

GETTING READY TO TAKE STOCK OF THE GLOBAL ENERGY TRANSITION

THE COMPLEXITY OF THE PARIS COMMITMENTS,
ENERGY SECURITY, AND GEOPOLITICAL UNCERTAINTY



CIEP acts as an independent forum for governments, non-governmental organizations, the private sector, media, politicians and all others interested in changes and developments in the energy sector.

CIEP organizes lectures, seminars, conferences and roundtable discussions. In addition, CIEP members of staff lecture in a variety of courses and training programmes. CIEP's research, training and activities focus on two themes:

- European energy market developments and policy-making;
- Geopolitics of energy and climate policy-making and energy markets

CIEP is endorsed by The Netherlands Ministry of Economic Affairs and Climate Policy, Ministry of Foreign Affairs, Air Liquide Industrie B.V., BP Nederland, Coöperatieve Centrale Raiffeisen-Boerenleenbank B.A. ('Rabobank'), ENGIE Energie Nederland N.V., Neptune Energy Netherlands B.V., Eneco Holding N.V., EBN B.V., Esso Nederland B.V., Equinor ASA, GasTerra B.V., N.V. Nederlandse Gasunie, ING Wholesale Banking N.V., Nederlandse Aardolie Maatschappij B.V., Vattenfall NL, TenneT TSO B.V., One-Dyas B.V., Havenbedrijf Rotterdam N.V., RWE Generation NL B.V., Shell Nederland B.V., Uniper Benelux N.V., Koninklijke Vopak N.V., Wintershall Dea Nederland B.V.

Find CIEP publications at www.clingendaelenergy.com/publications.

The content of all CIEP publications is the sole responsibility of CIEP and cannot be attributed to the partner organisations.

TITLE

Getting Ready to Take Stock of the Global Energy Transition

SUBTITLE

The Complexity of the Paris Commitments, Energy Security, and Geopolitical Uncertainty

AUTHOR

Susann Handke, PhD

COPYRIGHT

© 2023 Clingendael International Energy Programme (CIEP)

NUMBER

2023 | 01

DESIGN

Studio Maartje de Sonnaville

PUBLISHED BY

Clingendael International Energy Programme (CIEP)

ADDRESS

Breitnerlaan 299, 2596 HA The Hague, The Netherlands

TELEPHONE

+31 70 374 67 00

EMAIL

ciep@clingendaenergy.com

WEBSITE

www.clingendaenergy.com

GETTING READY TO TAKE STOCK OF THE GLOBAL ENERGY TRANSITION

THE COMPLEXITY OF THE PARIS COMMITMENTS,
ENERGY SECURITY, AND GEOPOLITICAL UNCERTAINTY

TABLE OF CONTENTS

EXECUTIVE SUMMARY	9
1 INTRODUCTION: THE PERSISTENT UNTIMELINESS OF THE UN CLIMATE REGIME	11
2 PARIS PROCESS: NEW INSTITUTIONS, NEGOTIATION LEGACIES, AND VITAL ADDITIONAL TOPICS	19
2.1 The global stocktake as institutionalised debate about climate change mitigation	19
2.2 The geopolitics of coalitions in climate negotiations	21
2.3 Adding vital energy-related topics to the debate	25
3 COOPERATION UNDER THE PARIS AGREEMENT: MAJOR PLAYERS AND THEIR ACTIONS	29
3.1 Reconsidered: Current Paris commitments	31
3.2 Repositioning: Domestic impetus for international action	36
4 DISJOINTED: CURRENT INTERNATIONAL RELATIONS AND PATHWAYS FOR ENERGY COOPERATION	57
4.1 Understanding the bifurcation of the global economy	57
4.2 Accomplishing the energy transition despite the systemic divide	64
5 TAKING STOCK - PROPERLY, PLAUSIBLY, AND PUBLICLY!	69
REFERENCES	73

EXECUTIVE SUMMARY

Institutions entail a story about the future. They matter not only in the brief moment when they are conceived but also reveal which changes those who make rules, design procedures, and establish regular dialogue formats expect to occur, and how they want to deal with possible challenges to the rules' objectives. The energy transition unfolds in a world of strategic risk and geopolitical uncertainty. Rules that facilitated international economic exchange in the past decades seem outdated. Established in a more cooperative era, for many countries these rules can no longer provide enough guidance on navigating the challenges of transforming the energy system in a way that also ensures the countries' energy security and overall strategic autonomy.

The current international scene sees the emergence of many cooperation formats in the field of energy that seek to establish partnerships in order to combine evolving domestic legislation and long-term energy transition policies with a nascent layer of international governance. For uncharted territory, such as the development of the hydrogen economy or the coordination of mineral policies, small groups seem to be most viable. However, when it comes to insights into the progress of reducing global greenhouse gas emissions and paths to climate neutrality, broad participation is essential. The global stocktake under the UN climate regime can become such an information-sharing forum: It comes with a global scope; and Decision 19/CMA.1, which details its procedures, stipulates that it is "party-driven." When the global stocktake will be held for the first time in late 2023, the parties to the UN climate regime need to decide how this institution can best serve the decarbonisation of the global economy.

The global stocktake as an evaluation procedure is a new mechanism under the Paris Agreement. After 2023, it will take place every five years. The successful conduct of the first global stocktake is a matter of great importance. The implementation of the Paris Agreement will to a large degree depend on a meaningful completion of this first assessment round, mainly because the stocktake is the basis for discussing further, more ambitious mitigation commitments.

The geopolitics of the energy transition and international climate negotiations are increasingly coinciding. In recent years, structural shifts in the global economy

re-contextualised both the transformation of the global energy sector and international cooperation to achieve the Paris goals. The first global stocktake is being carried out in a moment of geopolitical strife and geo-economic fragmentation. The global economy is split into a space in which the United States and its allies cooperate and a Chinese-led transnational realm of economic activity. Disagreement about the governance of economic affairs also politicises international institutions such as the UN climate regime.

However, industrial stakeholders in the energy sector and energy consumers alike have an interest in a further institutionalisation of the Paris process. The Paris Agreement's set-up is able to adjust to a changing world if the parties to the Agreement use its institutions in a forward-looking way. The global stocktake is a case in point. If the parties succeed in conducting its final part at COP28 focusing on substance and future cooperation, this mechanism can develop into a routine to exchange vital information about the energy transition beyond the assessment of the global emissions trajectory. The inclusion of key aspects of the global energy transition seems to be a way forward for meaningful conversations.

Studying the energy transition policies of the four largest greenhouse gas emitters, i.e. China, the United States, the EU, and India, reveals the need for regular updates on developments that shape the transformation of the energy sector and frequently require policy adjustments. Considerations regarding energy security challenges, the transition work in heavily coal-dependent regions, and policy implementation by sub-national governments are essential parameters that primarily determine the progress of domestic energy transition policies. Institutionalised exchange about these issues, either as part of the global stocktake or in addition to the formal meetings can help to build trust and inspire new forms of cooperation. Hence, there is a need for a proper debate about the results of the global stocktake and future climate action: The international community cannot afford to politicise this event.

1 INTRODUCTION: THE PERSISTENT UNTIMELINESS OF THE UN CLIMATE REGIME

For more than three decades, the international community has been trying to limit global warming. The UN climate regime is the predominant legal regime to structure international climate cooperation. It came into being with the adoption of the United Nations Framework Convention on Climate Change (UNFCCC) during the 1992 Earth Summit in Rio de Janeiro, Brazil.

Adopted in 2015, the Paris Agreement is the regime's third treaty. Since 2020, this Agreement has been the main legal instrument on which the parties¹ to the UN climate regime rely to coordinate their efforts to mitigate climate change. Cooperation under this Agreement builds on the parties' national climate and energy policies, the so-called Nationally Determined Contributions (hereafter NDCs). The parties to the Agreement are required to regularly submit these NDCs to the UNFCCC Secretariat.² Monitoring and review procedures help to keep track of how the parties implement their commitments. These procedures seek to ensure the compatibility of the parties' efforts with the dual goal of the Paris Agreement, i.e. limiting global warming to 1.5 to 2°C, compared to pre-industrial levels, and achieving global climate neutrality during the second half of this century.

In 2020, the parties submitted their national climate policies or updated previously communicated submissions. The implementation of these policies requires several years. The Paris Agreement includes a review process, the so-called global stocktake, that assesses the parties' progress in implementing their self-chosen commitments. In November 2023, this reoccurring review process will be concluded for the first time (see sub-section 2.1.). This paper does not intend to anticipate the content of the global stocktake, but takes the preparation for this assessment as its point of departure in order to ponder on the relationship between international climate cooperation and the complexities of the global energy system, including geopolitical uncertainties that will shape the third decade of this century.

1 As of 2022, 198 parties have ratified the UNFCCC, i.e. 197 states and one international economic integration organisation, the European Union. See, United Nations – Climate Change, "Status of Ratification of the Convention," <https://unfccc.int/process-and-meetings/the-convention/status-of-ratification-of-the-convention>.

2 The UNFCCC Secretariat hosts a lists of nationally determined contributions and tracks the countries' updates. See, United Nations – Climate Change, "Nationally Determined Contributions Registry," https://unfccc.int/NDCREG?gclid=Cj0KCQiA_bieBhDSARIsADU4zLcKINAmzQmFbimzu3UL_6ah1SuCbPpMJV5jvGKfgDyTAH66zdLXvqUaAo0DEALw_wcB.



NEGOTIATORS REJOICE AT THE ADOPTION OF THE PARIS AGREEMENT ON DECEMBER 12, 2015.

Generally, the adoption of a treaty that concerns the realms of socio-economic and environmental affairs inevitably resembles a snapshot of the international political economy. The treaty thus envisions future cooperation in the context of the global economic conditions of that particular moment in time. Furthermore, the treaty provisions also lock in the geopolitics of the regime. The relations between the parties in the context of an international legal regime unfold during the negotiation rounds, forming an additional layer of geopolitical strife. In the case of the UN climate regime, this strife points to the interaction of the major players as they seek to shape international climate cooperation under the Paris Agreement and its Rulebook. This additional layer of geopolitics draws its characteristics from both the legacy of more than 30 years of climate negotiations and the parties' interests related to emerging paths to climate neutrality.

After the adoption of a treaty, its provisions and the institutional set-up of implementation bodies reflect the successes of the prevailing coalitions and efforts to balance the interests of coalitions with different priorities. To state the obvious, every treaty is a compromise. It indicates and preserves the state of affairs at the time. Yet, through interpretation of its provisions the parties can choose to what extent they want to prolong the geopolitics of this moment into the future. The parties' wisdom and insight into the subject matter can help the treaty to communicate with any conceivable reality that takes shape after the treaty's entry into force.

To make the most of a treaty and honour its spirit, parties need to be able to work with the treaty and adapt their postures within the regime to changing circumstances. The success of international cooperation thus depends on the parties' willingness to embrace this engagement with both the treaty and the substantive affairs to which it applies. This paper aims to consider the cooperation under the Paris Agreement in the light of a radically changed energy landscape, mounting geopolitical challenges, and growing uncertainty about the future trajectory of the global economy. The paper examines both the international level and the largest emitters' domestic actions that this paper understands as the emerging compound field of energy, climate, and industrial policy.

Undeniably, the global energy landscape of 2023 is very different from the situation that the parties of the UN climate regime faced when they compiled and submitted their climate strategies in 2020. Three developments are primarily shaping the current dynamics:

- (1) the impact of the coronavirus pandemic on the global economy, especially related to shifting supply chains that also affect the transformation of the energy system;
- (2) the policy responses to Russia's full-scale invasion of Ukraine in February 2022 and their effects on international energy flows and prices; and
- (3) the shifting trends in the international political economy, which are mainly driven by the politics of U.S.-China trade relations and growing unpredictability of China's future development path.

The changes and profound challenges that these developments brought about caused many countries to re-assess their energy and climate policies; and they will significantly influence efforts to implement these strategies in the near future. Arguably, under these circumstances economic decision-making, especially in energy affairs, requires attention for mechanisms that enhance resilience, supply diversification, cooperation, and transparency.³ Undoubtedly, the availability of market data is vital for managing the transition to a new climate-neutral energy system. But timely information about and analyses of government policies that guide the energy sector are also aspects worth considering in a world of volatility and scarcity. Institutionalised international exchange on these critical issues is the topic of this paper. To detect structural changes in the global economy, the paper examines

3 El-Erian, Mohamed A., "Not Just Another Recession: Why the Global Economy May Never Be the Same," *Foreign Affairs*, 22 November 2022; Bordoff, Jason, and Meghan L. O'Sullivan, "The Age of Energy Insecurity: How the Fight for Resources Is Upending Geopolitics," *Foreign Affairs*, 10 April 2023.

major players' domestic energy and climate legislation. It then discusses ongoing institutional adjustments in the context of the evolution of international climate cooperation and the challenges of the energy transition.

The global energy transition was already underway when the parties of the Paris Agreement began to coordinate international climate cooperation under this treaty. By that time, the business community, policymakers, and the public in many countries were aware of multiple challenges that were likely to delay or complicate the transition to global climate neutrality. Yet, the impact that the combination of the above-mentioned developments has had on international climate cooperation came unexpected and has far-reaching implications. (These issues will be discussed in more detail below, especially in Chapter 4.)

In the history of the UN climate regime, the current situation is not the first time that the world has changed dramatically between the adoption of a treaty under the regime and the start of its implementation. The adoption of the UNFCCC in 1992 created the institutional basis for international climate cooperation. Yet, it took the parties five years to agree on first substantive steps to mitigate climate change. These initial measures were included in the 1997 Kyoto Protocol. Under this treaty, only developed countries were obliged to implement measures to limit or reduce their emissions of greenhouse gases.

The Kyoto Protocol entered into force in 2005. In 1997, the parties to the UN climate regime dealt with the global economy that awaited China's entry into World Trade Organization (WTO). The dot-com bubble was yet to blow up (and bust). After China acceded to the WTO in 2001, its companies massively increased their exports of manufactured goods. Based on cheap labour and subsidised energy, China realised an unprecedented expansion of its GDP during the first decade of the 21st century, while increasing its consumption of fossil fuels substantially.⁴ Subsequently, China's expanding energy and industrial sectors⁵ caught up with developed countries with respect to the emission of greenhouse gases.⁶ However, as a developing country

4 In 2001, China consumed 5.041 million b/d of oil, 27.7 bcm of natural gas, and 520.6 million tonnes of oil equivalent (Mtoe). After a decade of vast economic growth, the numbers for 2010 show a considerable increase: 9,057 million b/d of oil, 109.0 bcm of natural gas, and 1,713.5 Mtoe of coal. BP, "Statistical Review of World Energy," June 2002, pp. 9, 25, 32; BP, "Statistical Review of World Energy," June 2011, pp. 5, 23, 33.

5 Between 2004 and 2014, China's primary energy consumption almost doubled, rising from 1,573.1 Mtoe to 2,972.1 Mtoe. BP, "BP Statistical Review of World Energy 2015," June 2015, p. 40.

6 China surpassed the United States as largest emitter of greenhouse gases during the 2000s. By 2019, it was responsible for about one third of all annual global greenhouse gas emissions, which was more than the emissions of all OECD member states combined. Rhodium Group, "China's Greenhouse Gas Emissions Exceeded the Developed World for the First Time," 6 May 2021, <https://rhg.com/research/chinas-emissions-surpass-developed-countries/>.

China did not have any obligations under the Kyoto Protocol to limit or reduce its greenhouse gas emissions.

The first round of reduction efforts under the Kyoto Protocol, the so-called first commitment period, lasted from 2008 to 2012. By that time, the imagination of rules-based global economic exchange – the “WTO consensus” – already began to falter.⁷ The world economy was on the cusp of transitioning to a system that in many instances displays a systemic divide between those countries that (still) primarily seek to adhere to the WTO consensus and an increasingly global, Chinese-led realm of economic interdependence.⁸ Thus, the beginning of the third decade of the 21st century coincides with the commencement of a “new era of great power competition and strategic rivalry.”⁹ For some countries, depending on the subject issues, including energy relations and trade in raw materials, this rivalry offers benefits, as they try to play off the two main opponents.¹⁰ However, the changing premises of the evolving global order come with more volatility and uncertainty in international affairs. These developments contextualise both the institutionalisation of climate cooperation and practical aspects of the global energy transition.

Arguably, the Chinese leadership departed from the WTO consensus much earlier than policymakers in the West realised. Domestically, doubts about the workability of the export-led growth model and continued market reforms emerged around 2005.¹¹ Subsequently, economic statism experienced a resurgence.¹² The 2008 global financial crisis re-affirmed the Chinese leadership’s initial doubts about the utility of market forces, while emboldening the leaders’ confidence in the party-led economy.¹³ The reform era ended with Xi Jinping’s ascendancy to the posts of party

7 Yergin, Daniel, *The New Map: Energy, Climate, and The Clash of Nations*. New York, NY: Penguin Book, 2021, xvii.

8 The expansion of the BRICS in August 2023 exemplifies Chinese-led cooperation efforts. Quasi-multilateral forums and global diplomatic initiatives complement economic ties. By doing so, the Chinese leadership seeks to shape the international discourse on issues of development and security, as well as attempts to “repurpose” the United Nations. See for a summary of recent Chinese activities in this regard, Kynge, James, “China’s Blueprint for an Alternative World Order,” *Financial Times*, 22 August 2023.

9 Yergin, 2021, 445.

10 See how this ambivalence in the global economy and international relations unfolds, Russel, Alec, “The À la Carte World: Our New Geopolitical Order,” *Financial Times*, 21 August 2023.

11 See, Desmond Shum’s description of the domestic business environment around 2005, Shum, Desmond, *Red Roulette: An Insider’s Story of Wealth, Power, Corruption, and Vengeance in Today’s China*. New York, NY: Simon & Schuster, 2021.

12 See for an analysis of the evolution of domestic economic strategies, Friedberg, Aaron L., *Getting China Wrong*. Cambridge: Polity, 2022.

13 See for an assessment of the conclusions that the Chinese leadership drew following the global financial crisis related to the country’s further integration in the global economy, Shirk, Susan L., *Overreach: How China Derailed Its Peaceful Rise*. Oxford: Oxford University Press, 2023, 19.

and state leader in late 2012 and early 2013.¹⁴ In its foreign relations, China has been pursuing a more assertive course since about 2008, which is also reflected in a more forceful foreign economic policy and the presence of Chinese state-owned enterprises in many regions of the world.¹⁵ On the other hand, in many developed countries disenchantment with the economic consequences of hyper-globalisation grew during the 2010s, partially in response to China's posture. However, political and legal adjustments at the international level did not (yet) reflect this reality.

Accordingly, the Paris Agreement largely embraces the idea of pursuing prosperity by fostering global economic interdependence and free trade, despite the fact that at the time of its adoption considerable doubts and discontent already began to shape global economic affairs. Subsequent annual climate summits, the so-called conferences of the parties (COPs), were not intended to adjust the Agreement's basis in such a fundamental way. Instead, they focused on the completion of detailed rules to implement the Agreement, including the guidelines for the global stocktake. The resulting Rulebook was eventually finalised during the conference of the parties in Glasgow in late 2021.

A further accomplishment of this conference was the Glasgow Climate Pact. This final decision of the Glasgow climate summit called for "scaling up the deployment of clean power generation and energy efficiency measures, including accelerating efforts towards the phasedown of unabated coal power and phase-out of inefficient fossil fuel subsidies."¹⁶ Thus, during the Glasgow climate summit the parties to the UN climate regime for the first time took a decision that concerned the structure of the energy system.

The focus of the countries' NDCs on energy policies are testament to the emerging centrality of energy affairs in the global debate about coordinated international climate action. Therefore, it is worthwhile to consider the institutionalisation of the cooperation under the Paris Agreement together with the global energy landscape. This exercise sheds light on how the geopolitics of these two segments of international relations increasingly concur and affect each other. Inevitably, their interaction will shape the path to global climate neutrality.

14 The ascendancy of Xi Jinping completed China's political transition from norm taker to a strategy of proactively influencing global affairs based on its domestic situation. See for analyses of this transitional period, Minzner, Carl, *End of an Era: How China's Authoritarian Revival Is Undermining Its Rise*. Oxford: Oxford University Press, 2018.

15 See for an analysis of China's posture at the international level, Economy, Elizabeth C., *The World According to China*. Cambridge: Polity, 2022.

16 Glasgow Climate Pact, Decision 1/CMA.3 (FCCCC/PA/CMA/2021/10/Add.1), 8 March 2022, para 36.

This paper investigates how the institutionalisation of international climate cooperation that the Paris Agreement envisages can maintain its relevance and utility in a fast changing international political economy. The purpose of this paper is twofold. First, it provides an overview of both the legacies of the climate negotiations ahead of the global stocktake and the major parties' energy policies, together with the relevant geopolitical context. Second, it offers some thoughts on how the Paris Agreement's stocktake can become a cooperative exercise that facilitates international exchange about the future of the global energy system.

To streamline its account, the paper examines which elements of the global energy transition need to be included in the debate about the outcome of the global stocktake, at least when considering the transition's current stage. To find answers to this question, the paper studies the policies of the parties to the UN climate regime whose energy transition paths are vital for achieving global climate neutrality. Given the volume of their annual greenhouse gas emissions and their postures in global energy affairs, the paper discusses in greater detail the energy and climate policies of the European Union (EU), the United States (U.S.), China, and India. In the past, these actors played important roles in shaping the UN climate regime's institutions; and they will most likely further exert their influence on the trajectory of the UN climate regime.

The paper structures its account as follows. The next chapter briefly examines the institutions that facilitate the cooperation under the Paris Agreement, especially those that contribute to the global stocktake. It also shows how negotiation coalitions sought to influence the design of these institutions and the guidelines under which they operate. The third chapter provides an overview of the major players' commitments under the Paris Agreement as well as recent energy and climate measures. The fourth chapter considers the impact of increasing divisions in international economic affairs on the progress of the energy transition together with some forward-looking steps to cope with geopolitical uncertainty. The fifth chapter concludes with some thoughts on how the international community can preserve the spirit of the Paris Agreement despite geopolitical challenges and mounting obstacles on the path to climate neutrality.

2 PARIS PROCESS: NEW INSTITUTIONS, NEGOTIATION LEGACIES, AND VITAL ADDITIONAL TOPICS

With its reference to the future of the coal sector, the Glasgow Climate Pact constitutes a remarkable decision under the UN climate regime. For the first time, a final decision referred to changes in the global energy system in the context of mitigating climate change. Thus far, the UN climate regime only reluctantly moved towards a direct engagement with the energy sector.

When the UN climate regime was established during the early 1990s the negotiators were not yet aware of the central role that the energy sector needed to play, despite the sector's large component that relies on the combustion of fossil fuels. Greenhouse gas emissions were treated as a form of air pollution. From the outset, the regime evolved along the lines of other multilateral environmental agreements. This characteristic of the UN climate regime has consequences for the institutional set-up and the aims of negotiation coalitions. Yet, the adoption of the Paris Agreement and its Rulebook open up an opportunity to introduce more topics to the exchanges and cooperation under the UN climate regime. This Chapter provides an overview of the central function of the global stocktake for the cooperation under the Agreement. It also discusses prevailing negotiation legacies and vital energy-related topics that can help to inform the debate about international climate cooperation.

2.1 THE GLOBAL STOCKTAKE AS INSTITUTIONALISED DEBATE ABOUT CLIMATE CHANGE MITIGATION

The global stocktake is one of the innovations that the Paris Agreement added to the UN climate regime. Article 14 of the Paris Agreement summarises the task of the stocktake as an assessment of “the collective progress towards achieving the purpose of the Agreement and its long-term goals.”¹⁷ This assessment concerns mitigation, adaptation and the means of implementation and support, in the light of “the best available science.”¹⁸

17 Article 14 (1) Paris Agreement.

18 Ibid.

The outcome of this assessment has to inform the parties' successive NDCs. In other words, the global stocktake will reveal whether the scope of the parties' *collective* implementation efforts is adequate and to what extent they will have to intensify their work in order to achieve the Paris goals. Hence, a successful conduct of the stocktake is essential for the evolution of the parties' cooperation under the Paris Agreement and, specifically for guiding them towards increasingly ambitious commitments to mitigate climate change.

To facilitate the regular evaluation efforts, monitoring and review procedures were included in the Paris Agreement and further detailed in the Rulebook.¹⁹ The modalities of the stocktake are included in Decision 19/CMA.1 of the Rulebook. This Decision describes the global stocktake as a "Party-driven process conducted in a transparent manner and with the participation of non-Party stakeholders."²⁰ To this effect, all inputs to the stocktake should be online accessible.²¹ No doubt, these inputs, especially the state of greenhouse gas emissions and the parties' mitigation efforts, are of global public concern. Yet, the technical character of the assessment process complicates matters for a broader public.

After its conclusion in 2023, the global stocktake will be organised every five years. It can be imagined as an assessment procedure, consisting of three components, i.e. information collection and preparation, technical assessment, and the consideration of the outputs. The first two components take place in technical dialogues. These dialogues were held in Bonn, Germany, in June 2022, during COP27 in Egypt in November 2022, and again in Bonn in June 2023.²²

In addition, the UNFCCC Secretariat compiles the information that is needed for the debate about the stocktake's outcomes in several synthesis reports and addenda,²³ including one report and addendum on the state of greenhouse gas emissions and

19 See for a summary, Handke, Susann, "Regulating Post-Paris Climate Cooperation: The Geopolitics of Transparency, Flexibility, and Common Timeframes," CIEP Paper no. 2 (2021), <https://www.clingendaelenergy.com/inc/upload/files/CIEP-Paper-202102-web.pdf>, pp. 15–7.

20 Decision 19/CMA.1 – Matters Relating to Article 14 of the Paris Agreement and Paragraphs 99 – 101 of Decision 1/CP.21 (FCCC/PA/CMA/2018/3/Add.2), 19 March 2019, para 10.

21 Ibid.

22 See for an overview of the Global Stocktake, United Nations Climate Change, "Why the Global Stocktake Is a Critical Moment for Climate Action," <https://unfccc.int/topics/global-stocktake/about-the-global-stocktake/why-the-global-stocktake-is-a-critical-moment-for-climate-action>.

23 See for an overview of and links to the synthesis reports and addenda, United Nations Climate Change, "Global Stocktake Secretariat Synthesis Reports and Addendas," <https://unfccc.int/global-stocktake-secretariat-synthesis-reports-and-addendas>.

the parties' mitigation efforts.²⁴ A reflection on the outputs of the technical assessments forms the last component of the global stocktake and is part of the annual climate summit in the year during which the stocktake is concluded. Thus, the parties will finalise the first global stocktake during COP28;²⁵ and the outcomes of the global stocktake will be presented at "high-level events"²⁶ in the course of COP28 in the United Arab Emirates in late 2023.²⁷

The purpose of the global stocktake is to evaluate the parties' collective performance with respect to achieving the Paris goals. The outputs of the "high-level events" should "identify opportunities for and challenges in enhancing action and support for collective progress."²⁸ The outcomes should be summarised as "key political messages" and included "in a decision for consideration and adoption" by the parties to the Paris Agreement.²⁹ Thus, the conclusions of the deliberations will be added to the canon of decisions under the Agreement, further shaping the ideational and legal evolution of the UN climate regime.

2.2 THE GEOPOLITICS OF COALITIONS IN CLIMATE NEGOTIATIONS

The adoption of the Paris Agreement sought to solve a major structural deficiency of the Kyoto process that the second treaty of the UN climate regime initiated: Under the Kyoto Protocol, only developed countries were obliged to limit or even reduce their greenhouse gas emissions. As described above, this structural feature rendered the Protocol outdated before the cooperation began. In 2014, a bilateral initiative³⁰ – presented by the U.S. President Barack Obama and China's President Xi Jinping – paved the way for having all parties accept commitments under a new treaty, while

24 See United Nations Climate Change, "Secretariat GST Synthesis Report: Synthesis Report for the Technical Assessment Component of the First Global Stocktake State of Greenhouse Gas Emissions by Sources and Removals by Sinks and Mitigation Efforts Undertaken by Parties, Including the Information Referred to in Article 13, paragraph 7(a), and Article 4, paragraphs 7, 15 and 19, of the Paris Agreement," 31 March 2022, <https://unfccc.int/documents/461466>; and United Nations Climate Change, "Addendum to the Synthesis Report for the Technical Assessment Component of the First Global Stocktake: Overall Effect of the Parties' NDCs and Overall Progress Made by the Parties towards the Implementation of their NDCs, including the Information Referred to in Article 13, paragraph 7(b), of the Paris Agreement," 17 April 2023, <https://unfccc.int/documents/627853>.

25 See for an overview of the Global Stocktake, United Nations Climate Change, "Why the Global Stocktake Is a Critical Moment for Climate Action," <https://unfccc.int/topics/global-stocktake/about-the-global-stocktake/why-the-global-stocktake-is-a-critical-moment-for-climate-action>.

26 Decision 19/CMA.1, para 33.

27 See for more updated information, United Nations Climate Change, "Global Stocktake," <https://unfccc.int/topics/global-stocktake>.

28 Decision 19/CMA.1, para 34 (a).

29 Ibid, para 34 (b), (c).

30 The White House – President Barack Obama, "U.S.-China Joint Announcement on Climate Change," 12 November 2014, <https://obamawhitehouse.archives.gov/the-press-office/2014/11/11/us-china-joint-announcement-climate-change>.

at the same time the locale of deciding on the nature of the commitments shifted from the international to the national level. Hence, the Paris Agreement's main innovation are self-determined commitments for all parties.

The annual conferences of the parties that followed the adoption of the Agreement focused on the elaboration of its implementation rules. However, during the negotiations of the Rulebook the previous negotiation dynamics re-surfaced. These dynamics relate to the legacy of Annex I of the UNFCCC that listed the (mainly) developed, industrialised countries, which should take the lead in mitigating climate change. Thus, for most countries the institutionalised division in Annex I, which was based on the countries' level of economic development three decades ago, remains the dominant factor for aligning with coalitions in climate negotiations. Parties consistently choose their positions related to either side of the division that Annex I brought upon them.³¹

Generally, coalitions in international organisations or treaty regimes constitute key mechanisms that help the parties to facilitate and structure negotiations. Indeed, coalitions are useful for pooling resources, information, and expertise, especially for developing countries. Yet, coordinating negotiation positions with others also involves costs. Common positions inevitably constitute a compromise.³² Furthermore, in a heterogenous coalition reaching common positions is difficult. Therefore, it is most likely that the coalition's common positions reflect the interests and preferences of its most powerful members.³³

In the UN climate regime, more than 20 coalitions have existed throughout the history of the negotiations; and most of them are still active. Once they have formed a coalition, the members of such a coalition are reluctant to dissolve it.³⁴ Arguably, today's most noticeable grouping is the coalition of Like Minded Developing Countries (LMDC). It evolved from the G77 and China coalition when this group

31 Genovese, Federica, Richard J. McAlexander, and Johannes Urpelainen, "Institutional Roots of International Alliances: Party Groupings and Position Similarity at Global Climate Negotiations," *The Review of International Organizations*, 2 June 2022, <https://link.springer.com/article/10.1007/s11558-022-09470-4>, pp. 4, 7.

32 Klöck, Carola, Paula Castro, and Florian Weiler, "Coalitions in the Climate Change Negotiations," LIEPP Policy Brief (October 2021), https://web.archive.org/web/20220518073555id_/https://hal-sciencespo.archives-ouvertes.fr/hal-03409340/file/LIEPP-PB-55-Klock.pdf, pp. 2, 4.

33 Castro, Paula, "National Interests and Coalition Positions on Climate Change: A Text-based Analysis," *International Political Science Review* 42, no. 1 (2021): 110.

34 Klöck et al, 2021, p. 2.

began to fragment around 2010.³⁵ At that time, it became clear that a new treaty would restructure the UN climate regime and all parties would be expected to accept commitments to mitigate climate change. Some developing countries supported the reform efforts.

The countries that caucus as the LMDC, however, sought to preserve the differentiation of obligations based on the Annex I division of the parties.³⁶ They see the LMDC coalition as the true representation of developing countries' interests in the UN climate regime, despite the fact that the number of its members has not grown since the coalition's formation. It consists of a core group of 15 to 20 members.³⁷ Still, the coalition's influence on the UN climate regime's development is profound. The actions of the LMDC coalition during recent rounds of negotiations carry on the disruptive structural legacy of the Kyoto process, a deficiency that the Paris Agreement sought to end. No doubt, adhering to strict differentiation impedes the Agreement's implementation.

Recent research shows that LMDC submissions feature references to the principles of the UNFCCC,³⁸ which is a shorthand for supporting the differentiation paradigm. They often relate this topic to other issues that are being discussed. Among all groupings, the LMDC coalition delivered the most submissions regarding the implementation of the Paris Agreement, dealing with technical aspects of reporting and review, the guidance regarding the content and submission of NDCs, and the conduct of the global stocktake.³⁹

China and India are the most powerful members of the LMDC and successfully used the coalition to transmit their preferences in climate affairs to the international level.

35 From 2009 onwards, a number of developing countries that participate in the G77 group created new, smaller groups, based on national circumstances, such as the Climate Vulnerable Forum and the Mountainous Landlocked Developing Countries. Other developing countries sought to bridge the divide between industrial and developing parties in the UN climate regime, forming the Cartagena Dialogue and the Durban Alliance. China continued to participate in the G77 and China grouping and also established the BASIC group, together with Brazil, South Africa, and India, as well as the LMDC. See for an in-depth study on the role that groupings play in the climate negotiations, Blaxekjær, Lau Øfjord, and Tobias Dan Nielsen, "Mapping the Narrative Positions of New Political Groups under the UNFCCC," *Climate Policy* 15, no. 6 (2015): 751–66.

36 Castro, 2021, 97.

37 Blaxekjær, Lau Øfjord et al., "The Narrative Position of the Like-minded Developing Countries in Global Climate Negotiations," in *Coalitions in the Climate Change Negotiations*, ed. Carola Klöck et al. (London: Routledge, 2021), 127–8.

38 The principle of the UNFCCC apply to all treaties and decision under the UN climate regime. They are listed in Article 3 of the UNFCCC. The principle that points to the differentiation between developing and developed countries is the principle of common but differentiated responsibilities.

39 Castro, 2021, 108–9.

They also frequently reiterate the LMDC message in their individual submissions.⁴⁰ Obviously, their actions as emerging economies with large volumes of emissions are crucial for the meaningful implementation of the Paris Agreement. Both countries also play an important role in shaping the direction of post-Paris climate cooperation. During the closing session of the COP in Glasgow in 2021, for instance, China and India jointly changed the wording of the Glasgow Climate Pact that initially called upon the parties to accelerate “efforts towards the *phase-out* of unabated coal power,” settling on “efforts towards the *phasedown* of unabated coal power.”⁴¹

Undoubtedly, the implementation of the Paris Agreement will most likely be further influenced by the legacy of the Annex I-based division of the parties and the related differentiation of the parties’ obligations. Most recently, these issues resurfaced during a meeting of the Intergovernmental Panel on Climate Change (IPCC), inhibiting the adoption of a report that also contributes to the preparation of the global stocktake.⁴² The activities of the LMDC coalition and their members’ persistence show that the differentiation-based approach to climate cooperation still finds powerful supporters. For decades, its proponents have been able to include references to differentiation or ideational derivatives at crucial junctures in the evolution of the UN climate regime. Thus, it is likely that differentiation-themed submissions will also be presented during the debate about the outcomes of the global stocktake. The division of the parties is here to stay.

Nevertheless, variations among members of the group, such as the countries’ preferences and national energy situations, can help to create the conditions for a genuine debate. A shift to specific substantive issues can draw attention to matters that are essential for the mitigation of climate change and, in particular, for the global energy transition. To include in the global stocktake additional topics that are most relevant in this regard seems to be a promising approach, as the following subsection elaborates.

40 Ibid, 103, 110.

41 Glasgow Climate Pact, para 36. (italics added)

42 During the debate at the meeting of the IPCC, China more than once proposed to add “historical” emissions or responsibility to the text, despite the fact that UN climate regime does not include these concepts in assessing commitments under the regime. See, ENB, “Summary of the 58th Session of the Intergovernmental Panel on Climate Change,” 22 March 2023, https://enb.iisd.org/sites/default/files/2023-03/enb12819e_0.pdf, pp. 5, 14, 17; Hansen, Gerrit, “Destruktive Ambiguität brems Fortschritte im UN Klimaprozess,” SWP Paper, https://www.swp-berlin.org/publications/products/aktuell/2023A46_Bonn_UN-Klimaprozess.pdf, p. 2.

2.3 ADDING VITAL ENERGY-RELATED TOPICS TO THE DEBATE

The world is experiencing a “truly global” energy crisis.⁴³ Understanding the impact of the crisis is essential for meaningful exchange about national energy-related commitments under the UN climate regime. As Chapter 3 will show, the submissions to the UNFCCC Secretariat provide few details on how the parties can deal with the crisis. To comprehend ongoing energy transition trajectories, more substantive input to the debate seems necessary. This section discusses aspects that, at the current stage of the energy transition, are central to both responding to the energy crisis and upholding the Paris goals.

The causes of the global energy crisis developed during the pandemic. The sudden economic rebound after the most acute phase of the pandemic came to a close in most countries led to fuel shortages and rising prices. The impacts of Russia’s invasion of Ukraine in early 2022 exacerbated these trends. However, following both crises governments in the EU, U.S., and many other states responded by increasing investments in renewable energy and by accelerating policy measures to realise the energy transition. These inter-related trends will re-shape the international energy system in the coming years. Fruitful exchange about crucial aspects that guide energy governance can help improve international climate cooperation and contribute to mutual trust. This sub-section considers three topics, i.e. energy security, the role of sub-national governments, and transition processes in large coal-dependent regions.

The responses to the energy crisis were primarily driven by *energy security* considerations. Although energy supplies continue to be allocated by market forces, affordability and energy security of supply issues have recently emerged. These concerns will influence governments’ policy preferences. In some cases, this may lead to a stalling of energy transition investments, while other countries use the crisis to accelerate these investments. The countries’ financial resilience will to a large degree determine how they can digest the energy crisis, while staying on their energy transition course.

In other words, some governments may opt to (further) accelerate the low-carbon transition in order to become less dependent on imports of fossil fuels, while other governments may face situations where they need to slow down or delay the implementation of climate policies because of insufficient fuel supplies or supply shortages of critical components that are necessary for the utilisation of renewable

43 IEA, “Global Energy Crisis,” <https://www.iea.org/topics/global-energy-crisis>.

energy sources. Governments then might opt to prolong the use of fossil fuels, especially readily available coal supplies.

Accordingly, the low-carbon energy transition is not a linear process. As the immediate crisis responses have already shown, governments might be forced to allow energy companies to revert to previous energy consumption patterns, bringing the implementation of existing climate policies to a temporary halt. Although concerns about energy security are a vital component of the implementation of climate policies, this aspect is not explicitly part of the climate negotiations. Yet, the global stocktake seems to be an adequate occasion to share energy security concerns among the parties to the Paris Agreement, in order to contextualise the evaluation of global efforts to fulfil climate commitments, to increase trust among the parties, and to enhance the predictability of policy trajectories.

Another topic that deserves attention in the debates during the global stocktake is the progress that *sub-national governments and administrations* make in implementing climate measures. Efforts at these levels of governance are an important element of overall policy implementation, especially in countries with federal systems or devolved powers. The NDCs that the parties to the Paris Agreement submit generally summarise policy measures that national governments implement or plan to adopt. However, most of the transition work is realised in cooperation between energy companies and sub-national government bodies. At these levels, people and companies come up with innovative solutions and shape their countries' transition trajectories. The discussion about sub-national experiences with the promotion of the energy transition should preferably focus on best practices, which can promote constructive exchanges about the interaction between various levels of government and different stakeholders to realise the energy transition.

A third topic is the role of *coal* in the energy system and its relevance to climate change mitigation that the Glasgow Climate Pact sought to highlight. In this regard, the trajectories of heavily coal-dependent regions are particularly significant. Countries that heavily rely on the use of coal for their energy consumption display noteworthy regional differences with respect to the "exposure to coal."⁴⁴ In fact, coal mining in these countries is often concentrated in only one or a few regions. The transition to climate neutrality in these regions is crucial to achieving global climate neutrality. Yet, the trajectory that is most suitable for these regions will

44 IEA, "Coal in Net Zero Transitions: Strategies for Rapid, Secure and People-centred Change," November 2022, <https://iea.blob.core.windows.net/assets/4192696b-6518-4cfc-bb34-acc9312bf4b2/CoalInNetZeroTransitions.pdf>, p. 34.

considerably differ from the socio-economic policies that need to be adopted in other parts of the countries in question. Nevertheless, the developments in heavily coal-dependent regions and the success of climate policies there are vital for the progress of the countries' overall energy transition. The global stocktake provides a platform to specifically focus on the situation of heavily coal-dependent regions in developing countries and share best practices that help to realise a just and sustainable transition to climate neutrality.

To sum up, Decision 19/CMA.1, which details the rules of the global stocktake, suggests that the parties should learn from the experience of conducting the initial stocktakes, in order to improve its "procedural and logistical elements."⁴⁵ Substantive matters that enrich the debate need also be part of this learning process. The debate about the outcomes of the reports that contribute to the global stocktake will be shaped by the rules of Decision 19/CMA.1. Yet, it will also be influenced by the geopolitics of the climate negotiations that centre on the pursuit of differentiation. To avoid a resurgence of differentiation-themed debates and foster a constructive exchange about the outcomes of the stocktake, it is worthwhile to infuse concrete substantive issues into the discussion. These issues should be part of the assessments during the stocktake, preferably in the realm of the conference of the parties or, at least, inform the broader public deliberations that always accompany the annual climate summits. Keeping the spirit of the Paris Agreement alive means allowing its processes to communicate with the reality on the ground. The next chapter examines how this reality is evolving in the case of the parties whose economies emit the largest volumes of greenhouse gases per year.

⁴⁵ Decision 19/CMA.1, para 15.

3 COOPERATION UNDER THE PARIS AGREEMENT: MAJOR PLAYERS AND THEIR ACTIONS

The economic disruptions of the coronavirus pandemic resulted in a 5% drop in global greenhouse gas emissions in 2020. Yet, global emissions rose again in 2021, amounting to 49.5 gigatonnes of carbon dioxide equivalent (GtCO₂e). The four largest emitters were China with a share of 27%, the U.S. (11%), the EU (7%), and India (7%). Together they accounted for more than half of all global annual greenhouse gas emissions.⁴⁶

Figure 3.1 shows how the greenhouse gas emissions of these major players are expected to develop until 2030, considering their NDCs. The first bar is a reminder of the situation in 2015, the year when the Paris Agreement was adopted and the parties submitted their first NDCs. The second bar (only available for the EU) shows the effect of current policies on emissions until 2030, based on official data. The third bar gives an indication of the major players' emissions development until 2030, based on independent studies. The fourth bar reflects the implementation of the NDCs. In India's case a fifth bar displays the level of emissions if the conditional NDC is implemented. Finally, the horizontal line at 3 GtCO₂e/yr points to the exceptional position of the four largest emitters. In none of the other members of the G20 do annual emissions in these five categories exceed this level.⁴⁷

46 Rhodium Group, "Global Greenhouse Gas Emissions: 1990–2020 and Preliminary 2021 Estimates," 19 December 2022, <https://rhg.com/research/global-greenhouse-gas-emissions-2021/>.

47 UN Environmental Programme, "The Closing Window: Climate Crisis Calls for Rapid Transformation of Societies – Emissions Gap Report 2022." 27 October 2022, <https://www.unep.org/resources/emissions-gap-report-2022>, pp. 16–8.

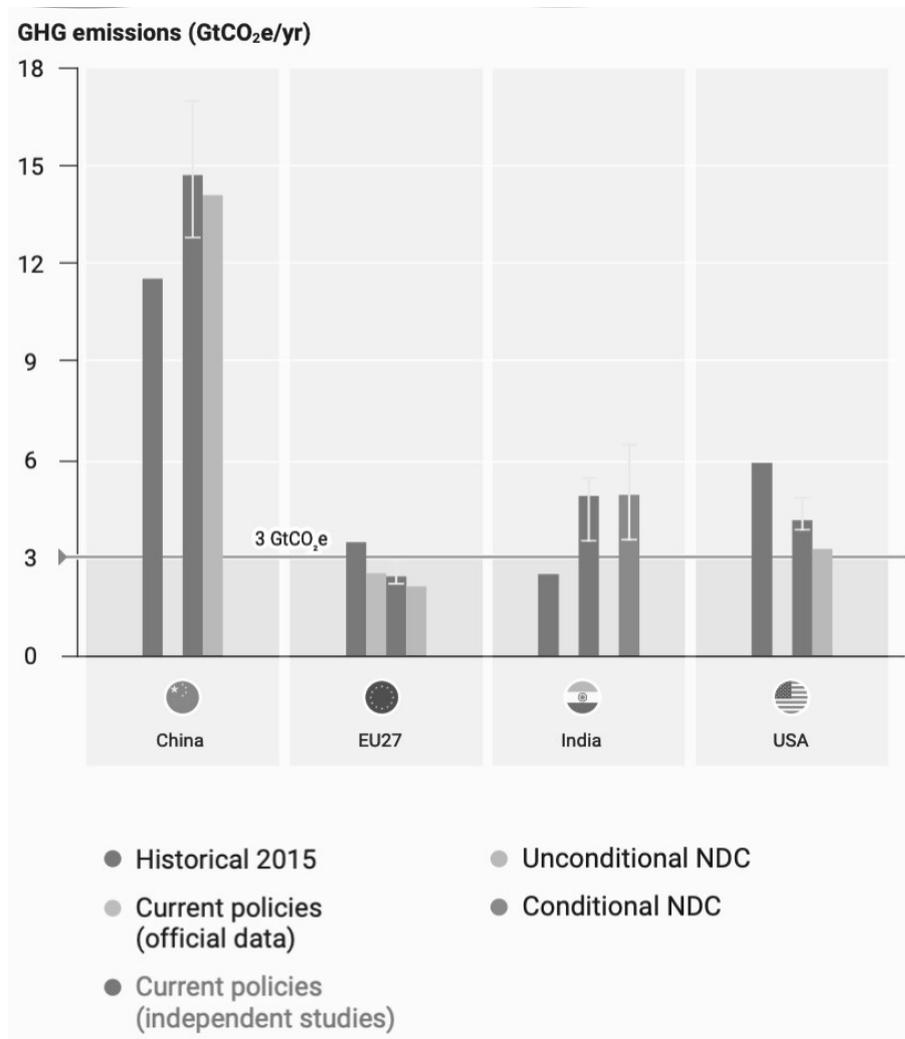


FIGURE 3.1: GREENHOUSE GAS EMISSIONS – ALL GASES AND SECTORS, INCLUDING LAND USE, LAND-USE CHANGE AND FORESTRY (LULUCF), GtCO₂e/YR – BY 2030 UNDER NDCs, COMPARED WITH 2015 HISTORICAL EMISSIONS

SOURCE: UNEP, 2022, P. 18.

In 2022, energy-related emissions of the four major emitters reached 20,697.2 million tonnes of CO₂ (MtCO₂), with China accounting for 10,550.2 MtCO₂, the U.S. for 4,825.8 MtCO₂, the EU for 2,725.4 MtCO₂, and India for 2,595.8 MtCO₂. Their combined emissions constituted two-thirds of all global energy-related emissions, which reached 34,374.1 MtCO₂ in 2022.⁴⁸ Thus, these emitters are major players in international climate affairs; and their energy and climate measures are vital for achieving the global Paris goals.

48 Energy Institute, "2023 – 72nd Edition Statistical Review of World Energy," 26 June 2023, <https://www.energyinst.org/statistical-review>, p. 14.

Accordingly, this chapter focuses on the actions of these emitters. It examines their plans for the energy sector, in order to understand the major emitters' positioning in international energy and climate governance. The first section of this chapter summarises the updated commitments that the major players submitted to the UNFCCC Secretariat. The second section considers their domestic energy transition,⁴⁹ including recent legislation and policy announcements. This helps to identify trends that emerge from the domestic political economy and institutional set-up. These trends are also likely to influence international climate cooperation.

3.1 RECONSIDERED: CURRENT PARIS COMMITMENTS

Cooperation under the Paris Agreement began in 2020. At that time, the future of this treaty looked ill-omened. A few years earlier, the Trump administration had announced the U.S. withdrawal from the Paris process and, more immediately, the world faced the first global pandemic for almost a century. Since the beginning of the pandemic, the four major emitters have adjusted their NDCs by submitting updates to the UNFCCC Secretariat.

The EU was the first to present new commitments under Paris Agreement.⁵⁰ Submitted in December 2020, the policy measures acknowledge the socio-economic disruptions caused by the pandemic. On 19 pages, the European Commission, representing the EU member states in international climate negotiations, announces the decision to achieve climate neutrality by 2050. This objective had initially been agreed in late 2019. In the wake of the pandemic, the European Commission and the member states reiterated this objective and linked it with a massive public and private investment plan to ensure "a sustainable and resilient recovery."⁵¹ The NDC indicates that the EU budget running from 2021 to 2026 would be the main tool for recovery investments, whose funding must consist of up to 30% of climate action, complying "with the objective of EU climate neutrality by 2050" and contributing to the enhanced climate targets for 2030.⁵²

The EU essentially presents as its new NDC the target of an "economy-wide net domestic reduction of at least 55% in greenhouse gas emissions by 2030, compared

49 The focus is on several energy sources. For the reduction of energy-related greenhouse gas emissions, abatement measures such as carbon capture storage and utilisation and efforts to enhance energy efficiency are also vital. A discussion of these developments is beyond the scope of this paper.

50 United Nations Climate Change – NDC Registry, "Update of the NDC of the European Union and Its Member States," 18 December 2020, https://unfccc.int/sites/default/files/NDC/2022-06/EU_NDC_Submission_December%202020.pdf, pp. 1–19.

51 European Commission, "The EU Budget Powers the Recovery Plan for Europe," 27 May 2020, COM(2020) 442 final, p. 1.

52 EU NDC, para 5.

to 1990.”⁵³ The updated NDC submission also stipulates that “all EU expenditure should be consistent with Paris Agreement objectives.”⁵⁴ It mentions the inclusion of a Just Transition Fund in the scope of the EU Recovery Plan.⁵⁵ Furthermore, the EU NDC announces legislative amendments to broaden the EU Emission Trading System (ETS) as well as “ambitious targets for improving energy efficiency and for increasing renewables in the EU energy mix” for 2030.⁵⁶ Energy efficiency should be raised to 32.5%, compared to the historic baseline of 2007, while by 2030 renewable energy should reach “at least 32%” in the Union’s final energy consumption.⁵⁷ Finally, the NDC submission clarifies that the “EU’s at least 55% net reduction target by 2030 is to be achieved through domestic measures only, without contribution from international credits.”⁵⁸

The U.S. officially rejoined the Paris Agreement on 19 February 2021, after President Joe Biden had signed an instrument to re-enter the Paris process on the first day in office.⁵⁹ Subsequently, in April 2021 the Biden administration detailed the country’s new NDC on 23 pages.⁶⁰ It commits the U.S. to an “an economy-wide target of reducing its net greenhouse gas emissions by 50–52 percent below 2005 levels in 2030.”⁶¹ The submission acknowledges the “long history of leadership” that state, local, and tribal governments have played in the course of climate action. The Biden administration aims to pursue a “whole-of-government approach,” while also building on sub-national policy initiatives.⁶² The NDC submission refers to the constitutional structure of governance in the U.S. that assigns certain powers to the federal government, while others are devolved to the states. Local governments are the principal level of policy implementation; and tribal governments exercise authority over various internal and territorial affairs.⁶³

53 EU NDC – Annex, pp. 7, 8.

54 *Ibid.*

55 EU NDC, para 7.

56 *Ibid.*, paras 16, 20.

57 *Ibid.*, para 20.

58 EU NDC – Annex, p. 17.

59 U.S. Department of State, “Press Release: The United States Officially Rejoins the Paris Agreement,” 19 February 2021, <https://www.state.gov/the-united-states-officially-rejoins-the-paris-agreement/>.

60 United Nations Climate Change – NDC Registry, “The United States’ Nationally Determined Contribution: Reducing Greenhouse Gases in the United States: A 2030 Emissions Target,” 21 April 2021, <https://unfccc.int/sites/default/files/NDC/2022-06/United%20States%20NDC%20April%2021%202021%20Final.pdf>, pp. 1–24.

61 *Ibid.*, p. 1.

62 *Ibid.*, p. 2.

63 *Ibid.*, p. 11.

The implementation of the NDC follows “sector-by-sector emissions reduction pathways.”⁶⁴ The energy sector will be decarbonised, by shifting to carbon-free electricity, electrifying and driving efficiency in vehicles, buildings, and parts of industry, and by deploying new energy sources and carriers such as carbon-free hydrogen.⁶⁵ The measures announced in the NDC are “expected to put the United States on a path to achieve net-zero emissions, economy-wide, by no later than 2050.”⁶⁶

In October 2021, China submitted an extensive, 56-page NDC.⁶⁷ It includes the government’s own assessment of its achievements in fulfilling the previous NDC, new goals, wide-ranging “proactive” adaptation measures, and thoughts on international climate cooperation. The section that concerns the development of the energy system lists ten key actions to achieve the peak in carbon dioxide emissions before 2030, adding that a plan to work towards this peak moment has yet to be formulated and will be implemented “continuously” during the periods of the 14th and 15th Five-Year-Plans (2021 to 2025 and 2026 to 2030, respectively).⁶⁸

The key actions include the green and low-carbon transition of the energy system, energy conservation, low-carbon measures in the industrial and construction sectors, as well as the transition to a green and low-carbon transport sector. The emissions-peaking moment will be realised “in a staged manner for different regions,” elaborating peaking plans for different localities and key industries.⁶⁹ The government will also encourage and support the establishment of “carbon peak pilots” in cities and industrial parks, in order to gain from their experiences and practices.⁷⁰ The NDC puts the “control of carbon intensity” of the Chinese economy at the centre of the country’s emission control framework. Thus, reducing carbon emission intensity will continue to be “a binding indicator in the national economic and social development plan.”⁷¹ Carbon intensity in industry should be decreased by cutting overcapacity in the steel and coal sectors and by “resolutely” curbing the “haphazard development of energy-intensive and high-emission projects.”⁷²

64 Ibid, p 3.

65 Ibid.

66 Ibid, p. 23.

67 See for an “unofficial translation” of the Chinese submission, which is also available on the same website, United Nations Climate Change – NDC Registry, “China’s Achievements, New Goals and New Measures for Nationally Determined Contributions,” 28 October 2021, <https://unfccc.int/sites/default/files/NDC/2022-06/China%E2%80%99s%20Achievements%20New%20Goals%20and%20New%20Measures%20for%20Nationally%20Determined%20Contributions.pdf>, pp. 1–56; United Nations Climate Change – NDC Registry, “中国失落国家自主贡献成效和新目标新举措,” 28 October 2021, pp. 1–74.

68 China NDC (unofficial translation), p. 34.

69 Ibid.

70 Ibid, p. 38.

71 Ibid, p. 35.

72 Ibid.

The NDC also offers a vision for China's energy system, referring to the "Four Reforms, One Revolution,"⁷³ whose goals the government will "proactively" fulfil.⁷⁴ The future energy system will predominantly supply non-fossil energy.⁷⁵ China aims to "stringently curb coal-powered projects, set strict limitations on the increase in coal consumption over the 14th FYP period and to phase it down in the 15th FYP period;" and simultaneously the "large scale development of wind and solar power will be accelerated."⁷⁶ Finally, a "new power system will be constructed and allocation of clean power resources will be optimized on a large scale," while the national carbon market that covers the power sector will be extended to other industries, including "high-emission industries."⁷⁷

In August 2022, India submitted a three-page updated NDC,⁷⁸ entailing its climate actions until 2030. The overall policy direction is described as pursuing "a healthy and sustainable way of living based on traditions and values of conservation and moderation, including through a mass movement for 'LIFE' – 'Lifestyle for Environment'."⁷⁹ The Indian government aims to adopt "a climate friendly and a cleaner path than the one followed hitherto by others at corresponding level of economic development."⁸⁰

India's NDC submission stresses that environmentally sustainable and low-carbon initiatives are the basis of all key sectors of the Indian economy.⁸¹ As its main target for 2030, the government seeks to reduce the emission intensity of the Indian GDP by 45%, compared to 2005.⁸² It specifically aims to "achieve about 50% cumulative electric power installed capacity from non-fossil fuel-based energy resources by 2030," relying on the transfer of technology and low-cost international finance, including from the Green Climate Fund.⁸³ The government expects that this updated NDC will help India to reach the long-term goal of "net-zero" by 2070.⁸⁴

73 In a White Paper on energy security from 2020, this terminology stands for the revolutions in energy consumption, energy supply, energy technology, and the energy system as well as the "all-directional" strengthening of international cooperation to realise energy security "in an open-minded way." See, Information Office of the State Council of the People's Republic of China, "新时代的总过能源发展 - 白皮书" [White paper on China's energy development in the new era], December 2020, <http://www.scio.gov.cn/ztk/dtzt/42313/44537/index.htm>.

74 China NDC (unofficial translation), p. 34.

75 In this part of the NDC, the government does not provide any percentages, numbers, or timelines that would detail the envisioned decarbonisation steps.

76 China NDC (unofficial translation), p. 34.

77 Ibid, pp. 34, 38.

78 United Nations Climate Change – NDC Registry, "India's Updated First Nationally Determined Contribution under Paris Agreement," 26 August 2022, <https://unfccc.int/sites/default/files/NDC/2022-06/United%20States%20NDC%20April%2021%202021%20Final.pdf>, pp. 1–24.

79 Ibid, p. 1.

80 Ibid.

81 Ibid, p. 2.

82 Ibid.

83 Ibid.

84 Ibid, p. 3.

To sum up, in the presentation of their NDCs, both the EU and the U.S. follow the mitigation goals of the Paris Agreement. They commit to climate neutrality by 2050 and, on the path towards this goal, to reductions of their annual greenhouse gas emissions of at least 50% by 2030, albeit with different baseline years. China and India commit themselves to decreasing the carbon or emission *intensity* of the GDP, while further details regarding the path to climate neutrality by 2060 and 2070, respectively, are not immediately detectable in their NDCs.

Figure 3.2 illustrates the emissions trajectories for the four largest greenhouse gas emitters as implied by their NDCs until 2030. As in Figure 3.1, the illustrations depart from the historical emissions of 2015. The upward direction in China's and India's trajectories highlights the fact that their emissions have not yet peaked and both governments have not yet provided any indication at which level annual volumes will peak. To put the NDCs and the resulting emissions trajectories into context, the next section considers the four major parties' energy situation and how domestic developments shape their international posture.

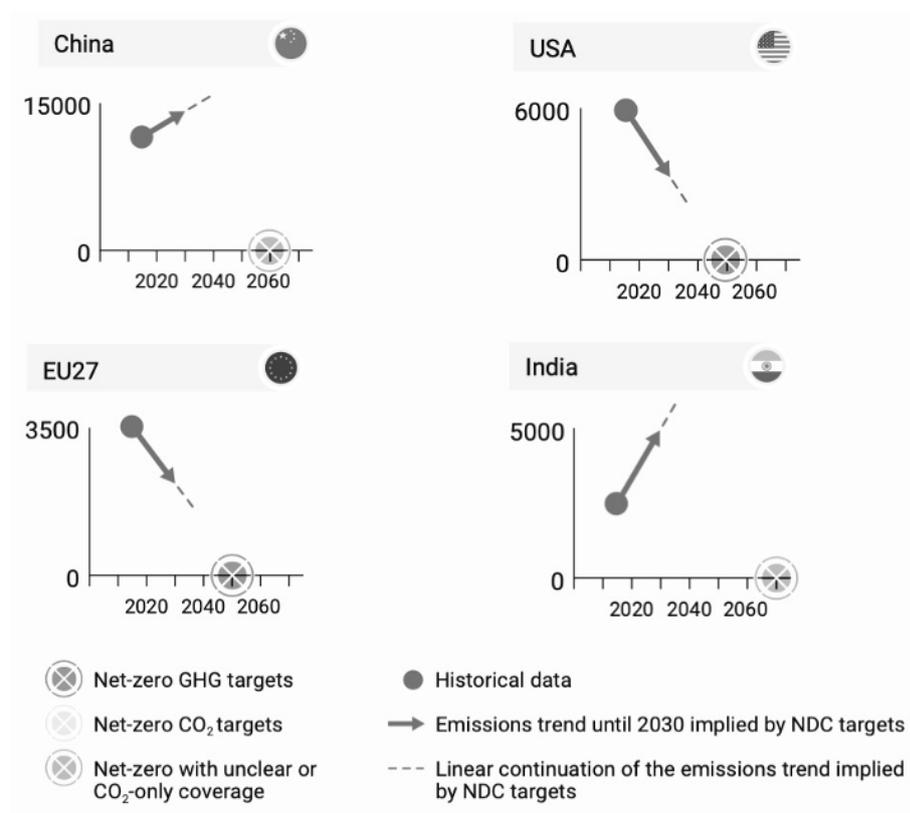


FIGURE 3.2: TRAJECTORIES IMPLIED BY NDCs AND NET-ZERO TARGETS COMPARED TO HISTORICAL EMISSIONS FOR 2015, SHOWING NATIONAL NET EMISSIONS IN MtCO_{2e}/YEAR OVER TIME

SOURCE: UNEP, 2022, P. 25.

3.2 REPOSITIONING: DOMESTIC IMPETUS FOR INTERNATIONAL ACTION

The NDCs that parties regularly submit to the UNFCCC Secretariat are typically an overview or merely a part of more extensive policies and legislation that they intend to implement to transform the energy sector. In addition, global energy markets are still coping with the consequences of the “first truly global energy crisis.”⁸⁵ This turmoil caused growing concerns about energy security in many countries, re-contextualising ongoing policy debates. Thus, domestic measures provide a broader perspective of the trajectories that the energy sectors in China, the U.S., the EU, and India will follow in the near future.

This sub-section focuses on the evolving individual energy landscapes, especially the state of the energy transition, recent developments in energy and climate governance, including plans to utilise hydrogen, and these parties’ positioning in UN climate negotiations. To put the following overview into context, table 3.1. provides some key energy and emission data; and two figures illustrate the recent development of the major players’ primary energy consumption (3.3) and the main sources of their energy consumption (3.4).

TABLE 3.1: MAJOR PLAYERS’ SELECTED ENERGY AND EMISSION DATA, 2022

	China	United States	European Union	India
primary energy consumption (exajoules)	159.39	95.91	58.18	36.44
electricity generation (terawatt-hours)	8,848.7	4,547.7	2,812.0	1,858.0
coal consumption (exajoules)	88.41	9.87	6.98	20.09
renewable energy consumption (exajoules, input-equivalent)	13.3	8.43	8.63	2.15
nuclear energy consumption (exajoules, input-equivalent)	3.76	7.31	5.48	0.42
energy-related CO₂ emissions (million tonnes of (CO ₂))	10,550.2	4,825.8	2,725.4	2,595.8

SOURCE: ENERGY INSTITUTE, 2023.

85 Fatih Birol, the Executive Director of the International Energy Agency, based this assessment on the situation of energy markets in the second half of 2022, when the markets for LNG tightened, while major oil exporters cut their daily output. Chow, Emily, and Muyu Xu, “World Is in Its ‘first truly global energy Crisis’ – IEA’s Birol,” *Reuters*, 25 October 2022.

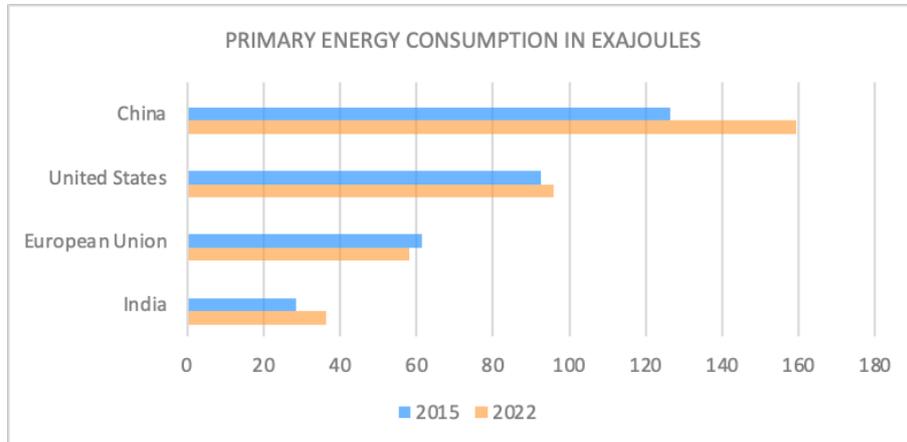


FIGURE 3.3: MAJOR PLAYERS' PRIMARY ENERGY CONSUMPTION IN EXAJOULES IN 2015 AND 2022
SOURCE OF THE DATA: ENERGY INSTITUTE, 2023, P. 8.

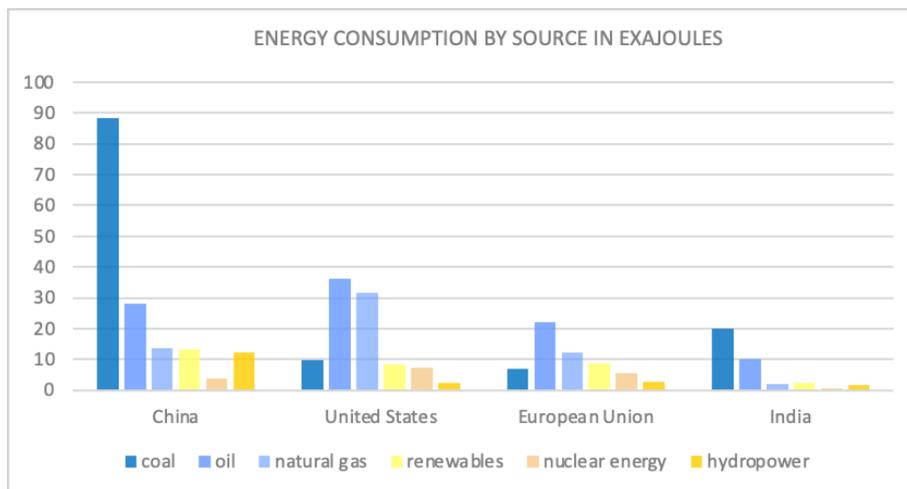


FIGURE 3.4: ENERGY CONSUMPTION BY SOURCE IN EXAJOULES IN 2022⁸⁶
SOURCE OF THE DATA: ENERGY INSTITUTE, 2023.

3.2.1 CHINA

China is the largest annual emitter of greenhouse gases. The state and future development of its energy transition is essential for the implementation of the Paris Agreement. Since the beginning of the 21st century, China's emissions have more than quadrupled, initially following an export-driven industrial and investment boom (2000–8) and, subsequently, caused by two waves of real estate, infrastructure, and

⁸⁶ Numbers for renewable and nuclear energy as well as hydroelectricity in exajoules input equivalent.

industrial expansion (2009–21).⁸⁷ The dominance of coal in China's energy system, together with an economic structure that relies heavily on the construction sector and energy-intensive industries, is responsible for the large volume of emissions relative to the country's GDP.⁸⁸ Thus far, state-owned enterprises and provinces that depend on the coal business are reluctant to support ambitious policies to reduce emissions and limit the use of fossil fuels.⁸⁹

Generally, sub-national authorities are responsible for funding and implementing climate policies, but they have little incentive to take fast and decisive action.⁹⁰ Instead, many local governments continue to add coal-based power plants to ensure the functioning of the local economy.⁹¹ They consider the use of coal for electricity generation as essential for both their jurisdictions' security of power supply and their communities' well-being. Recent research shows that richer provinces and municipalities that import electricity, such as Shanghai and Jiangsu, tend to allocate the responsibility for emissions reductions to the regions that produce electricity. However, power-exporting regions, such as Shanxi, Inner Mongolia, Ningxia, and Xinjiang lack the financial resources to implement emissions reduction measures or optimise their economic structure.⁹²

Given the country's regional geographical and economic diversity, examining decision-making at sub-national levels is essential for understanding the progress of the China's low-carbon transition. This is particularly true for regions that heavily depend on the coal sector. To assess China's trajectory, it is necessary to scrutinise policy measures in the most coal-mining intensive regions, such as Shanxi Province and Inner Mongolia, whose low-carbon transitions will have big socio-economic implications.⁹³

Another vital component for a successful energy transition is China's electricity sector. For years, the government has been trying to implement reforms. In 2015, analysts from the Central Committee of the Party and the central government

87 Myllyvirta, Lauri, Xing Zhang, and Liansai Dong, "China's Climate Transition: Outlook 2022," CREA – Heinrich-Böll-Stiftung, 21 November 2022, https://energyandcleanair.org/wp/wp-content/uploads/2022/11/Chinas-Climate-Transition_Outlook-2022.pdf, p. 9.

88 Ibid.

89 Ibid, 10.

90 Wu Shu, "A Systematic Review of Climate Policies in China: Evolution, Effectiveness, and Challenges," *Environmental Impact Assessment Review* 99 (2023): 9.

91 Bradsher, Keith, "Why Heat Waves Are Deepening China's Addiction to Coal," *The New York Times*, 20 July 2023.

92 Mi Zhifu, and Sun Xinlu, "Provinces with Transitions in Industrial Structure and Energy Mix Performed Best in Climate Change Mitigation in China," *Communications Earth and Environment* 2, no. 182 (2021): 1–12.

93 IEA, "Coal in Net Zero Transitions," 2022, pp. 34–6.

emphasised in a joint statement that power sector reform is necessary to address structural problems.⁹⁴ Most of the problems seem to persist.⁹⁵ In fact, the grid is incapable of absorbing the growing amount of variable renewable electricity that has become available following huge investments in wind and solar power generation in recent years, while power shortages continue to impact the socio-economic development in many regions of China.⁹⁶ In early 2022, the National Energy Administration under the National Development and Reform Commission, a government body responsible for drafting and implementing the country's economic policy, stipulated that fossil fuels will only be replaced "step by step" by clean low-carbon fuels after the renewable supplies will have shown to be "reliable."⁹⁷

In addition, the government wants to establish a power market system⁹⁸ that is compatible with more diverse sources of power supply.⁹⁹ However, policymakers are also forced to re-consider earlier plans in real time, as changing weather patterns affect hydropower plants in southwestern and central China, which supply electricity to populous regions in central and southern China.¹⁰⁰

Accordingly, for the time being China will retain most coal-based power plants to ensure its electricity supply. Having financed the construction of the power plants in

94 Central Committee of the Chinese Communist Party and State Council of the People's Republic of China, 关于进一步深化电力体制改革的若干意见（中共中央国务院2015年3月15日发布中发〔2015〕9号） [Some opinions regarding the further deepening of the power sector reform (Central Committee State Council, 15 March 2015, Central Committee document no. 9 [2015]).

95 Handke, 2021, p. 32.

96 Shortages have various causes. Recent incidents were the result of interference by authorities and drought. The curtailment of renewable power has been a problem for several years. In early 2022, for instance, regions in Inner Mongolia and Qinghai curtailed more than 10% of their wind and solar production. The reason for this development is the fast construction of new wind and solar power generation sites, without sufficiently expanding the grid capacity. Wang Lu, and Wang Mingyu, "弃风弃光局地抬头 新能源堵点待通" [Locally wind and solar power are curtailed again: A policy solution is needed for gridlocked renewables], *经济参考报*, 6 June 2022; Cheng, Evelyn, "Why China's Power Crunch Is Such a Big Deal," *CNBC*, 30 September 2021; Tabeta, Shunsuke, "Sichuan's Rolling Blackouts Pose Litmus Test for China Economy," *Nikkei Asia*, 20 July 2023.

97 National Development and Reform Commission, "国家发展改革委 国家能源局关于完善能源: 绿色低碳转型体制机制和政策措施的意见 - 发改能源〔2022〕206号" [National Energy Administration – National Development and Reform Commission Opinion on the green and low-carbon transition of the energy system and related policy measures, NDRC National Energy Administration document no. 206 (2022)], 30 January 2022, https://www.ndrc.gov.cn/xxgk/zcfb/tz/202202/t20220210_1314511.html, para 1.2.

98 In a recent report, the IEA presented options for the establishment of a unified market in China. See, IEA, "Building a Unified National Power Market System in China: Pathways for Spot Power Markets," April 2023, <https://iea.blob.core.windows.net/assets/666f55e2-83a8-470d-b8e4-f48618aeec1e/BuildingaUnifiedNationalPowerMarketSysteminChina.pdf>, pp. 1–75.

99 National Development and Reform Commission, Document 206, 2022, para 4.18.

100 Thomas, Mike, and David Fishman, "What Lessons Do The Chinese Hydropower Shortages in Summer 2022 Hold for the World?," *China Water Risk*, 24 May 2023, <https://chinawaterrisk.org/opinions/what-lessons-do-the-chinese-hydropower-shortages-in-summer-2022-hold-for-the-world/>.

their jurisdictions, local governments have an incentive to keep the coal-based plants running as long as possible. Importing “unreliable” renewable electricity from other regions of the country seems risky and uneconomic in this context. Thus, the success and speed of China’s energy transition will to a large degree depend on the restructuring of the power sector.

However, the government is promoting the reform of the power sector in order to facilitate the utilisation and transmission of renewable power,¹⁰¹ while also calling for security of supply that essentially results in the expansion of coal capacity.¹⁰² Following patterns that are specific to the development of China’s power sector, as discussed in previous research,¹⁰³ it is most likely that the policy targets will be renegotiated and to a large degree reflect the preferences of the sector’s major state-owned enterprises.

The example of the power sector illustrates that different priorities continue to guide decision-making at local, provincial, and central levels of governance. The focus on domestic supplies in the context of energy security considerations, as emphasised by President Xi Jinping,¹⁰⁴ has profound implications for the eventual scope of China’s fleet of coal-based power plants, its coal consumption, and related carbon emissions when the moment of “peak emissions” will be reached. In fact, to be able to achieve the goal of peaking emissions before 2030 China would right now need to completely shift new investments into clean capacity.¹⁰⁵

Despite its focus on coal use, China is also emerging as leading investor in other segments of the energy system. Nuclear energy is a case in point. In 2023, state authorities approved the construction of six reactors at nuclear power plants in coastal areas of Shandong, Fujian, and Liaoning Provinces. Chinese companies are

101 In autumn 2023, the National Development and Reform Commission and the National Energy Administration issued the national rules for electricity spot trading. This move should promote trade in renewable electricity as well as interprovincial electricity trade. China plans to establish an integrated national electricity market by 2030. See, You Xiaoying, and Zhao Xuan, “China Issues Nationwide Rules for Electricity Spot Market,” *Nikkei Asia*, 21 September 2023.

102 Crowther, Herbert, “Three Years on: Assessing Power Sector and Renewable Energy Manufacturing in China since the Announcement of Dual Carbon Goals,” OIES Paper no. CE10, October 2023, <https://www.oxfordenergy.org/wpcms/wp-content/uploads/2023/10/CE10-Three-years-on.pdf>, p. 6.

103 See for a discussion of the power relations in China’s electricity sector, Xu Yi-Chong, *Sinews of Power: The Politics of the State Grid Corporation of China*, Oxford: Oxford University Press, 2017.

104 Ifri, “习近平-中国能源的饭碗必须端在自己的手里” (Xi Jinping: China’s energy rice bowl must be served with our own hands), 20 October 2021, rfi.fr/cn/中国/20211022-习近平-中国能源的饭碗必须端在自己的手里.

105 Myllyvirta et al, 2022, p. 10; see for possible trajectories of China’s energy transition following the announcement of the emissions peaking and climate neutrality goals, IEA, “An Energy Sector Roadmap to Carbon Neutrality in China,” September 2021, <https://iea.blob.core.windows.net/assets/9448bd6e-670e-4cfd-953c-32e822a80f77/AnenergysectorroadmaptocarbonneutralityinChina.pdf>, pp. 1–301.

currently building 21 reactors for domestic use. In 2022, ten reactors were permitted. China began approving new reactors in 2019, after a period of safety reviews following the 2011 nuclear disaster in Fukushima, Japan. Having 55 reactors in operation today, China ranks third behind the U.S. and France among the world's leading producers of nuclear energy. Furthermore, Chinese companies are involved in the construction of 23 reactors abroad.¹⁰⁶ This engagement is noteworthy, both from the perspective of global technology leadership and related geopolitical implications.

Chinese manufacturers also dominate the global markets for components that are used in solar and wind power installations. They wiped out competitors from other parts of the world when the demand for supplies began to rise more than a decade ago. Manufacturers in the EU were particularly hard hit. Chinese companies are now eyeing the emerging global hydrogen sector. Demand for electrolyzers will increase considerably, mainly because many governments have devised huge investments to build hydrogen plants. At the moment, China holds a share of more than 40% in the global market for electrolyzers. It is likely that, at least in the near term, Chinese manufacturers will focus on export markets to expand their sales, because the Chinese government has not yet instituted any support policies to fasten the use of hydrogen.¹⁰⁷ A presence in this evolving market, will further enhance China's position in the global economy, and, specifically, in the energy transition business.

From the outset, China played an important role in the UN climate regime. Active participation in international climate negotiations allows the Chinese leadership to present the country as a responsible stakeholder and provider of important global public goods.¹⁰⁸ At the international level, China's focus increasingly follows its domestic prioritisation of adapting to the consequences of global warming,¹⁰⁹ as its updated 2021 NDC illustrates. Since the adoption of the Paris Agreement, Chinese representatives have been trying to introduce adaptation-related formulations in decisions and texts of various bodies of the UN climate regime.¹¹⁰ In addition, the

106 Murtaugh, Dan, "China Approves Six Nuclear Reactors at \$17 Billion Investment," *Bloomberg*, 1 August 2023; Clifford, Catherine, "How China Became the King of New Nuclear Power, and How the U.S. Is Trying to Stage a Comeback," *CNBC*, 30 August 2023; International Atomic Energy Agency, "Power Reactor Information System: Under Construction," 7 September 2023, <https://pris.iaea.org/pris/worldstatistics/underconstructionreactorsbycountry.aspx>.

107 Baker, David R., and Will Mathis, "China Has Set Its Sights on Cornering Another Green Energy Market: Hydrogen," *Bloomberg*, 9 January 2023.

108 Myllyvirta et al, 2022, p. 9.

109 Prytherch, Mallie, Kenneth G. Lieberthal, and Ryan Hass, "Unpacking China's Climate Priorities," *Order from Chaos Commentary*, 23 August 2023.

110 Qi, Jianfeng Jeffrey, and Peter Dauvergne, "China's Rising Influence on Climate Governance: Forging a Path for the Global South," *Global Environmental Change* 73 (2022): 4–6.

leadership seeks to defend the right to development. As discussed in Chapter 2, the leaders care deeply about China's posture as an important guarantor of developing countries' interests in global socio-economic and environmental governance.

3.2.2 UNITED STATES

Over a timespan of only two decades, the U.S. energy landscape experienced two consequential changes. First, from the mid-2000s onwards U.S. technological advances enabled entrepreneurs to exploit the country's vast shale gas and tight oil reserves. As a result, the U.S. has been reaping the economic and geopolitical benefits of "energy abundance"¹¹¹ for years now. In 2019, U.S. total energy production was greater than the country's total annual consumption for the first time since 1957.¹¹² The country is one of the biggest global producers of oil and natural gas. Today, international demand for petroleum and natural gas drives U.S. production. This trend will also continue in the near future.¹¹³

The energy and climate components of recent legislation that the Biden administration proposed and the U.S. Congress passed in August 2022 brought about the second consequential change in the U.S. energy sector. A combination of tax rebates for clean energy and industrial policy is altering the sector's structure, accelerating the energy transition, and attracting massive investments in the production of clean technologies. Over time, this will have a significant effect on energy-related greenhouse gas emissions.

Initial emission reductions were achieved during the two terms of the Obama administration (2008–11 and 2012–6), primarily in the electricity sector. The shale gas revolution was the basis for the shift in U.S. electricity generation from coal to natural gas. Renewable energy sources further contributed to the reduction of emissions. In 2022, a record share of 40.6% of the electricity mix derived from low-carbon energy sources, i.e. renewable energy sources, hydropower, and nuclear power. Over the last decade the share of coal in power generation has decreased from 37% (2012) to 19% (2022).¹¹⁴ The share of natural gas in total electricity generation rose from 37% in 2021 to about 39% in 2022.¹¹⁵

111 O'Sullivan, Meghan L., *Windfall: How the New Energy Abundance Upends Global Politics and Strengthens America's Power*, New York, NY: Simon and Schuster, 2017.

112 U.S. Energy Information Administration, "U.S. Energy Facts Explained," [eia.gov/energyexplained/us-energy-facts/](https://www.eia.gov/energyexplained/us-energy-facts/).

113 U.S. Energy Information Administration, "Annual Energy Outlook AEO 2023," March 2023, https://www.eia.gov/outlooks/aeo/pdf/AEO2023_Narrative.pdf, pp. 22, 23, 27.

114 World Economic Forum, "A Record Share of US electricity Comes from Zero-carbon Sources – But More Work Is Needed," 9 March 2023, [weforum.org/2023/03/us-electricity-energy-renewables/](https://www.weforum.org/2023/03/us-electricity-energy-renewables/).

115 Rivera, Alfredo, Ben King, John Larsen, and Kate Larsen, "Preliminary US Greenhouse Gas Emissions Estimates for 2022," 10 January 2023, <https://rhg.com/research/us-greenhouse-gas-emissions-2022/>.

Electricity generation from renewables also rose 12% compared to 2021. When they reached a combined share of 23% of total electric power generation in 2022, renewables surpassed coal for the first time. Wind was the largest source of renewable power generation, followed by hydropower and solar power. However, the expansion of wind and solar energy generating capacity lost pace in 2022 due to higher costs and supply chain issues.¹¹⁶

The tax incentives of the 800-page Inflation Reduction Act (IRA)¹¹⁷ seek to create favourable conditions for a further decarbonisation of the electricity sector, the use of renewable energy for heat generation, and the decarbonisation of the transport sector. If implemented by all levels of government, the IRA will contribute to the goal of reducing U.S. greenhouse gas emissions by up to 52%, compared to 2005 levels.

118

The industrial policy approach of the new legislation, which next to the IRA also includes the Infrastructure Investment and Jobs Act (IIJA) and the CHIPS and Science Act,¹¹⁹ aims to facilitate structural change and abandon the legacy of the era of “just-in-time” production and off-shoring.¹²⁰ The laws prioritise key industries, while adhering to technology neutrality. Generally, the three laws seek to reduce U.S. reliance on global supply chains and provide tax incentives that should help to enhance research and production capabilities in the United States.¹²¹

The laws follow four directions to transform the U.S. energy sector, i.e. promoting clean electricity generation, supporting the use of heat pumps and other clean-tech appliances, establishing a clean hydrogen sector, and providing manufacturing incentives to develop and produce critical clean energy technology in the United States. Thus, the laws intend to expand clean energy generation and reduce energy costs economywide.¹²² Through the IRA’s financial support the energy transition becomes more economically feasible. Moreover, the law inspired sub-national administrations to add further funding.

116 Ibid; World Economic Forum, “A Record Share of US electricity Comes from Zero-carbon Sources,” 2023.

117 Public Law 117-169 – Inflation Reduction Act of 2022; See for an overview, The White House, “Clean Energy Tax Provisions in the Inflation Reduction Act,” <https://www.whitehouse.gov/cleanenergy/clean-energy-tax-provisions/>.

118 Bourgoin, Courtney, “The United States Steps up on Climate,” *RMI*, 21 December 2022, <https://rmi.org/united-states-steps-up-on-climate/>.

119 Public Law 117-58 – Infrastructure Investment and Jobs Act; Public Law 117-169; Public Law 117-167 – CHIPS and Science Act.

120 Carey, Lachlan, and Jun Ukita Shepard, “Congress’s Climate Triple Whammy: Innovation, Investment, and Industrial Policy,” *RMI*, 22 August 2022, <https://rmi.org/climate-innovation-investment-and-industrial-policy/>.

121 Ibid.

122 Coequyt, John, “Four Ways the Inflation Reduction Act Speeds the Shift to a Cleaner, More Affordable Energy Future,” 16 August 2022, <https://rmi.org/four-ways-the-inflation-reduction-act-speeds-the-shift-to-a-cleaner-more-affordable-energy-future/>.

Front-runner states, such as California, Colorado, Illinois, New Jersey, New York, and Washington were quick to present new ambitious energy and climate plans to mitigate climate change. These states are responsible for 20% of total U.S. emissions. Thus, the U.S.\$370 billion funding that the IRA provides alters local economies that have been experiencing “a wave of new clean energy and technology factory announcements” since 2022.¹²³ In fact, by mid-2023 the three above-mentioned federal acts had already prompted companies to announce about U.S.\$230 billion in manufacturing investments.¹²⁴

Additional regulations at the state level target the use of energy in households, mainly promoting a shift from gas to electric heating and cooking. Moreover, electric vehicles hit record sales in the second quarter of 2023, with a 48% increase compared to the previous year. Electric cars were the fastest-growing segment of the auto market. Federal tax credits made the least expensive electric vehicles competitive with benzine-powered cars, while the number of companies that build charging stations was increasing quickly nationwide. A car industry executive called the months following the passage of the IRA an “once-in-a-generation inflection point.”¹²⁵

The Biden administration also seeks to enable a “nuclear-power renaissance.”¹²⁶ Under the 2005 Energy Policy Act, support for nuclear power was available in the form of loan incentives, production tax credits, and federal risk insurances for builders.¹²⁷ Still, the number of reactors has declined since 2012, while thus far only two reactors were added during this century. The reactor Vogtle 3 was connected to the grid in April 2023. A fourth reactor will be completed at the same plant in Burke County, Georgia, in 2024. The U.S. Energy Information Administration expects that the share of nuclear energy in the U.S. electricity generation will further decrease to about 13% in 2050.¹²⁸

123 Ibid.

124 Gelles, David, Brad Plumer, Jim Tankersley, and Jack Ewing, “The Clean Energy Future Is Arriving Faster than You Think,” *The New York Times*, 15 August 2023.

125 Ibid.

126 “America Aims for Nuclear-power Renaissance,” *The Economist*, 25 June 2023.

127 The White House – President George W. Bush, “Fact Sheet: The Advanced Energy Initiative: Ensuring a Clean, Secure Energy Future,” 24 May 2006, <https://georgewbush-whitehouse.archives.gov/news/releases/2006/05/20060524-4.html>.

128 World Nuclear Association, “Nuclear Power in the USA,” July 2023, <https://world-nuclear.org/information-library/country-profiles/countries-t-z/usa-nuclear-power.aspx>; U.S. Energy Information Administration, “U.S. Nuclear Industry,” 24 August 2023, <https://www.eia.gov/energyexplained/nuclear/us-nuclear-industry.php>.

The IRA's production tax credits are also available for investments in nuclear energy.¹²⁹ It remains to be seen whether the IRA can instigate more investment than the Energy Policy Act about two decades ago. But changes in the industry were already tangible soon after the passage of the IRA. More than a dozen states passed laws to keep plants running or build new ones, and initiated study groups.¹³⁰ The U.S. Department of Energy estimates that scaling today's nuclear capacity from 100 gigawatts (GW) to 300 GW in 2050 is necessary to achieve the Biden administration's climate goals.¹³¹ Moreover, a possible avenue for the installation of further nuclear plants in the U.S. is the construction of small modular reactors, especially to replace coal power plants.¹³²

More strategic aspects of the new legislation that are driving the U.S. energy transition are the promotion of hydrogen and efforts to become less dependent on critical minerals imports from China. To decarbonise the most carbon-intensive industrial sectors of the U.S. economy, the federal government provides production tax credits to promote clean hydrogen. The tax credit, for which producers can apply without "tax equity," can be as much as U.S.\$3 per kilogram of clean hydrogen. Grid-connected projects have to meet three main criteria – additionality, granular and emissions-accurate accounting, and deliverability – to ensure low emissions across geography and time.¹³³

Finally, to boost domestic production of critical minerals that are used in many clean technologies the Biden administration issued a Presidential Determination.¹³⁴ This step helps the federal government to support mining as well as processing and recycling of these critical materials in the United States. By relying on the Defense Production Act, the president can access funding and other means to increase the domestic industrial base, in order to secure resources that the private industry needs to contribute to the defence of national security and respond to emergencies.¹³⁵

129 "The IRA: Crediting Nuclear Energy," *Nuclear Newswire*, 7 September 2022.

130 The Nuclear Energy Institute (NEI) notices a "whirlwind of policy debates in state houses." By August 2023, 17 states enacted measures in favour of nuclear energy. These include Michigan, Texas, Minnesota, Idaho, Tennessee, North Carolina, Nebraska, Connecticut, Colorado, Ohio, North and South Dakota, Kentucky, Virginia, West Virginia, Indiana, and Arkansas. See, Csizmadia, Christine, "Take a Look at Nuclear Policy across the Map," *NEI*, 31 August 2023.

131 U.S. Department of Energy, "Pathways to Commercial Liftoff: Advanced Nuclear," March 2023, <https://liftoff.energy.gov/wp-content/uploads/2023/05/20230320-Liftoff-Advanced-Nuclear-vPUB-0329-Update.pdf>, p. 1.

132 Rapier, Robert, "Nuclear Power Gets a Boost in the United States," *Forbes*, 23 March 2023.

133 See for a brief explanation of the criteria, Piper, Alex, Taylor Krause, and Natalie Janzow, "The Hydrogen Credit Catalyst," 27 February 2023, <https://rmi.org/hydrogen-credit-catalyst>.

134 The White House, "Memorandum on Presidential Determination Pursuant to Section 303 of the Defense Production Act of 1950, as amended, No. 2022-11," 31 March 2022, <https://www.whitehouse.gov/briefing-room/presidential-actions/2022/03/31/memorandum-on-presidential-determination-pursuant-to-section-303-of-the-defense-production-act-of-1950-as-amended/>.

135 Swanson, Ana, "Biden Invokes Cold War Statute to Boost Critical Mineral Supply," *The New York Times*, 31 March 2022.

For the reduction of greenhouse gas emissions, the passage of the IRA can be seen as an important turning point. However, in order to achieve the 2030 goal of 50 to 52% emission reductions, compared to 2005, more legislative measures and fast implementation by all stakeholders are needed.¹³⁶ New legislation is being discussed to address the emissions gap. Providing tax credits for electrical transmission projects and accelerating permitting for renewables deployment were among concrete issues that need improvement. These measures will most likely be introduced when Democrats can gain control of both the White House and Congress in the coming elections.¹³⁷

Indeed, the current and next administrations need to proceed on this path of energy, climate, and industrial policies, not only to accomplish the energy transition domestically but also to enhance global cooperation.¹³⁸ Despite the Biden administration's massive move to advance the transition to decarbonised energy generation, the federal level is the weakest institutional component of U.S. energy and climate governance. There is a great difference between the two main political parties, the Democrat Party and the Grand Old Party (G.O.P./Republicans), regarding the need to address global warming.¹³⁹

However, Republican-leaning areas disproportionately share in the benefits of the IRA and CHIPS and Science Act. Moreover, Republican states are also national leaders in the generation of renewable electricity.¹⁴⁰ States like Texas, Florida, Nevada, Georgia, Virginia, Iowa, and Oklahoma were among the top states for wind and solar generation in 2021.¹⁴¹ Nevertheless, titled as *Project 2025*, Republican

136 Rivera et al, "Preliminary US Greenhouse Gas Emissions Estimates for 2022," 2023.

137 Senate Majority Leader Chuck Schumer said that, should the Democratic Party retain control of the Senate and White House in 2025 plus win back the House of Representatives, the Democrats would pursue a "multifront Approach" to addressing global warming, building on the successes of the IRA. See, Dumain, Emma, "The IRA Turns 1. Many Democrats Are Already Talking about the Next Climate Law," *Politico*, 16 August 2023, <https://www.politico.com/news/2023/08/15/anniversary-of-climate-bill-deal-democrats-want-more-00108357>.

138 See for an essay on the link between domestic energy governance and diplomacy, Bordoff, Jason, "The White House's Crowning Domestic Policy Achievement Can't Reach Its Full Potential without Engaging the World," *Foreign Policy*, 17 August 2022.

139 Republican candidates for the 2024 presidential elections were reluctant to acknowledge the link between human economic activity and climate change. However, there is a difference between older and younger people who vote for Republicans. See, Bustillo, Ximena, "Climate Change Made It in the GOP Debate: Some Young Republicans Say That's A Win," *NPR*, 25 August 2023.

140 The legislation creates jobs and brings investments to areas that generally vote for Republicans. States such as Georgia, South Carolina, and Ohio lead the destination for company commitments that benefit from the clean tech and renewables tax credits. See, "Biden's Climate Bill Brings Investments and Jobs to Many GOP Strongholds," *NPR*, 18 August 2023; Chu, Amanda, Oliver Roeder, and Myles McCormick, "Republican Districts Dominate US Clean Technology Investment Boom," *Financial Times*, 13 August 2023.

141 Climate Central, "Weather Power Year in Review: 2022," February 2023, https://assets.ctfassets.net/cxgxp8r5d/6BuG VQSGXiYcZlY1JKPnuv/210a620b1bff11154e467e5f61aad597/WeatherPowerYearinReview2022_EN_.pdf, pp. 9–14.

strategists have listed numerous federal climate and energy measures that they would reverse following a Republican election win in 2024.¹⁴²

No doubt, a reversal of domestic policies would (once again) sow doubt among other parties to the UN climate regime regarding the direction of U.S. energy decision-making. Historically, the U.S. played a crucial role in advancing the cooperation and the level of commitments under the regime. To correctly assess the trajectory of the U.S. energy transition, the continuity of its climate policies, and the country's emissions patterns, the international community needs to understand both the institutional instability of U.S. climate governance at the federal level¹⁴³ and the significance of sub-national legislative and administrative actions for transition continuity.

3.2.3 EUROPEAN UNION

In 2020, EU policymakers, in a forward-looking way, linked the recovery from the coronavirus pandemic with the transition to climate neutrality by setting up the Recovery and Resilience Facility, a fund of €723 billion of loans and grants to help EU member states to overcome the crisis.¹⁴⁴ The funding becomes available if EU member states implement reform measures, including measures to promote the energy transition. Subsequently, in 2022 the REPower EU Plan,¹⁴⁵ a crisis response to deal with some member states' dependence on Russian energy supplies, was placed under the Recovery and Resilience Facility. The Plan stipulates that the EU needs to solve the crisis both by saving energy, diversifying supplies, accelerating both the clean energy transition and quickly substituting fossil fuels, as well as by combining investments and reforms.¹⁴⁶ To fund ongoing efforts to respond to the energy crisis, the Plan became an integral part of the Recovery and Resilience Facility, evolving as the bloc's current energy strategy.

From an institutional perspective, throughout 2022 the EU proceeded with the necessary legislative procedures on its trajectory to climate neutrality, adopting the Fit for 55 package.¹⁴⁷ This package implements the climate-neutrality goal of the

142 Friedman, Lisa, "A Republican 2024 Climate Strategy: More Drilling, Less Clean Energy," *The New York Times*, 4 August 2023.

143 Mildemberger, Matto, "The Development of Climate Institutions in the United States," *Environmental Politics* 30, no. S1 (2021): 71–92.

144 See for the evolution of this mechanism, European Commission, "The Recovery and Resilience Facility," https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility_en.

145 European Commission, "REPowerEU Plan," 18 May 2022, COM(2022) 230 final, pp. 1–21.

146 *Ibid.*, p. 1.

147 See for an overview of the state of implementation, European Commission, "Fit for 55: Delivering on the Proposals," https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/delivering-european-green-deal/fit-55-delivering-proposals_en.

European Green Deal.¹⁴⁸ However, the acuteness of the 2022 energy crisis highlighted the changing geopolitics in the EU periphery and globally. For the continuation of the Union's trajectory, much will depend on the further integration of energy security in the bloc's foreign policy initiatives. It remains to be seen whether this crisis will delay the energy transition or even accelerate its implementation, as the measures of the REPowerEU Plan suggests.

No doubt, the 2022 crisis constitutes a significant turning point in EU energy affairs. By 2022, the EU energy transition had a noticeable track record of fulfilling the Union's commitments under the UN climate regime: It reduced its emissions by more than 30% by 2020.¹⁴⁹ The share of renewables in the Union's energy consumption reached 22.1% in 2020, accounting for 10.2% in the transport sector, 37.5% in electricity generation, and 23.1% in heating and cooling.¹⁵⁰

At high costs and in a relatively short period of time, efforts under the REPowerEU Plan helped the EU to change the structure of its gas imports. Instead of importing about 40% via pipelines from Russia, today about 40% of the imports arrive in the Union as liquified natural gas (LNG) shipments. Additional gas agreements were signed with Egypt and Israel. Furthermore, the Union – both private households and industry – managed to reduce energy demand by 20% in 2022. Between August 2022 and March 2023, gas demand dropped by 18%.¹⁵¹

The energy crisis also put increased emphasis on the Union's plans to utilise hydrogen. An initial strategy¹⁵² was presented in 2020. The strategy aimed to support investment in this emerging sector. The measures seek to stimulate production and demand, create a hydrogen market and infrastructure, as well as promote research and international cooperation. The implementation receives funding by labelling projects as Important Projects of Common European Interest. A first batch of 41 projects was already approved as "IPCEI Hy2Tech" by July 2022. In September 2022, the Commission approved the "IPCEI Hy2Use" scheme to support the construction of hydrogen-related infrastructure and technology development. Under the REPowerEU Plan, existing hydrogen plans are being accelerated and

148 European Commission, "The European Green Deal," 11 December 2019, COM(2022) 640 final, pp. 1–24.

149 European Commission, "EU Energy in Figures: Statistical Pocketbook 2022," September 2022, <https://op.europa.eu/en/publication-detail/-/publication/7d9ae428-3ae8-11ed-9c68-01aa75ed71a1/language-en>, p. 32.

150 Ibid, p. 27.

151 See for more information on the implementation of the REPowerEU Plan, European Commission, "REPowerEU: Affordable, Secure and Sustainable Energy for Europe," https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/repower-eu-affordable-secure-and-sustainable-energy-europe_en.

152 European Commission, "A Hydrogen Strategy for a Climate-neutral Europe," 8 July 2020, COM(2020) 301 final, pp. 1–24.

expanded, aiming to produce 10 million tonnes of hydrogen and import the same amount of renewable hydrogen by 2030.¹⁵³

In the wake of the energy crisis and debates about energy security, nuclear energy received more attention in the EU again. No doubt, disagreements between France and Germany persist about nuclear power's role in the bloc's energy transition.¹⁵⁴ Still, in early 2023 a group of EU member states formed a "nuclear alliance."¹⁵⁵ In a joint statement the alliance's member states specified the aims of the group, i.e. encouraging the European Commission to "fully integrate nuclear energy in the EU's energy strategy and relevant policies," and, more specifically, adding 30 to 45 newly built "large reactors and Small Modular Reactors (SMR)" to the Union's nuclear fleet.¹⁵⁶

By expanding the current 100 GW of installed nuclear capacity in the EU to 150 GW, the group intends to ensure "decarbonization, energy security and grid stabilization on a European scale" and seeks to strengthen "the Union's strategic capabilities across the European nuclear value chain, including security of supply of nuclear fuels and isotopes."¹⁵⁷ In July 2023, the group urged the European Commission to respect its principle of technology neutrality and treat nuclear energy equally with renewables, especially regarding EU investment vehicles as well as the application of state aid rules.¹⁵⁸

153 See for more information about the implementation of the EU hydrogen strategy, European Commission, "Energy Systems Integration: Hydrogen," https://energy.ec.europa.eu/topics/energy-systems-integration/hydrogen_en.

154 The conflict recently caused delays in the adoption of the new EU renewables directive and the reform of the EU electricity market. Disagreements concerned the inclusion of nuclear-derived low-carbon hydrogen in the category renewable energy sources and French subsidies for nuclear power plants. See, Messad, Paul, "Is Nuclear Power Set for a European Renaissance?," *Euractiv*, 15 August 2023; Federal Ministry for Economic Affairs and Climate Action, "Breakthrough in the Ambitious EU Expansion of Renewable Energy: EU Council Adopts New Directive for the Use of Renewable Energies in the Member States," 16 June 2023, <https://www.bmwk.de/Redaktion/EN/Pressemitteilungen/2023/06/20230616-breakthrough-eu-expansion-renewable-energy.html>; Hancock, Alice, "Germany Caves in to French Demands over EU Electricity Market Reform," *Financial Times*, 17 October 2023.

155 The alliance includes Belgium, Bulgaria, Croatia, Estonia, Finland, France, Hungary, the Netherlands, Poland, the Czech Republic, Romania, Slovenia, Slovakia, Sweden, Italy (observer), and the United Kingdom (guest). See Ministère de la Transition énergétique, "Réunion des pays membres de l'Alliance du nucléaire : le nucléaire pourrait fournir jusqu'à 150 GW de capacité électrique d'ici 2050 à l'Union européenne" [Meeting of the member states of the Nuclear alliance: Nuclear energy could provide 150 GW electricity to the European Union by 2050], 16 May 2023, <https://www.ecologie.gouv.fr/reunion-des-pays-membres-lalliance-du-nucleaire-nucleaire-pourrait-fournir-jusqua-150-gw-capacite>.

156 Ministère de la Transition énergétique, "Réunion des pays membres de l'Alliance du nucléaire – Paris, 16 mai 2023, Déclaration commune/Nuclear Alliance meeting – Paris 16 May 2023, Joint Statement," 16 May 2023, https://www.ecologie.gouv.fr/sites/default/files/16_05_23_REUNION_DES_PAYS_MEMBRES_DE_L%E2%80%99ALLIANCE_DU_NUCLEAIRE_A_PARIS.pdf, p. 3.

157 *Ibid.*, pp. 3–4.

158 See, for the content of the declaration of the member states of the nuclear alliance, Messad, Paul, "French-led Nuclear Alliance Calls for Equal EU Treatment with Renewables," *Euractiv*, 12 July 2023; Payne, Julia, "Pro-nuclear Energy EU States Ask for 'Level Playing Field' with Renewables," *Reuters*, 10 July 2023.

In a volatile geopolitical situation, more powerful industrial policy elements find their way into EU strategies. This essentially re-emphasises a trend towards geo-economic awareness that, since about 2017, has brought more instruments to the European Commission's set of tools.¹⁵⁹ Most notable are the European Commission's proposals for the critical materials act and the net-zero industrial act from March 2023. The proposed critical materials act includes a list of strategic raw materials that are vital for the green and digital transitions. To ensure dependable supplies, the act requires that Union diversifies its supply by 2030 for at least 10% of its annual consumption for extraction, at least 40% of its annual consumption for processing, and at least 15% of its annual consumption for recycling. The aim is that not more than 65% of the Union's annual consumption of each strategic raw material at any stage of processing originates from a single supplier. Realising that the EU cannot become self-sufficient in the supply of many raw materials, the EU intends to "strengthen its global engagement with reliable partners" in the supply chains of these materials.¹⁶⁰

The proposed net-zero industrial act addresses the Union's manufacturing capacity, which is another important element in the realisation of the energy transition from the perspective of self-reliance. The proposed act aims to "overcome barriers to scaling up" the Union's own capacity to produce vital clean tech components. The act includes a list of technologies that are part of this category, such as battery technologies, electrolysers, and grid technologies. The proposed act seeks to implement a benchmark for the manufacturing capacity for these technologies to meet at least 40% of the Union's annual deployment needs by 2030.¹⁶¹

Finally, the EU will continue to support the implementation of the Paris Agreement. However, the domestic challenges re-contextualise the premises of the Union's initial plans for the energy transition. Much efforts will be needed to implement the climate-neutrality goal by 2050, while also adjusting the Union's foreign economic policy. Still, given the bloc's dependence on external supplies, both for its fossil economy and clean technologies, the EU will need to become a much more geopolitical actor than it was in the past.

159 See for more details on this important ideational shift, Matthijs, Matthias, and Sophie Meunier, "Europe's Geoeconomic Revolution: How the EU Learned to Wield Its Real Power," *Foreign Affairs*, 22 August 2023.

160 European Commission, "Critical Raw Materials: Ensuring Secure and Sustainable Supply Chains for EU's Green and Digital Future," 16 March 2023, https://ec.europa.eu/commission/presscorner/detail/en/ip_23_1661.

161 European Commission, "The Net-zero Industry Act: Accelerating the Transition to Climate Neutrality," https://single-market-economy.ec.europa.eu/industry/sustainability/net-zero-industry-act_en.

3.2.4 INDIA

India is the most populous country in the world. Its expanding economy as well as the ongoing urbanisation and industrialisation will continue to result in growing annual energy demand in the near future. Since 1990, India's energy needs have been met for more than 80% by three fuels, i.e. coal, oil, and biomass.¹⁶² The carbon-intensity of India's power sector is above the global average. The sector contributes extensively to the air pollution in large population centres, resulting in severe public health problems.¹⁶³ An important aspect that shapes the development of the energy sector is the country's geography. This mainly points to the scarcity of resources on the sub-continent and its high population density, putting stress on water supply and constraining the use of land.¹⁶⁴ These features also negatively affect the deployment of renewables.

India is highly integrated with global markets for coal and oil. The country is one of the major importers of coal and also a centre of global oil refining. The import of LNG is impaired by the lack of infrastructure and the price levels of LNG.¹⁶⁵ The share of natural gas in India's energy consumption remained at 6% in recent years. The fuel is mainly used in industry.¹⁶⁶ Coal demand tripled between 2000 and 2019, largely related to fast growing electricity demand.¹⁶⁷ Most of India's greenhouse gas emissions are energy related. Thus, measures to stabilise emissions will need to focus on the energy sector.¹⁶⁸

Coal dominates the electricity sector, contributing more than 70% of total generation (2019). Solar and wind power reached a share of 10% in 2019.¹⁶⁹ Energy use across states varies considerably.¹⁷⁰ Thus, energy and climate measures have to take into account the socio-economic and geographical diversity of the country.¹⁷¹ Coal-producing areas are concentrated in the relatively poorer eastern part of the country.

162 International Energy Agency (IEA), "India Energy Outlook 2021," February 2021, https://iea.blob.core.windows.net/assets/1de6d91e-e23f-4e02-b1fb-51fdd6283b22/India_Energy_Outlook_2021.pdf, p. 23.

163 Ibid, 18.

164 Ibid, 21.

165 Ibid.

166 Ibid, 36.

167 Ibid, 24.

168 The share of energy-related emissions was 83% in 2013 and has been increasing steadily since then. See, Sreenivas, Ashok, and Ashwin Gambhir, "Aligning Energy, Development, and Mitigation," in Navroz K. Dubash, *India in a Warming World* (Oxford: Oxford University Press, 2019), 427.

169 IEA, 2021, 24.

170 Ibid, pp. 25–6.

171 The total final consumption of higher-income states, such as Goa, Haryana, Maharashtra, Kerala, and Tamil Nadu, is 40% higher than in states with low per capita incomes. Almost 40% of Indians live in states with both low per capita incomes and low per capita energy use. See, IEA, 2021, p. 44.

This part of India is also less able to utilise renewables.¹⁷² Thus, these regions face difficult policy choices when trying to implement a just transition. Thus far, existing strategies to foster the energy transition in these regions are too limited in scope.¹⁷³ Nevertheless, increasing concerns about local environmental impacts of coal use and rising costs of coal-based electricity resulted in a greater the willingness among decision-makers to shift away from coal to renewables.¹⁷⁴ In June 2023, the Indian government decided to pause the development of the country's fleet of coal power plants for five years.¹⁷⁵ Yet, the National Electricity Plan still lists several plants under construction that will be operational in the period until 2032.¹⁷⁶

The government plans to increase the share of installed capacity of non-fossil electricity to 57.4% by 2027, including 336,553 megawatts (MW) of capacity based on renewables.¹⁷⁷ The growth of wind and solar power in recent years was remarkable.¹⁷⁸ Yet, the development of the renewable energy sector faces considerable structural, regulatory, and institutional challenges. These include financial constraints of distribution companies, difficulties to obtain land, grid congestion, and uncertainties about the development of the grid infrastructure.¹⁷⁹ Yet, in renewables-rich states, wind and solar reach a share of about 15% in power generation. Under preferable wind conditions, some states can achieve a share of 50%.¹⁸⁰ However, next to geographical factors the major challenge for the deployment of renewables is the realisation of a reliable and cost-effective grid integration.¹⁸¹

India's government set ambitious renewables goals for 2022. However, it could only accomplish two-thirds of the planned 175 GW in renewable capacity.¹⁸² Recent research shows that the deplorable financial situation of electricity distribution companies, which are often owned by state governments, was the main obstacle to

172 Sreenivas and Gambhir, 2019, 451.

173 Chhotray, Vasudha, "Extractive Regimes in the Coal Heartlands of India: Difficult Questions for a Just Energy Transition," in *Climate Justice in India*, ed. Prakash Kashwan (Cambridge: Cambridge University Press, 2022), pp. 74–96.

174 Sreenivas and Gambhir, 2019, 442.

175 Arasu, Sibi, "India Pauses Plans to Add New Coal Plants for Five Years, Bets on Renewables, Batteries," *AP*, 1 June 2023.

176 *Ibid.*, p. 5.39.

177 Government of India – Ministry of Power, "Central Electricity Authority Notifies the National Electricity Plan for the Period of 2022–32," 31 May 2023, <https://pib.gov.in/PressReleasePage.aspx?PRID=1928750>.

178 IEA, 2021, 37.

179 IEA, 2021, 38.

180 *Ibid.*

181 Sreenivas and Gambhir, 2019, 446.

182 Jain, Neelima, and Richard M. Rossow, "Accelerate: 175 – A Plan for Targeted Renewable Energy Cooperation with Key Indian States," CSIS Report, 19 April 2023, https://csis-website-prod.s3.amazonaws.com/s3fs-public/2023-04/230419_Jain_Accelerate175_IndianStates.pdf, p. 3.

the expansion of renewable capacity.¹⁸³ Institutionally, the Union government and the states jointly manage the electricity sector, but state governments wield more influence on how the electricity sector operates in their jurisdictions. Thus, 28 state governments are mainly in charge of determining the structure of India's electricity generation.¹⁸⁴

As a response to missing the 2022 renewables target, the Union government adopted several policy measures, including the 2022 Electricity (Late Payment Surcharge and Related Matters) Rules. The implementation of this measure has already improved the amount of payments transferred to distribution companies.¹⁸⁵ In the coming years, India seeks to integrate even more renewable capacity into the power system, planning to achieve 450 GW by 2030. Much will depend on institutional adjustments at the state level and on sufficient investments in power generation and grid modernisation.¹⁸⁶

India aims to achieve 50% of installed capacity to rely on non-fossil fuels by 2030.¹⁸⁷ Nuclear energy will play a complementary role to the generation of electricity from renewables.¹⁸⁸ Currently, nuclear energy accounts for 1.7% of India's installed capacity. As of 2022, India had 21 reactors in operation with an installed capacity of 6,780 MW.¹⁸⁹ The National Electricity Plan includes five plants where units are under construction. Further units at four nuclear plants received approval for construction.¹⁹⁰ The government issued proposals for new nuclear plants in 2019, containing a further list of reactors that by then had received "in-principal" approval.¹⁹¹ In addition, the government is considering the inclusion of foreign and private investors in the further expansion of India's nuclear power sector, especially regarding investments in the construction of small modular reactors.¹⁹²

The Indian government studied the development of a hydrogen sector at a relatively early moment, starting with the National Hydrogen Energy Roadmap in 2006.

183 Ibid.

184 Ibid, p. 7.

185 Ibid, p. 6.

186 Ibid, p. 9.

187 Government of India, "National Electricity Plan, Volume I: Generation," 18 May 2023, https://cea.nic.in/wp-content/uploads/notification/2023/06/NEP_2022_32_FINAL_GAZETTE_English.pdf, para 19.7.

188 Singh, Rishika, "Exploring the Role of Nuclear Energy in India's Energy Transition," *South Asian Voices*, 13 March 2023.

189 Government of India, "National Electricity Plan, Volume I: Generation," 2023, p. 5.32.

190 Ibid, p. 5.39.

191 Government of India – Department of Atomic Energy, "Proposals for New Atomic Power Plants," 3 January 2019, <https://pib.gov.in/newsite/PrintRelease.aspx?relid=187135>.

192 Singh, Sarita Chaganti, "India Considering Allowing Foreign Investment in Nuclear Power," *Reuters*, 5 May 2023.

Although the government was unable to achieve the goals set for 2020, it decided to revive the strategy, joining the current global hydrogen race.¹⁹³ In 2022, the government launched the National Hydrogen Energy Mission, with the aim of decreasing the dependence on fossil fuels and becoming the world's leading producer of green hydrogen.¹⁹⁴ However, the deployment of hydrogen solutions in the transport and power sectors still faces serious economic and governance problems. Thus far, research and development projects showed few interest in the potential role of hydrogen in the Indian power sector.¹⁹⁵

As described above, governance problems have impaired the development of India's energy sector for decades.¹⁹⁶ In recent years, the Union and states' governments have issued a long list of programmes and policies to address specific weaknesses of the energy sector. If implemented, these measures will change India's positioning in international climate cooperation.¹⁹⁷ Thus, domestically driven policies can help India to evolve as a more active actor in international cooperation on climate change, possibly accepting a greater role in climate change mitigation.¹⁹⁸ No doubt, the country's success in implementing its transition policies will be a source of inspiration for other developing countries' energy policies.

3.2.5 DETERMINANTS OF THE NEW GLOBAL ENERGY LANDSCAPE

As a governed transition, the implementation of the low-carbon energy transition requires a "substantial renegotiation" of economic institutions.¹⁹⁹ The essential role of public policy in driving the transition distinguishes the shift from hydrocarbons to renewables and the electrification of a great portion of the economy from previous changes in the energy sector. Other aspects that are different relate to the short period of time in which this transition has to take place and the fact that incumbent energy sources and technologies should largely be displaced, instead of merely adding new sources to the existing mix.²⁰⁰

193 Kar, Sanjay Kumar et al, "Hydrogen Economy in India: A Status Review," *WIREs Energy and Environment* (May 2022): 2.

194 Ministry of Information and Broadcasting, "National Hydrogen Mission: Decarbonising India, Achieving Net-zero Vision," 21 March 2022, <https://static.pib.gov.in/WriteReadData/specificdocs/documents/2023/jan/doc2023110150801.pdf>, p. 3.

195 Kar et al, 2022, 14–6.

196 Sreenivas and Gambhir, 2019, 449.

197 *Ibid*, 432.

198 India's role in international governance is characterised by the fact that it is not yet recognised as an equal great power, while India has not yet accepted greater managerial responsibilities in international affairs. See, Prys-Hansen, Miriam, "Politics of Responsibility: India in Global Climate Governance," in *Great Powers, Climate Change, and Global Environmental Responsibilities*, ed. Robert Falkner and Barry Buzan (Oxford: Oxford University Press, 2022), 142.

199 Mildemberger, 2021, 89.

200 Yergin, Daniel, "The Energy Transition Confronts Reality," *Project Syndicate*, 23 January 2023.

This transition process affects a wide range of socio-economic policies. The need to contemplate transition pathways leads to the emergence of a compound field of energy, climate, and industrial policy. The choices that the four major players make at home contribute enormously to the evolution of a new global energy landscape. By doing so, they also re-constitute the parameters of global economic exchange. Measures to account for supply chain emissions and domestic-content requirements for clean tech are cases in point. Together with clean tech and industry subsidies as well as the diversification of critical mineral supplies, these policy choices will influence trade flows and investment decisions.

The brief overview of the major players' energy sectors showed that each of them faces constraints going forward. In China's case the need for a simultaneous implementation of institutional and structural reforms in the electricity sector, while maintaining security of power supply, leads to significant inefficiencies and transition delays. Yet, in many sectors that shape the energy transition the country's companies are global leaders. This creates leverage in the global political economy. The U.S. trajectory has to deal with past and (potential) future political discontinuity at the federal level that can negatively influence its role in international climate cooperation and delay the coordination of domestic policies. Still, recent legislation will lead to a profound structural change in the U.S. energy system. The ideational force of the U.S. approach will also influence the debate in other industrialised countries. The EU's main challenge concerns various threats to its energy security throughout the transition period, while being confronted with major geopolitical upheaval at its southern and southeastern peripheries. When designing energy transition policies, India has to simultaneously address difficult socio-economic, environmental, and governance problems. Nevertheless, India's efforts to decarbonise the energy sector, while urbanisation and industrialisation are continuing to reshape the country's economy, place its case at the centre of the global debate, as the country's experiences can guide the implementation of low-carbon policies in other developing countries.

The transformative forces that are being unleashed by today's policy decisions are already reshaping the structures of the global economy. For the time being, the bifurcation and increasing geopolitical tensions greatly complicate the task of designing policies to implement the energy transition. Western technological innovation and China's ability to produce at large scale were crucial for the economic globalisation during the last three decades. It remains to be seen how in the changing global economy companies will be able to scale up new technologies.

Tracing the interaction between current trends in the international political economy and the energy transition is vital. This helps to identify challenges for international climate cooperation under the Paris Agreement. Moreover, studying global economic trends reveals potential avenues for future bilateral or multilateral cooperation to bolster domestic energy policies. The next section briefly describes the state of the international political economy and looks for evolving institutions that can facilitate cooperation on energy affairs in the future.

4 DISJOINTED: CURRENT INTERNATIONAL RELATIONS AND PATHWAYS FOR ENERGY COOPERATION

In the 1990s, world leaders came together to address various global environmental problems. Global warming was one of those issues. In addition, after the ideological strife of the Cold War seemed to have ended, economic integration promised benefits to all countries and was thought to contribute to a lasting peace. Three decades on, divisions regarding various international developments, but in particular about the mode of economic governance, impair fruitful cooperation on climate change. Upholding an imaginative level-playing field does not work in times of systemic competition and geopolitical uncertainty. It is important to understand the origins and consequences of the increasingly adversarial global (economic) affairs. In its first part, this section provides a brief overview of the most contentious issues relating to the topic of this paper. The second part ponders on emerging trends in international energy affairs that might help moderate the exposure to growing divisions.

4.1 UNDERSTANDING THE BIFURCATION OF THE GLOBAL ECONOMY

Cooperation under the UN climate regime began during the mid-1990s.²⁰¹ At about the same time, trade negotiators were finalising the rules to establish the World Trade Organization (WTO). Both the UN climate regime and the WTO drew inspiration from the idea of utilising the peace dividend to promote global cooperation. Unsurprisingly, the United Nations Framework Convention on Climate Change, the foundational treaty of the UN climate regime, envisions the economic context of the parties' climate policies as "a supportive and open international economic system."²⁰² Thus, economic interdependence, facilitated by unimpeded trade under WTO rules, was one of the central premises of cooperation under the UN climate regime.

201 The first two treaties under the UN climate regime were the 1992 United Nations Framework Convention on Climate Change and the 1997 Kyoto Protocol.

202 Article 3 (4) UNFCCC.

When the implementation of the Paris Agreement began in 2020, the “WTO consensus” – the spirit of cooperatively managing international economic affairs – had largely vanished, especially in the relations between China and the U.S., the world’s two largest economies.²⁰³ The ensuing years were dominated by the disruptions that mainly resulted from the coronavirus pandemic and Russia’s full-scale invasion of Ukraine. However, the most important politico-economic trend that is shaping the thinking about energy security during the transition to a climate-neutral economy is the increasing bifurcation of the world economy, i.e. a space of economic activity dominated by the U.S. and its allies and one that follows China’s approach to international economic affairs.

Other than the ideological strife that shaped the Cold War between the West and the Soviet Union, the systemic rivalry between the United States and China is largely techno-economic.²⁰⁴ This technological-commercial characteristic²⁰⁵ of the growing division can impact the course of the low-carbon energy transition. Domestic and regional endeavours to enhance energy security throughout the low-carbon transition period can become more complicated and expensive or the energy transition and the broader industrial transformations will proceed at a slower pace than necessary to build a climate-neutral economy by 2050. Thus, energy-related climate action unfolds in an international arena that can be described as “a global *political* economy more than it has been for decades.”²⁰⁶ Innovative practices and perhaps new institutions are needed to ensure energy security and handle geopolitical uncertainty. To find solutions, it is important to reflect on how the systemic division came about and how it may affect the energy transition.

With growing concerns about the access to rare earths supplies, the global energy transition finally took a geopolitical turn. The unease centres on China’s dominance of the sector. Two instances of Chinese export restrictions on such minerals illustrate the changes that occurred in the country’s foreign economic policy during the last decade. China restricted exports of rare earths for the first time in 2010. The restrictions were issued in September 2010, after Japan had detained a Chinese fishing trawler captain whose boat had hit two Japanese coast guard vessels during a quarrel of about 40 minutes when he tried to fish in Japanese-controlled waters.

203 Yergin, 2021, xvii.

204 Teece, David J., “A Wider-aperture Lens for Global Strategic Management: The Multinational Enterprise in a Bifurcated Global Economy,” *Global Strategy Journal* 12, no. 3 (2022): 490; italics as displayed in the original text.

205 Despite the fact that the rivalry between the U.S. and China has diplomatic, military, and ideological aspects, its most salient dimensions are technological and economic. See, Brown, Michael, and Robert Atkinson, “The Real Contest with China: Washington Needs a Comprehensive Industrial Strategy to Outpace Beijing,” *Foreign Affairs*, 28 August 2023.

206 Teece, 2022, 511.

The fisherman was released soon after. China uphold the restrictions for two months and resumed exports to Japan in November 2010. The government never acknowledged that an embargo had been imposed on Japan,²⁰⁷ essentially depriving the Japanese side of any legal remedy. At the time, China already dominated the global mining and supply of rare earths.²⁰⁸ This instance alerted the world to the level of dependence on Chinese supplies and its potential weaponisation. During the years after this incident, Japan diversified its imports and created a highly efficient rare earth recycling system.²⁰⁹ In the rest of the world, the issue quickly disappeared from the news cycle. A regional conflict and unknown minerals cannot engage a global public for long.

In July 2023, rare earths hit the headlines again, when China announced export controls on gallium and germanium. These minerals are used for the production of many vital products, such as chips, telecommunication products, electric vehicles, and solar panels. China's dominance in the global supply of these minerals was as overwhelming as more than a decade ago. This time, however, the Chinese restrictions came as a response to a U.S.-led export ban on both high-end semiconductors and the means to produce them. The U.S. measures were primarily instigated by the potential use of the products in Chinese military equipment. China's move in retaliation to the export ban became world news. The country was willing and able to "strike back."²¹⁰ In fact, the Chinese leadership can rely on the market power of a recently merged company, i.e. the China Rare Earth Group.²¹¹ It combined a dominant position in a vital industrial sector with a political message to a global audience. None of the commentaries alluded to the WTO dispute settlement system as a locale for solving this issue.

207 After the end of the embargo, China issued export restrictions for several minerals. In 2012, Japan filed a WTO case against these restrictions, later joined by the EU and other importers. The WTO ruling held that China's export restrictions violated its obligations. In 2015, China notified the WTO that the restriction had been removed. See, World Trade Organization – Dispute Settlement, *DS433: China – Measures Related to the Exportation of Rare Earths, Tungsten and Molybdenum*, https://www.wto.org/english/tratop_e/dispu_e/cases_e/ds433_e.

208 Bradsher, Keth, "Amid Tension, China Blocks Vital Exports to Japan," *The New York Times*, 22 September 2010; "China Resumes Rare Earth Exports to Japan," *BBC News*, 24 November 2010.

209 Dominguez, Gabriel, "The Complex Road to Ending the Dependence on Chinese Rare Earths," *The Japan Times*, 8 February 2022.

210 "In Its Tech War with America, China Brings out the Big Guns," *The Economist*, 4 July 2023.

211 Headquartered in Ganzhou, Jiangxi Province, the China Rare Earth Group comprises the former rare-earth operations of Aluminium Corp. of China, China Minmetals, and Ganzhou Rare Earth Group. The group holds about 70% of China's production quota for medium and heavy rare earths, and nearly 40% for China's rare earths output if light elements are also included. Tabeta, Shunsuke, "China Consolidates 3 Rare Earth Miners into 'Aircraft Carrier'," *Nikkei Asia*, 24 December 2021.



ENTRANCE TO THE HEADQUARTERS OF CHINA RARE EARTH GROUP IN GANZHOU, JIANGXI PROVINCE. THIS GOVERNMENT COMPOUND ALSO HOSTS A CITY DISTRICT GOVERNMENT AND THE CITY DISTRICT COMMITTEE OF THE CHINESE COMMUNIST PARTY.
SOURCE: ARTWORK BY AUTHOR.

Arguably, the Chinese side took the first steps to disengage from the WTO consensus.²¹² The policy reversal can be seen as a means by the Chinese Communist Party to maintain control. Essentially, the economic reforms of the 1980s and 1990s resulted in a diminished influence of the party over both society and the economy. In 2012, Xi Jinping told an audience of 3,000 cadres that the economy had been “hijacked” by the U.S in the course of the reform era. After China had opened up, U.S. and other foreign companies were operating in the country largely without restraint; and Chinese private enterprises operated outside the control of the party. Xi seemed determined to correct this situation.²¹³

Under Xi, China’s political repositioning built on a shift in domestic economic policy that the previous leadership under Hu Jintao and Wen Jiabao had already initiated, i.e. a return to industrial policy. This shift began with several megaprojects in 2006, followed by the start of the Strategic Emerging Industry programme in 2010. This support scheme covered 20 key industries and intended to enable China to become global technology and manufacturing leader in future industries, including wind power, solar power, and electric vehicles.²¹⁴ The programme envisioned a guiding role for government in “making the market” and directing the companies in the targeted sectors, comprising mostly state-owned enterprises and some private enterprises with close government links.²¹⁵

The following economic policies increasingly deteriorated the relations with the U.S. and other Western countries. Milestones on the path towards a party-state economy were the *Made-in-China 2025* initiative, a set of policies published in 2015 to promote China’s global technological dominance, and the 2017 push for military-civilian fusion that entailed the military utilisation of technologies developed by commercial players. In 2020, Xi Jinping proposed the operation of China’s economy in “dual circulation,” i.e. shielding the domestic economy from outside influences, while still benefitting from international economic exchange. Since 2018, the U.S. and other countries have been implementing a growing array of tariffs and economic sanctions in order to either respond to unfair economic practices or protest against human rights violations by Chinese officials. These measures will be in place for the

212 Pearson et al, “The New China Shock: How Beijing’s Party-State Capitalism Is Changing the Global Economy,” *Foreign Affairs*, 8 December 2022.

213 Nakazawa, Katsuji, “Analysis: Xi, Not Trump, Started on Path to Decoupling,” *Nikkei Asia*, 20 April 2023.

214 The development of China’s nuclear industry was part of an earlier megaproject scheme that preceded the 2010 Strategic Emerging Industry programme. See for an in-depth account of China’s industrial policy and, specifically, the initiation of the industrial policy after the turn of the century, Naughton, Barry, *The Rise of China’s Industrial Policy 1978 to 2020*. Mexico City: Universidad Nacional Autónoma de México, 2021, 49–67.

215 *Ibid*, 59, 65.

foreseeable future; and the current Chinese leadership is also unlikely to change its policies any time soon.

Among China's largest trade partners, the U.S. was first to respond in a structural way. In a speech in April 2023, National Security Advisor Jake Sullivan explained the new direction of U.S. foreign economic policy.²¹⁶ According to Sullivan, the "cracks" in the foundations of the post-World War II international economic order and the ramifications of "a shifting global economy," demand "that we forge a new consensus."²¹⁷ This realisation forms the basis of the Biden administration's approach, which Sullivan describes as "pursuing a modern industrial and innovation strategy – both at home and with partners around the world."²¹⁸ The impetus for engaging in trade relations differs from the goals of the 1990s. Priorities in today's trade relations include the creation of diversified and resilient supply chains as well as the mobilisation of public and private investment for a just and clean energy transition.²¹⁹

In its relations with China, the EU increasingly seems to be drawing the same conclusions as the United States. In August 2023, EU trade commissioner Valdis Dombrovskis said that the trade relationship with China was "very unbalanced."²²⁰ He hoped to solve the problems through dialogue and emphasised the important role that the WTO system has played in China's economic development. Nevertheless, he mentioned the possibility of deploying "a range of new trade weapons" that the Union had acquired in recent years. Moreover, he suggested that the EU was also contemplating export controls, which "would be narrowly focused on national security grounds."²²¹

Electric vehicles, vital for the electrification and decarbonisation of the transport sector, emerged as a new bone of contention when, in her State of the Union address, President Ursula von der Leyen announced an anti-subsidy investigation into the Chinese government's support schemes for this sector.²²² During her address, von der Leyen also referred to earlier remarks when she proclaimed a new phase in

216 The White House, "Remarks by National Security Advisor Jake Sullivan on Renewing American Economic Leadership at the Brookings Institution," 27 April 2023, <https://www.whitehouse.gov/briefing-room/speeches-remarks/2023/04/27/remarks-by-national-security-advisor-jake-sullivan-on-renewing-american-economic-leadership-at-the-brookings-institution/>, pp. 1–14.

217 European Commission, "2023 State of the Union Address by President von der Leyen," 13 September 2023, https://ec.europa.eu/commission/presscorner/detail/en/speech_23_4426.

218 Ibid.

219 Ibid, p. 8.

220 Bounds, Andy, and Sam Fleming, "EU Trade Chief to Push China on Barriers to Exports," *Financial Times*, 7 August 2023.

221 Ibid.

222 Ibid.

EU-China relations, following the realisation that “China’s economic and security ambitions have shifted.”²²³ The Union’s response would be “economic de-risking,” i.e. strengthening supply chain resilience and trade diversification.²²⁴ According to von der Leyen, aligning with other partners would be part of the Union’s approach. Weeks later, the Hiroshima G7 summit endorsed the notion of “de-risking” when the leaders declared with respect to China that their countries’ “economic resilience requires de-risking and diversifying.”²²⁵

To sum up, both China and the U.S. and its allies seem determined to adhere to their policy choices. An increasingly confrontational international arena coincides with a difficult economic situation in China,²²⁶ while the leadership’s economic policies are even less predictable than in the past.²²⁷ In a highly politicised international climate, the rest of the world has to prepare for the ramifications of China’s economic decline.²²⁸ Yet, at least for some time the world’s second-largest economy will remain a vital supplier of many raw materials and products that are needed for a timely implementation of the energy transition.²²⁹

Over time, however, international economic exchange will adjust; and new forms of institutionalised cooperation will evolve. To achieve this, policymakers need to develop mechanisms that can facilitate cooperation. The next sub-section discusses solutions that might help to cushion the negative effects of the emerging divisions in the global economy, allowing the transformation of the energy system to proceed.

223 European Commission, “Speech by President von der Leyen on EU-China Relations to the Mercator Institute for China Studies and the European Policy Centre,” 30 March 2023, https://ec.europa.eu/commission/presscorner/detail/en/speech_23_2063, pp. 1–4.

224 Ibid.

225 2023 Hiroshima Summit, “G7 Hiroshima Leaders’ Communique,” 20 May 2023, https://www.g7hiroshima.go.jp/documents/pdf/Leaders_Communique_01_en.pdf, para 50.

226 By mid-2023, domestic demand was sluggish; and unemployment was rising. The Chinese economy slipped into deflation. Both imports and exports were slumping, while local governments were mired in debt, leaving the central government few options to respond meaningfully. Gao, Liangping, and Ryan Woo, “China Tips into Deflation as Efforts to Stoke Recovery Falter,” *Reuters*, 9 August 2023; He, Laura, “Why China Has Few Good Options to Boost Its Faltering Economy,” *CNN*, 6 August 2023.

227 The economic downturn is already affecting the consensus among the country’s political elite. Party elders criticised Xi’s policy implementation during the annual Beidaihe meeting in summer 2023. See, Nakazawa, Katsuij, “Analysis: Xi Reprimanded by Elders at Beidaihe over Direction of Nation,” *Nikkei Asia*, 5 September 2023.

228 Tepperman, Jonathan, “China’s Dangerous Decline: Washington Must Adjust as Beijing’s Troubles Mount,” *Foreign Affairs*, 19 December 2022; Liu, Zongyuan Zoe, and Benn Steil, “Xi’s Plan for China’s Economy Is Doomed to Fail: ‘Consumption-led Growth’ Is Good Policy But Bad Politics,” *Foreign Affairs*, 29 June 2023; Wei, Lingling, and Stella Yifan Xie, “China’s 40-year Boom Is Over: What Comes Next?,” *Wall Street Journal*, 20 August 2023; “Why China’s Economy Won’t Be Fixed,” *The Economist*, 24 August 2023.

229 White, Edward, “How China Cornered the Market for Clean Tech,” *Financial Times*, 9 August 2023.

4.2 ACCOMPLISHING THE ENERGY TRANSITION DESPITE THE SYSTEMIC DIVIDE

The low-carbon energy transition is taking place in a challenging international environment. Companies have to deal with systemic risk and geopolitical uncertainty,²³⁰ often forcing them to reconsider their business strategies. Governments increasingly feel the need to reassess assumptions about international relations and, where necessary, guard the domestic energy trajectory against disruptions.

Energy security rather than the pursuit of a level-playing field dominates the economic discourse. To be sure, trade liberalisation will not recede entirely. Countries that are willing to adhere to WTO rules will certainly apply them in their relations with like-minded partners. Yet, vital socio-economic and security interests that relate to energy cooperation require arrangements that go beyond tariff reductions and non-discrimination rules. They must be both substantive and flexible. Therefore, such arrangements will most likely be bilateral or include only a small number of participants.

These characteristics are already noticeable in partnerships that were announced recently. In fact, a flurry of energy-related initiatives has emerged during the last two years. The announcements and activities reveal some commonalities that might provide clues for future energy cooperation. In response to the disruptions that occurred from 2020 onwards, an adjusted international institutional eco-system is currently emerging, largely driven by the U.S. and the EU. It complements the convergence of energy, climate, and industrial policies at the domestic level. Two objectives of international platforms that promote energy cooperation are most notable. First, they seek to diversify supply relations and secure new supply chains. Second, a proper way of accounting for environmental costs, especially greenhouse gas emissions, seems to become an intrinsic part of trade relations.

The G7 Clean Energy Economy Action Plan²³¹ that the G7 members issued during their summit in Hiroshima in 2023 reflects both objectives.²³² The G7 members agreed to cooperate on the creation of trade policies that contribute to the decarbonisation of their economies. Moreover, they want to increase investments globally in order to accelerate the development of “resilient clean energy supply

230 Teece, 2022, 510.

231 Ministry of Foreign Affairs of Japan, “G7 Clean Energy Economy Action Plan,” 20 May 2023, https://www.mofa.go.jp/ecom/rs/page1e_000685.html, pp. 1–4.

232 The Group of Seven (G7) consists of seven developed countries – Canada, France, Germany, Italy, Japan, the United Kingdom, and the U.S. – as well as the EU.

chains,” and “grow shared markets for clean energy goods and services.”²³³ The members will adjust their trade policies to the effect that the policies are able to facilitate decarbonisation and emissions reductions “by spurring markets to account for embedded emissions in traded goods.”²³⁴



G7 LEADERS DURING THEIR SUMMIT IN HIROSHIMA, JAPAN, MAY 2023.

To realise these goals, the G7 members intend to rely on existing mechanisms and institutions. Research conducted by the Organization for Economic Cooperation and Development (OECD) should help to introduce methodological approaches for calculating the carbon intensity of goods and entire sectors. Reports by the International Energy Agency (IEA) on clean energy supply chains and a clean energy manufacturing roadmap will further inform G7 policies.²³⁵ The G7 Partnership for Global Infrastructure and Investment (PGII) will help to work with other countries to develop clean energy supply chains.²³⁶ The G7 members will further participate in the Minerals Security Partnership²³⁷ and “work to develop technical international standards for critical minerals markets through the International Organization for Standardization.”²³⁸

233 Ministry of Foreign Affairs of Japan, “G7 Clean Energy Economy Action Plan,” pp. 2, 4.

234 Ibid, p. 2.

235 Ibid, pp. 2, 3.

236 Ibid, p. 3.

237 U.S. Department of State, “Minerals Security Partnership,” 14 June 2022, <https://www.state.gov/minerals-security-partnership/>.

238 G7 Clean Energy Economy Action Plan, p. 3.

In addition, during a meeting on energy cooperation as part of the G7 process, five countries of the group – the United Kingdom, the United States, Canada, Japan, and France – formed an alliance to collaborate in order to ensure “the stable supply of fuels for the operating reactor fleets of today” and “enable the development and deployment of fuels for the advanced reactors of tomorrow.”²³⁹ Multilateral cooperation should help to strengthen the members’ “domestic sectors and establish a level playing field to compete more effectively against predatory suppliers.”²⁴⁰

Ideas and objectives that are included in the G7 Plan for clean energy action are also part of other forms of collaboration that have a more regional focus, for instance the Clean Economy Pillar of the Indo-Pacific Economic Framework.²⁴¹ The U.S.-EU Energy Council coordinates energy relations between the U.S. and the EU, including its member states. It was launched in 2009 and is the “leading forum to guide bilateral energy cooperation.”²⁴² Three working groups support the exchange in the council. They focus on energy technology, energy policy, and energy security. The joint statement following the most recent meeting in April 2023 lists numerous fields of cooperation, ranging from emergency energy assistance to Ukraine and Moldova to business roundtables and efforts to reduce energy-related methane emissions.²⁴³

Specific goals can also be found in bilateral energy partnerships, such as the cooperation between the U.S. and Mongolia on the supply of critical minerals. Both sides agreed to establish a framework to facilitate technical support for the development of Mongolia’s mineral resource sector and encourage investment.²⁴⁴

Another example for cooperation on a specific segment of the energy sector is the EU-Japan Energy Security Dialogue on Global Liquefied Natural Gas (LNG) Architecture that was established in July 2023. This dialogue addresses three issues, i.e. global security of supply, transparency of markets, and the reduction of methane emissions in the LNG supply chain. The dialogue format was added to the already existing strategic energy partnership between the EU and Japan. Moreover, the EU

239 U.S. Department of Energy, “Statement on Civil Nuclear Fuel Cooperation between Canada, France, Japan, the United Kingdom, and the United States,” 17 April 2023, <https://www.energy.gov/articles/statement-civil-nuclear-fuel-cooperation-between-united-states-canada-france-japan-and>.

240 Ibid.

241 U.S. Department of Energy – Office of International Affairs, “Asia and the Indo-Pacific,” energy.gov/ia/asia-indo-pacific.

242 U.S. Department of Energy – Office of International Affairs, “U.S.-EU Energy Council,” <https://www.energy.gov/ia/us-eu-energy-council>.

243 European Commission, “Joint Statement by the EU and the US following the 10th EU-US Energy Council,” 4 April 2023, https://ec.europa.eu/commission/presscorner/detail/en/statement_23_2121.

244 U.S. Department of State, “The United States and Mongolia Sign MOU to Collaborate on Critical Minerals,” 26 June 2023, <https://www.state.gov/the-united-states-and-mongolia-sign-mou-to-collaborate-on-critical-minerals/>.

and Japan agreed that the LNG dialogue “is open to cooperation with other partners who share the same vision of a secure and sustainable energy future.”²⁴⁵

The U.S.-India Strategic Clean Energy Partnership comprises several workstreams, such as clean and renewable energy, energy efficiency, battery storage, gas hydrates, advanced biofuels, as well as hydrogen and electrolyser production. During recent talks in July 2023, both sides emphasised the “importance of producing green/clean hydrogen as a critical energy source for global decarbonization and agreed to support each other’s national hydrogen missions.”²⁴⁶

Indeed, announcements about bilateral energy cooperation increasingly include joint efforts to build the hydrogen economy as part of the future energy system. The recent agreement of June 2023 between Chile and the EU is a case in point. This initiative seeks to develop the production of renewable hydrogen in Chile, initially funded with €225 million and jointly financed by the Union’s Latin America and Caribbean Investment Bank, the European Investment Bank, and the state-owned German Development Bank KfW.²⁴⁷ In 2022, the Chilean government had already signed a memorandum of understanding with the city-state of Hamburg and the Port Authority of Hamburg regarding the supply of Chilean-produced hydrogen to central European markets via this German port.²⁴⁸

In September 2022, the First EU-India Green Hydrogen Forum took place. Taking into account India’s 2021 National Hydrogen Mission and the 2020 European Hydrogen Strategy, both sides intend to use this platform to “exchange best practices, policy frameworks and production and application technologies for renewable hydrogen as well as opportunities for EU-India cooperation in the area.”²⁴⁹ The initiative for this exchange emerged from the EU-India Clean Energy and Climate Partnership that was established in 2016. In 2021, both sides decided to add new topics to the existing cooperation, including renewable hydrogen.²⁵⁰

245 European Commission, “EU and Japan to Reinforce Energy Cooperation through a Dedicated Dialogue on Global LNG Architecture,” 18 July 2023, https://energy.ec.europa.eu/news/eu-and-japan-reinforce-energy-cooperation-through-dedicated-dialogue-global-lng-architecture-2023-07-18_en.

246 U.S. Department of Energy, “U.S. and India Advance Partnership on Clean Energy,” 18 July 2023, <https://www.energy.gov/articles/us-and-india-advance-partnership-clean-energy>.

247 Delegation of the European Union to Chile, “Chilean Government and the European Union Launch Two New Cooperation Initiatives on Renewable Hydrogen Worth 225 Million Euros,” 14 June 2023, https://www.eeas.europa.eu/delegations/chile/chilean-government-and-european-union-launch-two-new-cooperation-initiatives_en?s=192.

248 Ministry of Foreign Affairs, “Chile Signs Agreement with Germany’s Largest Port for Green Hydrogen Exports,” 24 August 2022, <https://www.minrel.gob.cl/news/chile-signs-agreement-with-germany-s-largest-port-for-green-hydrogen>.

249 EU-India Clean Energy and Climate Partnership, “First EU-India Green Hydrogen Forum,” 8 September 2022, <https://www.cecp-eu.in/events/post/first-eu-india-green-hydrogen-forum>.

250 Ibid.

Energy cooperation on supply chains to enhance energy security and hydrogen partnerships are still an emerging field of international cooperation. They display broad variations in terms of scope, content, and the degree of institutionalisation. Nevertheless, they form vital locales that help develop ideas, innovative approaches, and, at some point, more institutionalised mechanisms. These flexible partnerships have the advantage that they leave room to discuss domestic socio-economic priorities and energy policies. The partners can develop the cooperation based on their specific goals and circumstances. Over time, these arrangements will lead to new trade flows and might require further institutionalisation. Subsequently, more partners can join. This process of institution-building will necessarily take into account the arrangements that initiated the partnership.

Since these cooperation formats concern vital parts of the economy, they clearly have the potential to evolve as cooperative laboratories of the energy transition era, facilitating exchange about new priorities in economic affairs. They also offer the opportunity to test the limitations of cooperation in the emerging compound field of energy, climate, and industrial policy. Hence, under circumstances of strategic risk and geopolitical uncertainty energy partnerships among like-minded countries can contribute to the reform of the global economy's existing institutions or become a stepping stone towards the creation of new institutions.

5 TAKING STOCK - PROPERLY, PLAUSIBLY, AND PUBLICLY!

In June 2023, climate negotiators met in Bonn, Germany, in preparation of COP28 and, specifically, the first global stocktake under the Paris Agreement. The chairs of the Subsidiary Body for Scientific and Technological Advice and the Subsidiary Body for Implementation, two institutions under the UN climate regime, issued a document with their “draft conclusions” of the meeting. They emphasised “the importance of the global stocktake for achieving the purpose and long-term goals of the Paris Agreement”²⁵¹ and encourage “Parties and non-Party stakeholders” to hold “events, at the local, national, regional and international level [...] in support of the first global stocktake.”²⁵²

Emboldened by this note, this paper pondered on the importance of making this first global stocktake a success and sought to imagine what a successful “first-of-its-kind” would look like. The paper explained the significance of having institutionalised, regular assessments of the parties’ efforts to mitigate climate change. No doubt, these assessments need to take place in a sphere that is not marred by the divisive legacy of climate negotiations; and, above all, they primarily need to involve the largest annual emitters of greenhouse gas emissions. Further, the focus should be on the core objective of the UN climate regime, i.e. the “stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.”²⁵³ Hence, achievements and new efforts to stabilise and reduce greenhouse gas emissions must play a central role in the global stocktake.

Chapters 3 and 4 examined emerging institutions that converge energy, climate, and industrial policies both at the domestic and international levels. Against the backdrop of a bifurcated global economy, the international community needs new rules and institutions to cooperatively decarbonise global energy generation. By providing valuable information about the state of the energy transition, the global stocktake can become a salient part of this new institutional eco-system.

251 Matters Relating to the Global Stocktake under the Paris Agreement, Draft conclusions by the Chairs (FCCC/SB/2023/L.3), 15 June 2023, para 1.

252 Ibid, para 9.

253 Article 2 UNFCCC.

In conclusion and in support of this pivotal juncture in the evolution of the UN climate regime, this section expands on the topics that seem to be appropriate additions to the first global stocktake:

More often than not, new norms and novel approaches under the UN climate regime were delayed and watered down by the politicisation of international climate cooperation, as Chapter 2 described. The conclusions of the global stocktake are the main vehicle to directly relate the NDCs with the state of annual global emissions. This paper argues that it is of vital importance that the parties avoid politicising the deliberations about climate change mitigation during the global stocktake, mainly because the debates and conclusions form the basis for further cooperation under the Paris Agreement, especially for strengthening the parties' NDCs. Figure 5.1 visualises this thought.

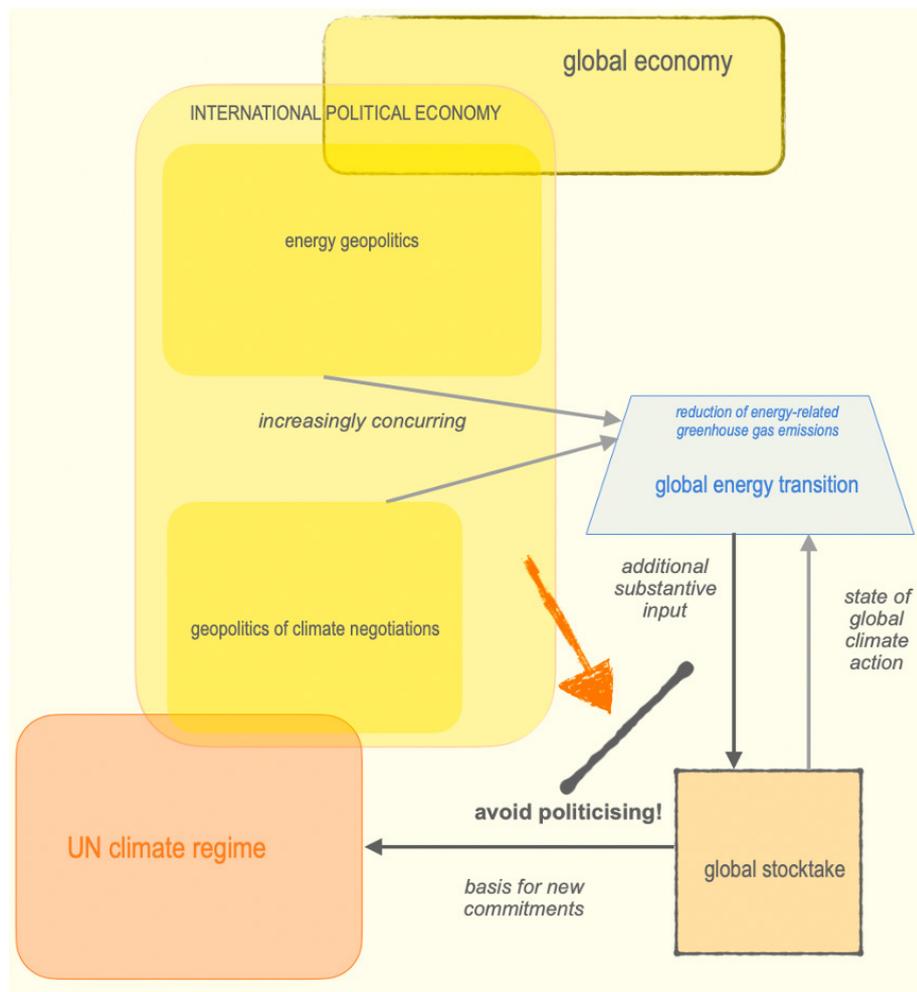


FIGURE 5.1: PROTECTING THE GLOBAL STOCKTAKE AGAINST GEOPOLITICAL INTERFERENCE
SOURCE: AUTHOR.

Chapter 2 gave thought to the substantive part of the global stocktake and suggested additional topics for the deliberations, either as part of the global stocktake or during events that accompany this quintennial activity. These additional topics concern the parties' experiences with enhancing energy security, fostering sub-national climate action, and the progress towards a meaningful phasedown of unabated coal use. Obviously, experiences with these matters differ greatly among the parties. Yet, sharing them would complement the technical exchange about emissions and reduction percentages.

For instance, it would be of great interest to hear how the thinking and actions on energy security are evolving in the EU and China. The multilateral debate would also gain from more insights into energy and climate governance in the U.S., including sub-national efforts to implement the energy transition. This would provide a better understanding of country's involvement in the Paris process, particularly in times of domestic political contestation.

Moreover, it would be helpful to receive regular updates about the situation in China's and India's most coal-dependent regions, such as Shanxi and Jharkand. Other parties that have to deal with large-scale socio-economic transitions to phase down coal would most likely place high value on experiences and proven best regulatory and socio-economic practices in coal-dependent regions. Multilateral lending institutions can also obtain insights for their work to support just transitions.

Indeed, how information enters the discourse matters. To ensure continuous attention for these essential additional topics, some form of institutionalisation is preferable, for instance as peer review procedures. Multilateral organisations that facilitate cooperation on socio-economic affairs have been working with peer reviews for decades.²⁵⁴ Peer reviews can be organised by pairing parties of the UN climate regime or by grouping countries around certain topics, to obtain as much substantive input as possible.

254 Examples are peer reviews on development assistance as part of the membership of the Organization for Economic Cooperation and Development (OECD), peer reviews on transparency and exchange of information standards that the Global Forum on Transparency and Exchange of Information for Tax Purposes organises, and peer reviews that the Financial Stability Board facilitates among G20 members, assisted by the International Monetary Fund (IMF). See, OECD – Global Forum on Transparency and Exchange of Information for Tax Purposes, <https://www.oecd.org/tax/transparency/what-we-do/>; OECD – Development Co-operation Directorate, "Peer Reviews of DAC Members," <https://www.oecd.org/dac/peer-reviews/>; Financial Stability Board, "Peer Reviews," https://www.fsb.org/work-of-the-fsb/implementation-monitoring/peer_reviews/; International Monetary Fund, "G-20 Ministerial Meeting," 7 November 2009, <https://www.imf.org/en/News/Articles/2015/09/28/04/53/sonew110709a>

The global stocktake is essential for the cooperation of the parties under the Paris Agreement. The international community cannot afford that this mechanism and its regular conduct become politicised. To some, the current international mood may discourage extensive exchanges. Yet, making rules for international cooperation is an attempt to institutionalise practices and procedures that allow parties to stay engaged, beyond immediate tensions. Thus, from this perspective, a successful first global stocktake should be held in a spirit of trustful, forward-looking cooperation. Adding substantive topics, based on experiences with the energy transition, may help to focus on practical efforts to reduce greenhouse gas emissions.

Finally, the commitments of the parties to the UN climate regime are nationally determined. The global stocktake, however, needs to be a global affair. The climate-change battered global public has a right to serious debate during and around this event, including a proper choice of salient topics. Participants need to ensure that plausible answers are given to reasonable questions about national actions; and all of this needs to take place publicly. Efforts should be made that the global stocktake proceeds as a cooperative exercise. This year's global stocktake is of utmost importance. The rules that are being developed during this occasion will shape the global conversation on climate change mitigation for years to come – and will hopefully enhance the willingness among the parties to formulate more ambitious commitments. When climate negotiators will meet in Dubai later this year, the world will take notice and partake. Let's embrace the global stocktake – as industrial stakeholders, as energy consumers, as the global public!

REFERENCES

Blaxekjær, Lau Øfjord, Bård Lahn, Tobias Dan Nielsen, Lucia Green-Weiskel, and Fang Fang. "The Narrative Position of the Like-minded Developing Countries in Global Climate Negotiations." In *Coalitions in the Climate Change Negotiations*, ed. Carola Klöck et al. (London: Routledge, 2021), 113–35.

Blaxekjær, Lau Øfjord, and Tobias Dan Nielsen. "Mapping the Narrative Positions of New Political Groups under the UNFCCC." *Climate Policy* 15, no. 6 (2015): 751–66.

Bordoff, Jason. "The White House's Crowning Domestic Policy Achievement Can't Reach Its Full Potential without Engaging the World." *Foreign Policy*, 17 August 2022.

Bordoff, Jason, and Meghan L. O'Sullivan. "The Age of Energy Insecurity: How the Fight for Resources Is Upending Geopolitics." *Foreign Affairs*, 10 April 2023.

Brown, Michael, and Robert Atkinson. "The Real Contest with China: Washington Needs a Comprehensive Industrial Strategy to Outpace Beijing." *Foreign Affairs*, 28 August 2023.

Castro, Paula. "National Interests and Coalition Positions on Climate Change: A Text-based Analysis." *International Political Science Review* 42, no. 1 (2021): 95–113.

Central Committee of the Chinese Communist Party and State Council of the People's Republic of China, 关于进一步深化电力体制改革的若干意见（中共中央国务院2015年3月15日发布中发〔2015〕9号）[Some opinions regarding the further deepening of the power sector reform (Central Committee State Council, 15 March 2015, Central Committee document no. 9 [2015])].

Chhotray, Vasudha. "Extractive Regimes in the Coal Heartlands of India: Difficult Questions for a Just Energy Transition." In *Climate Justice in India*, ed. Prakash Kashwan (Cambridge: Cambridge University Press, 2022), pp. 74–96.

European Commission. "The EU Budget Power the Recovery Plan for Europe." 27 May 2020, COM(2020) 442 final, pp. 1–20.

European Commission. "The European Green Deal." 11 December 2019, COM(2022) 640 final, pp. 1–24.

Friedberg, Aaron L. *Getting China Wrong*. Cambridge: Polity, 2022.

Genovese, Federica, Richard J. McAlexander, and Johannes Urpelainen. "Institutional Roots of International Alliances: Party Groupings and Position Similarity at Global Climate Negotiations." *The Review of International Organizations*, 2 June 2022, <https://link.springer.com/article/10.1007/s11558-022-09470-4>, pp. 1–31.

Glasgow Climate Pact, Decision 1/CMA.3 (FCCCC/PA/CMA/2021/10/Add.1), 8 March 2022.

Government of India – Ministry of Power/Central Electricity Authority. "National Electricity Plan, Volume I: Generation." 18 May 2023, https://cea.nic.in/wp-content/uploads/notification/2023/06/NEP_2022_32_FINAL_GAZETTE_English.pdf, pp. 1–316.

Handke, Susann. "Regulating Post-Paris Climate Cooperation: The Geopolitics of Transparency, Flexibility, and Common Timeframes." CIEP Paper no. 2 (2021), <https://www.clingendaelenergy.com/inc/upload/files/CIEP-Paper-202102-web.pdf>, pp. 1–47.

2023 Hiroshima Summit. "G7 Hiroshima Leaders' Communiqué." 20 May 2023, https://www.g7hiroshima.go.jp/documents/pdf/Leaders_Communique_01_en.pdf, pp. 1–40.

Information Office of the State Council of the People's Republic of China. "新时代的总过能源发展 - 白皮书" [White paper on China's energy development in the new era]. December 2020, <http://www.scio.gov.cn/ztk/dtzt/42313/44537/index.htm>.

International Energy Agency (IEA). "Building a Unified National Power Market System in China: Pathways for Spot Power Markets." April 2023, <https://iea.blob.core.windows.net/assets/666f55e2-83a8-470d-b8e4-f48618aeec1e/BuildingaUnifiedNationalPowerMarketSysteminChina.pdf>, pp. 1–75.

Crowther, Herbert. "Three Years on: Assessing Power Sector and Renewable Energy Manufacturing in China since the Announcement of Dual Carbon Goals." OIES Paper no. CE10, October 2023, <https://www.oxfordenergy.org/wpcms/wp-content/uploads/2023/10/CE10-Three-years-on.pdf>, pp. 1–38.

Decision 19/CMA.1 – Matters Relating to Article 14 of the Paris Agreement and Paragraphs 99 – 101 of Decision 1/CP.21 (FCCC/PA/CMA/2018/3/Add.2), 19 March 2019.

Economy, Elizabeth C. *The World According to China*. Cambridge: Polity, 2022.

El-Erian, Mohamed A. "Not Just Another Recession: Why the Global Economy May Never Be the Same." *Foreign Affairs*, 22 November 2022.

ENB. "Summary of the 58th Session of the Intergovernmental Panel on Climate Change." 22 March 2023, https://enb.iisd.org/sites/default/files/2023-03/enb12819e_0.pdf, pp. 1–22.

Energy Institute, "2023 – 72nd Edition Statistical Review of World Energy," 26 June 2023, <https://www.energyinst.org/statistical-review>, pp. 1–60.

European Commission. "2023 State of the Union Address by President von der Leyen." 13 September 2023, https://ec.europa.eu/commission/presscorner/detail/en/speech_23_4426.

European Commission. "Joint Statement by the EU and the US following the 10th EU-US Energy Council." 4 April 2023, https://ec.europa.eu/commission/presscorner/detail/en/statement_23_2121.

European Commission. "EU Energy in Figures: Statistical Pocketbook 2022." September 2022, <https://op.europa.eu/en/publication-detail/-/publication/7d9ae428-3ae8-11ed-9c68-01aa75ed71a1/language-en>, pp. 1–264.

European Commission. "REPowerEU Plan." 18 May 2022, COM(2022) 230 final, pp. 1–20.

European Commission. "A Hydrogen Strategy for a Climate-neutral Europe." 8 July 2020, COM(2020) 301 final, pp. 1–24.

International Energy Agency (IEA). "Coal in Net Zero Transitions: Strategies for Rapid, Secure and People-centred Change." November 2022, <https://iea.blob.core.windows.net/assets/4192696b-6518-4cfc-bb34-acc9312bf4b2/CoalInNetZeroTransitions.pdf>, pp. 1–222.

International Energy Agency (IEA). "An Energy Sector Roadmap to Carbon Neutrality in China." September 2021, <https://iea.blob.core.windows.net/assets/9448bd6e-670e-4cfd-953c-32e822a80f77/AnEnergySectorRoadmapToCarbonNeutralityInChina.pdf>, pp. 1–301.

International Energy Agency (IEA). "India Energy Outlook 2021." February 2021, https://iea.blob.core.windows.net/assets/1de6d91e-e23f-4e02-b1fb-51fdd6283b22/India_Energy_Outlook_2021.pdf, pp. 1–249.

Jain, Neelima, and Richard M. Rossow. "Accelerate: 175 – A Plan for Targeted Renewable Energy Cooperation with Key Indian States." CSIS Report, 19 April 2023, https://csis-website-prod.s3.amazonaws.com/s3fs-public/2023-04/230419_Jain_Accelerate175_IndianStates.pdf, pp. 1–38.

Kar, Sanjay Kumar, Akhoury Sudhir Kumar Sinha, Sidhartha Harichandan, Rohit Bansal, Marriyappan Sivagnanam Balathanigaimani. "Hydrogen Economy in India: A Status Review," *WIREs Energy and Environment* (May 2022): 1–26.

Kashwan, Prakash, ed. *Climate Justice in India*. Cambridge: Cambridge University Press, 2022.

Klöck, Carola, Paula Castro, and Florian Weiler. "Coalitions in the Climate Change Negotiations." LIEPP Policy Brief (October 2021), https://web.archive.org/web/20220518073555id_/https://hal-sciencespo.archives-ouvertes.fr/hal-03409340/file/LIEPP-PB-55-Klock.pdf, pp. 1–5.

Klöck, Carola, Paula Castro, Florian Weiler, and Lau Øfjord Blaxekjær. *Coalitions in the Climate Change Negotiations*. London: Routledge, 2021.

Matthijs, Matthias, and Sophie Meunier, "Europe's Geoeconomic Revolution: How the EU Learned to Wield Its Real Power," *Foreign Affairs*, 22 August 2023.

Mi Zhifu, and Sun Xinlu. "Provinces with Transitions in Industrial Structure and Energy Mix Performed Best in Climate Change Mitigation in China." *Communications Earth and Environment* 2, no. 182 (2021): 1–12.

Mildenberger, Matto. "The Development of Climate Institutions in the United States." *Environmental Politics* 30, no. S1 (2021): 71–92.

Ministère de la Transition énergétique, "Réunion des pays membres de l'Alliance du nucléaire – Paris, 16 mai 2023, Déclaration commune/Nuclear Alliance meeting – Paris 16 May 2023, Joint Statement," 16 May 2023, https://www.ecologie.gouv.fr/sites/default/files/16_05_23_REUNION_DES_PAYS_MEMBRES_DE_L'E2%80%99ALLIANCE_DU_NUCLEAIRE_A_PARIS.pdf, pp. 1–4.

Ministry of Foreign Affairs of Japan. "G7 Clean Energy Economy Action Plan." 20 May 2023, https://www.mofa.go.jp/ecm/rs/page1e_000685.html, pp. 1–4.

Minzner, Carl. *End of an Era: How China's Authoritarian Revival Is Undermining Its Rise*. Oxford: Oxford University Press, 2018.

Myllyvirta, Lauri, Xing Zhang, and Liansai Dong. "China's Climate Transition: Outlook 2022." CREA – Heinrich-Böll-Stiftung, 21 November 2022, https://energyandcleanair.org/wp/wp-content/uploads/2022/11/Chinas-Climate-Transition_Outlook-2022.pdf, pp. 1–95.

National Development and Reform Commission. "国家发展改革委 国家能源局关于完善能源: 绿色低碳转型体制机制和政策措施的意见 - 发改能源 [2022] 206号" [National Energy Administration – National Development and Reform Commission Opinion on the green and low-carbon transition of the energy system and related policy measures, NDRC National Energy Administration document no. 206 (2022)]. 30 January 2022, https://www.ndrc.gov.cn/xxgk/zcfb/tz/202202/t20220210_1314511.html.

Naughton, Barry. *The Rise of China's Industrial Policy 1978 to 2020*. Mexico City: Universidad Nacional Autónoma de México, 2021.

O'Sullivan, Meghan L. *Windfall: How the New Energy Abundance Upends Global Politics and Strengthens America's Power*. New York, NY: Simon and Schuster, 2017.

Pearson, Margaret M., Meg Rithmire, and Kellee S. Tsai. "The New China Shock: How Beijing's Party-State Capitalism Is Changing the Global Economy." *Foreign Affairs*, 8 December 2022.

Prys-Hansen, Miriam. "Politics of Responsibility: India in Global Climate Governance." In *Great Powers, Climate Change, and Global Environmental Responsibilities*, ed. Robert Falkner and Barry Buzan (Oxford: Oxford University Press, 2022), 139–63.

Qi, Jianfeng Jeffrey, and Peter Dauvergne. "China's Rising Influence on Climate Governance: Forging a Path for the Global South." *Global Environmental Change* 73 (2022): 1–13.

Shirk, Susan L. *Overreach: How China Derailed Its Peaceful Rise*. Oxford: Oxford University Press, 2023.

Shum, Desmond. *Red Roulette: An Insider's Story of Wealth, Power, Corruption, and Vengeance in Today's China*. New York, NY: Simon & Schuster, 2021.

Teece, David J. "A Wider-aperture Lens for Global Strategic Management: The Multinational Enterprise in a Bifurcated Global Economy." *Global Strategy Journal* 12, no. 3 (2022): 488–519.

Tepperman, Jonathan. "China's Dangerous Decline: Washington Must Adjust as Beijing's Troubles Mount." *Foreign Affairs*, 19 December 2022.

The White House. "Remarks by National Security Advisor Jake Sullivan on Renewing American Economic Leadership at the Brookings Institution." 27 April 2023, <https://www.whitehouse.gov/briefing-room/speeches-remarks/2023/04/27/remarks-by-national-security-advisor-jake-sullivan-on-renewing-american-economic-leadership-at-the-brookings-institution/>, pp. 1–14.

The White House. "Memorandum on Presidential Determination Pursuant to Section 303 of the Defense Production Act of 1950, as amended, No. 2022-11." 31 March 2022, <https://www.whitehouse.gov/briefing-room/presidential-actions/2022/03/31/memorandum-on-presidential-determination-pursuant-to-section-303-of-the-defense-production-act-of-1950-as-amended/>.

The White House – President Barack Obama. "U.S.-China Joint Announcement on Climate Change." 12 November 2014, <https://obamawhitehouse.archives.gov/the-press-office/2014/11/11/us-china-joint-announcement-climate-change>.

Thomas, Mike, and David Fishman, "What Lessons Do The Chinese Hydropower Shortages in Summer 2022 Hold for the World?," *China Water Risk*, 24 May 2023, <https://chinawaterisk.org/opinions/what-lessons-do-the-chinese-hydropower-shortages-in-summer-2022-hold-for-the-world/>.

United Nations Climate Change – NDC Registry. "Update of the NDC of the European Union and Its Member States." 18 December 2020, https://unfccc.int/sites/default/files/NDC/2022-06/EU_NDC_Submission_December%202020.pdf, pp. 1–19.

United Nations Climate Change – NDC Registry. "The United States' Nationally Determined Contribution: Reducing Greenhouse Gases in the United States: A 2030 Emissions Target." 21 April 2021, <https://unfccc.int/sites/default/files/NDC/2022-06/United%20States%20NDC%20April%2021%202021%20Final.pdf>, pp. 1–23.

United Nations Climate Change – NDC Registry, "China's Achievements, New Goals and New Measures for Nationally Determined Contributions." 28 October 2021, <https://unfccc.int/sites/default/files/NDC/2022-06/China%E2%80%99s%20Achievements%2C%20New%20Goals%20and%20New%20Measures%20for%20Nationally%20Determined%20Contributions.pdf>, pp. 1–56.

United Nations Climate Change – NDC Registry. "中国失落国家自主贡献成效和新目标新举措," 28 October 2021, <https://unfccc.int/sites/default/files/NDC/2022-06/%E4%B8%AD%E5%9B%BD%E8%90%BD%E5%AE%9E%E5%9B%BD%E5%AE%B6%E8%87%AA%E4%B8%BB%E8%B4%A1%E7%8C%AE%E6%88%90%E6%95%88%E5%92%8C%E6%96%B0%E7%9B%AE%E6%A0%87%E6%96%B0%E4%B8%BE%E6%8E%AA.pdf>, pp. 1–74.

United Nations Climate Change. "Secretariat GST Synthesis Report: Synthesis Report for the Technical Assessment Component of the First Global Stocktake State of Greenhouse Gas Emissions by Sources and Removals by Sinks and Mitigation Efforts Undertaken by Parties, Including the Information Referred to in Article 13, paragraph 7(a), and Article 4, paragraphs 7, 15 and 19, of the Paris Agreement." 31 March 2022, <https://unfccc.int/documents/461466>.

United Nations Climate Change. "Addendum to the Synthesis Report for the Technical Assessment Component of the First Global Stocktake: Overall Effect of the Parties' NDCs and Overall Progress Made by the Parties towards the Implementation of their NDCs, including the Information Referred to in Article 13, paragraph 7(b), of the Paris Agreement." 17 April 2023, <https://unfccc.int/documents/627853>.

United Nations Climate Change – NDC Registry. “India’s Updated First Nationally Determined Contribution under Paris Agreement.” 26 August 2022, <https://unfccc.int/sites/default/files/NDC/2022-08/India%20Updated%20First%20Nationally%20Determined%20Contrib.pdf>, pp. 1–3.

UN Environmental Programme, “The Closing Window: Climate Crisis Calls for Rapid Transformation of Societies – Emissions Gap Report 2022.” 27 October 2022, <https://www.unep.org/resources/emissions-gap-report-2022>, pp. 1–101.

U.S. Department of Energy. “Statement on Civil Nuclear Fuel Cooperation between Canada, France, Japan, the United Kingdom, and the United States.” 17 April 2023, <https://www.energy.gov/articles/statement-civil-nuclear-fuel-cooperation-between-united-states-canada-france-japan-and>.

U.S. Department of Energy. “Pathways to Commercial Liftoff: Advanced Nuclear.” March 2023, <https://liftoff.energy.gov/wp-content/uploads/2023/05/20230320-Liftoff-Advanced-Nuclear-vPUB-0329-Update.pdf>, pp. 1–57.

U.S. Energy Information Administration. “Annual Energy Outlook AEO 2023.” March 2023, https://www.eia.gov/outlooks/aeo/pdf/AEO2023_Narrative.pdf, pp. 1–46.

Wu Shu. “A Systematic Review of Climate Policies in China: Evolution, Effectiveness, and Challenges.” *Environmental Impact Assessment Review* 99 (2023): 1–12.

Xu Yi-Chong. *Sinews of Power: The Politics of the State Grid Corporation of China*. Oxford: Oxford University Press, 2017.

Yergin, Daniel. “The Energy Transition Confronts Reality.” *Project Syndicate*, 23 January 2023.

Yergin, Daniel. *The New Map: Energy, Climate, and The Clash of Nations*. New York, NY: Penguin Book, 2021.

CLINGENDAEL INTERNATIONAL ENERGY PROGRAMME | CIEP

ADDRESS

Breitnerlaan 299 +31 70 374 67 00
2596 HA The Hague, www.clingendaelenergy.com
The Netherlands ciep@clingendaelenergy.com