Introduction

> Where there is ruin, there is hope for a treasure.
>
> Rumi (1207–1273)

Energy is an important component of economic activities. It includes non-renewable (fossil and nuclear) energy and renewable (typically, hydro, solar, wind, geothermal and biomass) energy in both primary and secondary forms.[1] Energy intersects with the environment at every stage of its life cycle, namely exploration, extraction, production, conversion, storage, transportation, distribution, use and disposal.

The energy supply chain can negatively affect nature and public health by polluting air, land and water or generating harmful waste, among others. Fossil fuel mining and excessive land use for growing biofuel feedstocks can damage the surrounding ecosystem. Nuclear power plant accidents bring about dangerous consequences felt even in regions far from the accident site. Climate change is probably the 'most global' acute problem associated with energy. Nearly 75 per cent of the world's greenhouse gas (GHG) emissions come from energy use in industry, transport, buildings and elsewhere.[2] This is so because almost 80 per cent of the world's energy is produced by burning fossil fuels, such as oil,

[1] The concept of 'energy' lacks a uniform definition and can change over time. By way of illustration, the United Nations (UN) energy statistics distinguish the following categories of 'energy products': solid fossil fuels (hard coal, brown coal, peat, oil shale, etc.), liquid fossil fuels (conventional crude oil, natural gas liquids, oil products, motor gasoline, etc.), gaseous fossil fuels (natural gas, gas works gas, coke oven gas, blast furnace gas, etc.), biofuels and waste (animal/vegetable waste, biogasoline, biodiesels, biogases, etc.), electricity and heat (primary/secondary electricity generated from fossil, nuclear or renewable energy sources; heat produced by primary/secondary processes, etc.). See UN, '2020 United Nations Energy Statistics Yearbook', 2020, pp. ix–xv, https://unstats.un.org/unsd/energystats/pubs/yearbook/2020/04d.pdf.

[2] Hannah Ritchie, Max Roser and Pablo Rosado, 'CO_2 and Greenhouse Gas Emissions', OurWorldInData.org, 2020, https://ourworldindata.org/co2-and-greenhouse-gas-emissions.

coal and gas.[3] Under the Paris Agreement (2015), governments agreed to pursue efforts to limit global warming to well below 2°C, preferably to 1.5°C, compared to pre-industrial levels.[4] But the preferable 1.5°C target requires achieving net-zero carbon dioxide (CO_2) emissions globally by the early 2050s.[5]

In order to reduce our dependence on high-carbon energy, more needs to be done to increase renewable energy generation and improve energy efficiency. It is thus not a mere coincidence that these are the two climate mitigation options that have been indicated most frequently in countries' nationally determined contributions, or action plans, under the Paris Agreement.[6] In parallel, greater efforts to conserve and sustainably exploit exhaustible energy resources will help avoid environmental pollution as well. In this respect, scientists suggest that in order to stabilize Earth's climate, a third of the world's oil reserves, half of its gas reserves and over 80 per cent of its coal reserves should remain unused.[7] Furthermore, environmentally safe production and use of carbon-free nuclear energy is another example of how properly managed energy can prevent harm to the environment.

As energy is involved in trade and investment projects, it is covered by the trade and investment branches of international economic law and regulated in these fields mainly by the rules of the World Trade Organization (WTO), the Energy Charter Treaty (ECT), regional trade agreements (RTAs) and international investment agreements (IIAs).

I.1 Recent Developments Regarding the Energy–Environment Agenda

Today, energy-related policies of virtually all nations, regardless of their geographical location or economic status, have incorporated

[3] World Trade Organization (WTO), 'Climate Change and International Trade', World Trade Report 2022, 2022, p. 20.
[4] Article 2.1(a) of the Paris Agreement (2015).
[5] Intergovernmental Panel on Climate Change, 'The Evidence Is Clear: The Time for Action Is Now. We Can Halve Emissions by 2030', 4 April 2022, www.ipcc.ch/2022/04/04/ipcc-ar6-wgiii-pressrelease/.
[6] UN, 'Nationally Determined Contributions under the Paris Agreement: Synthesis Report by the Secretariat', Conference of the Parties Serving as the Meeting of the Parties to the Paris Agreement, FCCC/PA/CMA/2022/4 (26 October 2022), paras. 33, 182.
[7] Christophe McGlade and Paul Ekins, 'The Geographical Distribution of Fossil Fuels Unused When Limiting Global Warming to 2°C', 517 *Nature* 187 (2015), p. 187.

environmental aspects, albeit with differing aspirations. As of 1 September 2022, 136 countries and the European Union (EU) have adopted or proposed net-zero targets to be achieved mostly by mid-century covering around 83 per cent of global carbon emissions.[8] To give just two examples, the European Green Deal (2019) lays down the EU strategy for reaching the bloc's climate neutrality by 2050 and decoupling economic growth from resource use through decarbonizing the energy system, mobilizing industry for a clean and circular economy, improving the energy performance of buildings and so on.[9] China's Fourteenth Five-Year Plan (2021–2025) expects the country to reach its CO_2 emissions peak by 2030 and carbon neutrality by 2060 and seeks to 'promote the clean, low-carbon, safe and efficient use of energy and advance the low-carbon transformation of industry, construction and transportation in an in-depth manner'.[10]

On the global stage, the Group of Twenty (G20) leaders made a political commitment to 'rapidly scale up the deployment of zero and low emission power generation, including renewable energy resources, and measures to enhance energy efficiency, abatement technologies as well as removal technologies, taking into account national circumstances'.[11] This corresponds to 'the importance of enhancing a clean energy mix, including low-emission and renewable energy, at all levels as part of diversifying energy mixes and systems, in line with national circumstances', as stressed by the Paris Agreement parties.[12]

Varying 'national circumstances' influence the pace of energy transition not only domestically but also at a regional level, including among

[8] Organization for Economic Co-operation and Development (OECD), 'The Climate Action Monitor 2022: Helping Countries Advance towards Net Zero', OECD, 2022, pp. 17, 19.

[9] See European Commission, 'The European Green Deal', Communication to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions, COM(2019) 640 final (11 December 2019).

[10] China, 'Outline of the People's Republic of China 14th Five-Year Plan for National Economic and Social Development and Long-Range Objectives for 2035', 12 March 2021, Article XXVIII (section 4) (English translation at Centre for Security and Emerging Technology, https://cset.georgetown.edu/publication/china-14th-five-year-plan/).

[11] Group of Twenty (G20) Bali Leaders' Declaration, Bali (Indonesia), 15–16 November 2022, para. 12, www.g20.org/en/.

[12] Sharm el-Sheikh Implementation Plan, Decision 1/CP.27, para. 13, Conference of the Parties, FCCC/CP/2022/10/Add.1 (17 March 2023) in UN, 'Report of the Conference of the Parties on Its Twenty-Seventh Session, Held in Sharm el-Sheikh from 6 to 20 November 2022'.

developing countries. For example, the present energy cooperation policy of the Association of Southeast Asian Nations (ASEAN) aims to optimize the role of clean coal technology in decarbonization efforts and sets region-wide targets for reducing energy intensity and increasing renewables' portion in the total energy mix.[13] By contrast, the African Union does not have pre-defined 'greening' targets for the entire continent yet. Its current highest priority is to increase universal energy access in Africa in the short to medium term while the enhancement of the uptake of renewable energy is considered as a goal for the long term.[14]

Although the international trade and investment regimes focus on respective *economic* activities, the extent to which they are capable of addressing energy-related *environmental* issues is of increasing significance today. Indeed, new developments in international economic practice accentuate the energy–environment interplay more than ever. To name a few, there are ongoing WTO initiatives on trade and environmental sustainability, sustainable plastics trade and reforming fossil fuel subsidies; pro-environmental modernization efforts directed to the ECT; greening elements frequently entering today's investment and trade treaty-making; the growing number of trade and investment disputes on renewable energy; and international discussions on creating 'climate clubs' in the near future.[15] In addition, New Zealand, Costa Rica, Fiji, Iceland, Norway and Switzerland are currently negotiating an Agreement on Climate Change, Trade and Sustainability (ACCTS) seeking to liberalize trade in environmental goods and environmental services, eliminate harmful fossil fuel subsidies and develop guidelines concerning voluntary eco-labelling programmes and mechanisms. Once concluded, this agreement will then be open to other interested WTO members.[16]

[13] Association of Southeast Asian Nations (ASEAN) Centre for Energy, 'ASEAN Plan of Action for Energy Cooperation (APAEC) 2016–2025, Phase II: 2021–2025', 2020, pp. 2–3, https://aseanenergy.org/asean-plan-of-action-for-energy-cooperation-apaec-phase-ii-2021–2025/.

[14] See African Union, 'Africa Speaks with Unified Voice as AU Executive Council Adopts African Common Position on Energy Access and Just Energy Transition', 22 July 2022, https://au.int/en/pressreleases/20220722/africa-speaks-unified-voice-au-executive-council-adopts-african-common. See also Kigali Communique, 'Ensuring a Just and Equitable Energy Transition in Africa: Seven Transformative Actions for SDG 7', 19 May 2022, www.mininfra.gov.rw/index.php?eID=dumpFile&t=f&f=44024&token=c9d8a3e4e9ad4d22aa3c3b883055c9426760c584.

[15] See Sections 1.2.1, 1.2.2, 1.2.3, 1.2.4, 2.1.3, 3.2.2 and 5.2.

[16] See New Zealand Foreign Affairs and Trade, 'Agreement on Climate Change, Trade and Sustainability (ACCTS) Negotiations', www.mfat.govt.nz/en/trade/free-trade-agree

Furthermore, trade and clean energy are among the negotiating pillars of the Indo-Pacific Economic Framework for Prosperity launched by thirteen countries in 2022.[17] Importantly, on 19 January 2023, the European Commission, the EU Member States and twenty-six partner countries – both developed and developing countries – established a Coalition of Trade Ministers on Climate to build partnerships between trade and climate communities and identify ways in which trade and trade policies can promote global climate actions and support the most vulnerable developing and least-developed countries (LDCs).[18]

As for domestic policies, most of the environment-related trade measures notified to the WTO over the last ten years have been aimed at energy conservation and efficiency as well as alternative and renewable energy.[19] The EU legislative plans to introduce border adjustments for internal decarbonization costs and the United States' 2022 law disabling government financial support for the local use of many imported electric vehicles are among current hot issues that have energy–environment implications.[20]

I.2 Situating This Book within the Existing Literature

Energy has been in intense spotlight of academic research in international economic law, especially since 2010, partly in reflection of remarkable activism in the energy-related international discourse and dispute settlement in the realms of trade and investment. The literature on sustainability issues concerning energy production and use keeps growing. Without undermining the importance and intellectual value

ments/trade-and-climate/agreement-on-climate-change-trade-and-sustainability-accts-negotiations/.

[17] US White House, 'Statement on Indo-Pacific Economic Framework for Prosperity', 23 May 2022, www.whitehouse.gov/briefing-room/statements-releases/2022/05/23/statement-on-indo-pacific-economic-framework-for-prosperity.

[18] See Coalition of Trade Ministers on Climate, www.tradeministersonclimate.org; European Commission, 'Trade and Climate: EU and Partner Countries Launch the "Coalition of Trade Ministers on Climate"', 19 January 2023, https://ec.europa.eu/commission/presscorner/detail/en/IP_23_248.

[19] In the period 2009–2021, 'energy conservation and efficiency' and 'alternative and renewable energy' taken together were most frequently cited (or if taken separately, No. 2 and No. 3 among twenty-five) environment-related objectives of trade measures notified to the WTO. See 'Types of Environment-Related Objectives' in WTO Environmental Database (as of 1 April 2023), https://edb.wto.org/charts.

[20] See Sections 2.1.1 and 2.2.1.1.

of each work and given the spatial constraints that do not allow a review of all scholarship, one can distinguish a number of books in the fields of international trade and investment law that are particularly relevant to our topic.

In the area of trade law, Vranes, and Epps and Green examine the role of WTO law in addressing, respectively, trade–environment and trade–climate linkages.[21] While not energy-specific, these publications are comprehensive in considering complex intersectional issues from a multilateral trade perspective. By contrast, Selivanova's edited volume specifically deals with energy, underscoring the distinct status of energy as a commodity and service, and examines how it is regulated under both general and specialized frameworks, such as the WTO, the North American Free Trade Agreement (NAFTA) and the ECT. Some environmental aspects (e.g., bioenergy development and environmental impacts of energy dual pricing) are included but do not constitute the focal point of this book.[22] Marhold carries out an up-to-date comprehensive review of multilateral and preferential trade agreements and the ECT with particular reference to key concepts, historical developments and legal issues of market decentralization, decarbonization and security in the energy sector. The part on energy decarbonization is confined to dual pricing and fossil fuel subsidies.[23] Some other works are dedicated to specific issues of energy trade law but do not elaborate on environmental protection: for example, Azaria and Pogoretskyy provide an in-depth analysis of transit of energy via pipelines, looking into the concept of freedom of transit under the trade regime, among others.[24] Further, Hufbauer and others and Cottier and Espa edited a separate collection of papers on regulation of trade in sustainable energy/electricity.[25]

[21] Erich Vranes, *Trade and the Environment: Fundamental Issues in International Law, WTO Law, and Legal Theory* (Oxford: Oxford University Press, 2009); Tracey Epps and Andrew Green, *Reconciling Trade and Climate: How the WTO Can Help Address Climate Change* (Cheltenham and Northampton: Edward Elgar, 2010).

[22] Yulia Selivanova (ed.), *Regulation of Energy in International Trade Law: WTO, NAFTA and Energy Charter* (Alphen aan den Rijn: Kluwer Law International, 2011).

[23] Anna-Alexandra Marhold, *Energy in International Trade Law: Concepts, Regulations and Changing Markets* (Cambridge: Cambridge University Press, 2021).

[24] Danae Azaria, *Treaties on Transit of Energy via Pipelines and Countermeasures* (Oxford: Oxford University Press, 2015); Vitaliy Pogoretskyy, *Freedom of Transit and Access to Gas Pipeline Networks under WTO Law* (Cambridge: Cambridge University Press, 2017).

[25] Gary C. Hufbauer, Ricardo Meléndez-Ortiz and Richard Samans (eds.), *The Law and Economics of a Sustainable Energy Trade Agreement* (Cambridge: Cambridge University Press, 2016); Thomas Cottier and Ilaria Espa (eds.), *International Trade in Sustainable*

In the area of investment law, Viñuales extensively analyses synergetic and conflicting aspects of the relationship between foreign investment law and environmental law and points to the possibility for greater integration of environmental reasoning into investment adjudicative mechanisms.[26] Other representative monographs on the investment–environment interplay concern implications of the historical evolution of investment law for environmental protection (Miles), the right to regulate (Titi) and investment case law's impact on environmental policy (Tienhaara).[27] These works are not specific to energy per se, but they provide a useful framework for contextualizing the energy–environment nexus under international investment law. By contrast, a commentary on the ECT (Hobér), an edited volume on international energy arbitration (Scherer) and a book on stability in the energy investment regime (Cameron) specifically focus on the protection of energy investments across a wide spectrum of matters while dedicating only some parts to certain environmental issues.[28]

In addition, one cannot ignore the scholarship that discusses a broader picture of how to mainstream environmental sustainability under the international economic system. In this category, Condon and Sinha, Bacchus, and Petersmann discuss the transformation of global economic governance in response to climate change challenges and sustainable development needs.[29] This strand of literature offers solid intellectual grounds for urging greening actions within the world trade and investment architecture as a whole, including the energy part thereunder.

Electricity: Regulatory Challenges in International Economic Law (Cambridge: Cambridge University Press, 2017).

[26] Jorge E. Viñuales, *Foreign Investment and the Environment in International Law* (Cambridge: Cambridge University Press, 2012), pp. 392–393.

[27] Kate Miles, *The Origins of International Investment Law: Empire, Environment and the Safeguarding of Capital* (Cambridge: Cambridge University Press, 2013); Aikaterini Titi, *The Right to Regulate in International Investment Law* (Baden-Baden: Nomos, 2014); Kyla Tienhaara, *The Expropriation of Environmental Governance: Protecting Foreign Investors at the Expense of Public Policy* (Cambridge: Cambridge University Press, 2009).

[28] Kaj Hobér, *The Energy Charter Treaty: A Commentary* (Oxford: Oxford University Press, 2020); Maxi Scherer (ed.), *International Arbitration in the Energy Sector* (Oxford: Oxford University Press, 2018); Peter D. Cameron, *International Energy Investment Law: The Pursuit of Stability* (Oxford: Oxford University Press, 2010).

[29] Bradly J. Condon and Tapen Sinha, *The Role of Climate Change in Global Economic Governance* (Oxford: Oxford University Press, 2013); James Bacchus, *The Willing World: Shaping and Sharing a Sustainable Global Prosperity* (Cambridge: Cambridge University Press, 2018); Ernst-Ulrich Petersmann, *Transforming World Trade and Investment Law for Sustainable Development* (Oxford: Oxford University Press, 2022).

Last but not least, some monographs address the environmental intersection under international economic law with respect to specific issues pertaining to a wide range of economic activities, not necessarily confined to the energy sector. They deal with, for instance, processes and production methods (PPMs), emissions trading and carbon-related border adjustments.[30]

Without prejudice to the contents and merits of each publication, the literature above can be divided roughly into three groups: (i) works with a comprehensive scope on either energy trade law or energy investment law, with some environmental issues covered under each, or otherwise on the environmental linkage within 'general' trade or investment law; (ii) works focusing on a particular energy-related issue with/without environmental elements; and (iii) 'umbrella' works on the role of the global economic governance in accommodating sustainable development. Because of its comprehensive scope, our book is situated within the first group and intends to fill the existing gap there by focusing specifically on *the energy–environment nexus* under trade law *and* investment law. Its comprehensiveness applies to the range of covered issues as well as the breadth of the legal landscape spanning from multilateral to regional/preferential and energy-specialized agreements. While the previous literature in the first group has discussed either trade law or investment law, the consideration of both in this book allows, where relevant, for comparisons between these two to show their similarities, differences or even (potential) conflicts at the energy–environment interface. Given the intensifying interaction and convergence between the trade and investment law regimes,[31] this interdisciplinary approach has both doctrinal and practical importance in helping to promote coherence across energy-related trade and investment policies concerned. As another added value to academic research, our work includes some data-based observations where applicable. Data are being increasingly used in international

[30] See, for example, Christiane R. Conrad, *Processes and Production Methods (PPMs) in WTO Law: Interfacing Trade and Social Goals* (Cambridge: Cambridge University Press, 2011); David Sifonios, *Environmental Process and Production Methods (PPMs) in WTO Law* (Cham: Springer, 2018); James Munro, *Emissions Trading Schemes under International Economic Law* (Oxford: Oxford University Press, 2018); Felicity Deane, *Emissions Trading and WTO Law: A Global Analysis* (Cheltenham and Northampton: Edward Elgar, 2015); Kateryna Holzer, *Carbon-Related Border Adjustment and WTO Law* (Cheltenham and Northampton: Edward Elgar, 2014).

[31] See, for example, Jürgen Kurtz, *The WTO and International Investment Law: Converging Systems* (Cambridge: Cambridge University Press, 2016).

economic law research,[32] and in line with this practice, we rely on available and processed statistics and data related to the energy–environment nexus to provide more informed insights into recognizable trends and patterns concerning the topic.

I.3 The Purpose and Scope of This Book

Under international economic law, energy and the environment intersect in both factual and legal contexts. With respect to the factual context, this happens when States take action under any of the following policy domains:

- decarbonization of energy's life cycle;
- renewable energy;
- energy efficiency;
- environmentally safe energy supply chain (regarding nuclear energy, for instance); and
- conservation of exhaustible energy resources.

In these policy domains, trade and investment measures can take the form of laws, regulations, requirements, fiscal charges, restrictions, permissions, standards, stimuli and others, and they often pertain to more than one domain.

With respect to the legal context, the energy–environment nexus is discernible especially where trade law and investment law deal with States' right to regulate for the sake of environmental protection or create greening obligations in any of the policy domains above.

The purpose of this book is to examine such legal context, focusing on how far international economic law accommodates environmental concerns or values in energy-related trade and investment and what improvements are required here to better regulate the energy–environment nexus. Our approach in discussing both the legal status quo and the areas of improvement is similar to what some other authors have done with respect to their topics in the previous literature.[33] As shown throughout this book, greening reforms are currently being considered by governments on both trade and investment fronts, which

[32] See Wolfgang Alschner, Joost Pauwelyn and Sergio Puig, 'The Data-Driven Future of International Economic Law', 20 *Journal of International Economic Law* 217 (2017).

[33] See, for example, Pogoretskyy, supra note 24, pp. 8–9; Tienhaara, supra note 27, pp. 3, 267, 283.

amplifies the relevance of the narrative on necessary improvements in today's realities.

This book consists of six chapters. Chapter 1 discusses the foundations of the energy–environment nexus derivable from both 'external' and 'internal' legal sources. Intertwined with international economic law, the key principles and concepts of international (environmental) law, such as permanent sovereignty over natural resources, sustainable development, the polluter-pays principle, common but differentiated responsibilities and some others, are at the very base of the intersection of energy and the environment. In addition, the internal foundations are provided by international trade and investment rules that preserve regulatory sovereignty of States over environmental issues through exception clauses or other legal flexibilities.

The next chapters will focus on five topics, such as trade control, subsidies, technical standards, investment protection and technology policies. This selection covers all pertinent areas of international economic regulation and corresponds to the comprehensive nature of our analysis. Each topic is commonly tied to any of the aforementioned energy–environment policy domains but shows different aspects of government interventions with trade- and/or investment-related elements. Despite these differences, the five topics are linked to the same theme: how to strengthen environmental sustainability across various types of State measures, such as restrictions (Chapters 2, 4 and 5), incentives (Chapters 3, 5 and 6) and liberalization (Chapter 6). This linking theme serves to signal that governments must be consistent throughout their environmental responses when they apply, say, anti-carbon restrictions and measures to facilitate green technology dissemination, on the one hand, and incentives for carbon-emitting energy, on the other.

Chapter 2 starts with carbon pricing adjustments at the border as this matter is entering the mainstream of climate policymaking following the EU's recent legislative actions in this direction. Other trade control measures included in this chapter are import restrictions associated with air pollution, localization of renewable energy production, and radioactive pollution as well as export restrictions that governments often connect to their environmental rhetoric.

Unlike Chapter 2 about basically 'protective' government interventions, Chapter 3 discusses 'promotive' measures, namely subsidies for fossil fuels and renewable energy that generally have negative and positive environmental impacts, respectively. Thus, the examination of the energy–environment nexus here deals with eliminating unnecessary