford University Press 1998) 44.

[140] The discussion on transferability is beyond the scope of this article. See, e.g., C Joachim, 'European Union and Chinese Environmental Protection – Some Comparative Elements' (2020)<https://hal.archives-ouvertes.fr/hal-03429322/document>.

[141] Oberthür (n 12); Bodansky (n 15).

[142] Commission (EU), 'Joint European Action for more Affordable, Secure and Sustainable Energy' (8 March 2022)<https://ec.europa.eu/commission/presscorner/detail/en/ip_22_1511>.

be whether the stringency and adaptiveness assessments can help reveal the extent to which the legal framework can continuously promote the delivery of targets in post-COVID 19 recovery in both jurisdictions. In addition, beyond a doctrinal examination, a legal–sociological approach could bring added value in exploring how legal, political and administrative culture and traditions in China will facilitate the development of its distinctive pathway towards a stringent and adaptive legal framework for carbon neutrality.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable as no datasets were generated or analysed in this article.

ORCID

Hao Zhang https://orcid.org/0000-0003-2429-5336

AUTHOR BIOGRAPHIES

Haomiao Du is a postdoctoral researcher at the Utrecht Centre for Water, Oceans and Sustainability Law, Utrecht University. Her research focuses on international and comparative climate law.

Hao Zhang is an Assistant Professor at the Faculty of Law, The Chinese University of Hong Kong. His research focuses on energy and environmental law, and he is the deputy programme director of the LLM programme (energy and environmental law).

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