

THE ENERGY CHARTER TREATY AND ITS IMPLICATIONS FOR PREVENTING PLASTICS PRODUCTION

Stirring the Plastic Soup?

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ABSTRACT

This chapter delves into the intricate relationship between the plastics industry and fossil fuels. Despite the climate crisis, the plastics sector continues to grow, which may increase demand for fossil fuels. At present, environmental issues are addressed within specific sectors, which masks the more general consequences

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of fossil fuel-based plastics for health, biodiversity and the climate. Against this backdrop, the study examines the global regulatory landscape, in particular the Energy Charter Treaty (ECT) and its support for fossil fuel investments, which contribute to ongoing plastic production. The limitations of the ECT are contrasted with the potential of the future United Nations Treaty on Plastic Pollution, which was designed to address the plastics life cycle comprehensively. Many uncertainties surround the future Plastics Treaty, and existing policies are geared towards waste management rather than the prevention of plastics production. Therefore, an innovative Earth system law approach is proposed as a response to the mounting evidence of plastics being a substantial threat to the planet. This approach aims to establish transnational regulations that are aligned with the objective of preserving planetary integrity.

1. INTRODUCTION

The latest climate report of the World Meteorological Organization presents compelling evidence for the proposition that global temperatures are highly likely to increase to unprecedented levels in the next five years.¹ These data on the climate emergency underscore the urgency of the socio-ecological transition, at the heart of which is the energy transition (or, rather, the energy transformation).² The primary obstacle to efforts to mitigate global warming is reliance on fossil fuels, of which plastic is a derivative. The production of plastic on a global scale has grown exponentially over the past few decades. The annual volume of production has reached approximately 400 million tonnes. That estimates show that a mere 12 per cent of total plastic output is incinerated, and that only 9 per cent is recycled, should be a matter of grave concern; the remainder is either deposited into landfills or released into the environment, including into marine ecosystems.³ The destructive planetary consequences of human activity in the Anthropocene, especially through activity that involves synthetic substances that do not exist in nature, such as plastics, can only be mitigated through human intervention.

The relationship between climate change, fossil fuels and the plastics industry is a matter of concern for researchers, policymakers, civil society organisations and communities. Plastics are derived from fossil fuels, with oil, gas and coal

¹ World Meteorological Organization (WMO), 'Global temperatures set to reach new records in next five years', press release, 17 May 2023, <https://public.wmo.int/en/media/press-release/global-temperatures-set-reach-new-records-next-five-years>.

² J. Paterson, 'Energy law and Energy Transformation' in R. Fleming, et al. (eds.), *A Force of Energy: Essays in Energy Law in Honour of Professor Martha Roggenkamp*, University of Groningen Press, 2022, pp. 20 *et seq.*

³ United Nations Environment Programme (UNEP), *Report: Drowning in Plastics – Marine Litter and Plastic Waste Vital Graphics*, UNEP, 2021, <https://www.unep.org/resources/report/drowning-plastics-marine-litter-and-plastic-waste-vital-graphics>.

serving as raw materials for their production.⁴ Plastic waste contributes to climate change⁵ and biodiversity loss, impacts on health, and persists in the environment, creating other toxic products and affecting society.⁶

Policies and regulations play a crucial role in mitigating the impact of the plastics industry on climate change. The present authors argue that there should be a shift from treating plastics primarily as a problem for waste management law, to a legal approach that prevents their production and consumption, hence its entire lifecycle. Law-driven innovation should focus on the immediate phasing-out of the production of fossil fuel-based virgin plastic, as well as of the use of plastic waste for energy.⁷ The plastics industry can achieve large short-term reductions in emissions by maximising the use of renewable electricity across its supply chain.⁸ The environmental and climate risks of plastics cannot be addressed without binding legal provisions that establish targets, rules and methodologies that generate clear duties for the participants in the plastics supply chain, which is inordinately complex and opaque.⁹ In a business-as-usual scenario, in which policies continue to foster plastic production, fossil fuel consumption in the sector will increase.¹⁰ Worldwide plastic-related greenhouse gas emissions are projected to reach 1.34 gigatons annually, by 2030, and to increase to 2.8 gigatons per year by 2050.¹¹

In order to address these problems, the United Nations Environment Programme (UNEP) recently unveiled a comprehensive suite of measures aimed at rectifying the inadequate functioning of the plastic-recycling system. Its ultimate objective is to reduce pollution from plastics by 80 per cent, by 2040. If political commitments are to be converted into legally binding objectives, the next step should be an international treaty. Such a treaty is currently being negotiated under

⁴ B. Bauman, 'How plastics contribute to climate change', *Yale Climate Connections*, 20 August 2019, <https://yaleclimateconnections.org/2019/08/how-plastics-contribute-to-climate-change/>.

⁵ Studies such as *Plastic and Climate: The Hidden Costs of a Plastic Planet* (2019), by the Center for International Environmental Law (CIEL), provide valuable insights into the relationship between plastics and climate change: <https://www.ciel.org/wp-content/uploads/2019/05/Plastic-and-Climate-FINAL-2019.pdf>.

⁶ M. Macleod et al., 'The global threat from plastic pollution', *Science*, (2021) 373, p. 61, <https://doi.org/10.1126/science.abg5433>.

⁷ T. Walker, 'Policies to Mitigate Climate Change by Addressing Single-Use Plastic Production and Waste Disposal', June 2021, <https://ssrn.com/abstract=3857828>.

⁸ M. Peltier, J. Fallurin and S. Hughes 'Clean Energy 101: Reducing Climate Pollution from the Plastics Industry', RMI, February 21, 2023, <https://rmi.org/clean-energy-101-reducing-climate-pollution-from-the-plastics-industry/>.

⁹ *Ibid.*

¹⁰ Bauman, *supra*, note 4.

¹¹ M. Shen et al., '(Micro)plastic crisis: Un-ignorable contribution to global greenhouse gas emissions and climate change', *Journal of Cleaner Production*, (2020) 254, 120138, <https://doi.org/10.1016/j.jclepro.2020.120138>.

the auspices of the United Nations, and it is slated for approval in 2024. This treaty aims to prevent severe pollution from plastics and the use of fossil fuels.

The analysis presented here is organised as follows: [section 2](#) explains the relationship between the plastics-producing petrochemical industry and fossil energy resources. The extant data indicates that, despite the climate emergency, the industries within the plastics sector are growing. This expansionary trend is poised to result in investments that would perpetuate global demand for fossil fuels. Those investments would extend beyond the conventional energy sector. Fossil fuels are linked to the plastics industry, and the tendency to address socio-ecological problems from a sectoral perspective obscures the complexity of this industrial cluster, as well as the consequences of fossil fuel-derived plastics for health, biodiversity and the climate. [Section 3](#) will present the international regulatory framework, including attempts to improve it. To that end, [section 3.1.](#) will present a critical legal examination of the Energy Charter Treaty (ECT), and of the contentious and ultimately unsuccessful attempt to modernise it. The ECT endorses investments in fossil fuel initiatives, and thus contributes to the perpetuation of the plastics production cycle. The inadequacies of the ECT may be contrasted with the output of the ongoing negotiations on a United Nations Treaty on Plastic Pollution ([section 3.2.](#)). The Plastics Treaty marks a break with past practice, because it addresses the entire life cycle of plastics. However, lingering uncertainties remain about the model of the forthcoming treaty, the operational mechanisms by which its goals will be realised, and its interplay with the other international legal regimes that govern the intertwined planetary boundaries. [Section 3.3](#) introduces some preliminary observations on the interactions between these instruments. [Section 4](#) draws on evidence that indicates that plastics have emerged as a threat to planetary boundaries, and adumbrates an Earth system law approach aimed at establishing transnational regulations which are aligned with the imperative of safeguarding planetary integrity. [Section 5](#) contains the authors' concluding remarks.

2. HOW THE PLASTIC INDUSTRY ENTRENCHES FOSSIL FUEL LOCK-IN

A voluminous body of climate change law has accumulated across the globe. At the same time, recent reports and studies have raised concerns about the role of 'other fossil-dependent industry sectors' in jeopardising the decarbonisation of economies, and in hindering efforts to preserve biodiversity and the environment. The petrochemical industry, which produces plastics, is one such sector. Plastics are produced from organic polymers sourced from fossil fuels. According to the Center for International Environmental Law (CIEL), '[p]lastics are materials formed from organic polymers – giant molecules made by linking together long

chains of smaller molecules, called monomers. These molecules are products of a supply chain that almost always starts at a wellhead, oil rig, or coal mine.¹² The term ‘plastic’ covers a large variety of resins, synthetic fibres and additives, all of which have different properties. Despite the wide variety of plastic polymers, at present most plastics are produced from five such substances: polyethylene (PE), polypropylene (PP), polyvinyl chloride (PVC), polyethylene terephthalate (PET) and polystyrene (PS).¹² PE, PVC, PET and PS are based on ethylene, and PP is based on propylene.¹³ Propylene is mainly a co-product in ethylene production, and ethylene is sourced from natural gas liquids (NGLs), or from naphtha, a petroleum product. In the US, 90 per cent of the plastics produced come from NGLs, because of the abundance of gas in that country. In China, Europe, South East Asia and Japan, plastics come primarily from petroleum.¹⁴

The dependency of the plastics sector on the hydrocarbon industry is due not only to the need for feedstock material, but also to the integration of the physical infrastructure and the technologies that are employed to produce plastics.¹⁵ Petrochemical facilities are usually located close to places where petroleum oil and gas are extracted, because fossil fuel serves both as feedstock material and as process energy. Furthermore, those facilities are clustered. In petrochemical industries, process units operate at very high temperatures and pressures: for that reason, clusters are organised so that heat can be recovered from different processes through exchanger networks, water systems and on-site electricity generation. Reaction vessels, process units, heat exchangers, pipelines, valves, sensors and control systems are all integrated.¹⁶ According to Bauer et al.:

The petrochemical sector is not one or two defined processes but instead the agglomeration of many processes and material flows and hundreds of thousands of plastics and other chemical products. Production processes operate across a vast and complex network of facilities and processes, where a high level of physical integration drives efficiency gains and lower[s] production costs.¹⁷

Unlike energy and transportation, in which demand for fossil fuel is expected to drop because of decarbonisation strategies, the plastics sector is growing

¹² CIEL, ‘Fueling Plastics: Fossil, Plastics, and Petrochemical Feedstocks’, 2017, <https://www.ciel.org/wp-content/uploads/2017/09/Fueling-Plastics-Fossils-Plastics-Petrochemical-Feedstocks.pdf>.

¹³ Ibid.

¹⁴ Ibid.

¹⁵ F. Bauer and G. Fontenit, ‘Plastic dinosaurs – Digging deep into the accelerating carbon lock-in of plastics’, *Energy Policy*, vol. 156, Sep. 2021, 112418, <https://doi.org/10.1016/j.enpol.2021.112418>.

¹⁶ F. Bauer et al., ‘Plastics and climate change – Breaking carbon lock-ins through three mitigation pathways’, *One Earth*, (2022) (5–4), pp. 361–376, <https://doi.org/10.1016/j.oneear.2022.03.007>.

¹⁷ Ibid., pp. 363–365.

consistently. For example, '[g]lobal plastic resin production has increased from about 1.7Mt in 1950 to 368 Mt in 2019, with an average annual growth rate of about 3.5% since 2011'.¹⁸ Plastics have created new consumer habits and cultures, as exemplified by the widespread use of single-use packaging, and the popularity of online shopping, takeaway food and disposable items. These cultures are more mature in wealthier regions, as is evident from statistics on annual per capita consumption. In 2015, it was estimated that the average resident of the NAFTA and Western European regions consumed 140 kilogrammes of plastics. The corresponding figure for Japan was 108 kilogrammes. At the same time, the average person in Asia consumed 36 kilogrammes of plastics, and the average for the Middle East and Africa was as low as 16 kilogrammes. As populations grow, and as regions become wealthier, plastic consumption is expected to increase more rapidly. For instance, '[a]ssuming annual growth levels of 2% or 4% would lead to global plastic production levels of 680 or 1240 Mt in 2050'.¹⁹ According to the CIEL, if current trends in oil consumption and plastic production persist, 'the consumption of oil by the entire plastics sector will account for 20% of the total consumption by 2050'.²⁰

Plastics have become a backup industry for prominent actors in oil, gas and transportation, in this period of intensive climate action.²¹ Recent studies have shown that the giants of the hydrocarbon industry are making large investments into the production of plastics and other chemicals.²² Between 2010 and 2019, 221 billion euros were applied to that end, in the US alone,²³ and the chemical industry is projected to spend \$164 billion on 264 new plastics facilities or other expansion projects across the globe, by the end of 2023.²⁴

Although Europe has traditionally been an important region for plastics production, it attracts little investment at present. Bucking this trend, the chemical company INEOS recently announced plans to build a propane dehydrogenation plant for propylene production in Antwerp. The project is expected to produce up to 750,000 tonnes of propylene.²⁵ One of the most

¹⁸ Ibid., pp. 362–363.

¹⁹ Ibid.

²⁰ CIEL, 'Fueling Plastics', supra, note 12.

²¹ Africa Oil+Gas Report, 'Fossil Fuel-based Production Growth of Polyethylene is Forecast to Continue Until the Early 2040s While Focus Increases on Reducing Plastic Waste', 28 February 2022, <https://africaoilgasreport.com/2022/02/in-the-news/fossil-fuel-based-production-growth-of-polyethylene-is-forecast-to-continue-until-the-early-2040s-while-focus-increases-on-reducing-plastic-waste/>.

²² F. Bauer and T.D. Nielsen, 'Oil companies are ploughing money into fossil-fuelled plastics production at a record rate – new research', *The Conversation*, 2 November 2021, <https://theconversation.com/oil-companies-are-ploughing-money-into-fossil-fuelled-plastics-production-at-a-record-rate-new-research-169690>.

²³ Bauer et al., supra, note 16, p. 367.

²⁴ CIEL, *Plastic and Climate: The Hidden Costs of a Plastic Planet*, supra, note 5.

²⁵ CIEL, 'Fueling Plastics', supra, note 12.

significant plastics expansion projects in the US Gulf Region is a joint venture between ExxonMobil and Saudi Basic Industries Corporation (SABIC): \$20 billion will be spent on the construction of 11 chemical, refining, lubricant and liquefied natural gas (LNG) projects. Moreover, a \$20 billion ethane cracker will be built in Texas.²⁶

The SADARA project in Saudi Arabia is another significant investment that evinces the growing involvement of oil and gas companies (and oil-exporting countries) in the plastics industry. This project is a joint venture between the state-owned oil company Saudi Aramco, which is contributing \$4.39 billion to it, and the US-based Dow Chemical Company, which is contributing \$2.37 billion. The complex will include 26 manufacturing units, a mixed-feed steam cracker, and an aromatics plant. The project is based in Jubail Industrial City II. The facility is expected to produce 1.5 million tonnes of ethylene and 400,000 tonnes of propylene per annum, which will provide plastics for use in the energy, transportation, construction, electrical and electronic sectors. Interestingly, beyond Dow and Aramco, the project has also attracted \$1.3 billion from the Saudi Public Investment Fund, \$220 million from the Islamic Development Bank (in the form of debt), \$169 million in public funds from the development banks of Canada and Germany, and \$5 billion in direct financing from the Export–Import Bank of the US.²⁷ These investments are likely to lock in global demand for fossil fuels beyond the energy sector.

3. THE ENERGY CHARTER TREATY AND THE UN PLASTICS TREATY ROAD MAP

The United Nations Environment Assembly recently adopted the Resolution ‘End plastic pollution: Towards an international legally binding instrument’, in Nairobi. Before that Resolution, transnational regulation on plastics was typically fragmented and tangential. The 2022 *Global Plastics Outlook*²⁸ report, by the Organisation for Economic Co-operation and Development (OECD), emphasises that, before plastics became a prominent item on the political agenda, a range of international agreements had established mandatory obligations and non-binding guidance for their management, and the prevention of pollution. There are notable gaps in this mosaic of agreements. There is no overarching international governance framework that addresses the multifaceted challenges

²⁶ Ibid.

²⁷ J. Skovgaard, et al., ‘Finance for Fossils – the Role of Public Financing in Expanding Petrochemicals’, June 2022, <http://dx.doi.org/10.2139/ssrn.4141958>.

²⁸ OECD, *Global Plastics Outlook: Economic Drivers, Environmental Impacts and Policy Options*, OECD, 2022, pp. 142–143, https://read.oecd-ilibrary.org/environment/global-plastics-outlook_e01d60f3-en#page1.

of the various stages of the plastics life cycle comprehensively. The table below²⁹ provides an overview of the international legal instruments and their provisions on plastics. These provisions are categorised into four distinct domains, namely pollution, biodiversity, chemicals and the waste trade.

Table 1. Fragmentation of global agreements on plastics

Binding agreements		
Domain	Agreement	Objective
Pollution	United Nations Convention on the Law of the Seas (UNCLOS)	Establishes the legal foundation for human activities, encompassing a broad mandate to implement all required measures for the prevention, reduction, and control of plastic pollution. UNCLOS was enacted in 1994.
	The Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Convention) and its Protocol (the London Protocol)	The London Convention prohibits the direct disposal or discharge of plastic waste into the ocean. The London Convention came into force in 1972 and its Protocol was enacted in 1996
	Annex V of the International Convention for the Prevention of Pollution from Ships (MARPOL)	MARPOL stands as the singular global international treaty dedicated to addressing maritime debris. Annex V specifically prohibits ships from dumping plastic waste into the ocean, with the Annex becoming effective in 1988.
Biodiversity	The Convention on Biological Diversity (CBD)	Alchi Biodiversity Target 8 set a goal to diminish plastic pollution to levels that do not harm ecosystem function by the year 2020. The 2022 Kunming-Montreal Global Biodiversity Framework includes Target 7, which seeks to eliminate the discharge of plastic waste, emphasising a stronger stance on global efforts to combat plastic pollution.
	The United Nations Fish Stocks Agreement	The agreement mandates that states must work to minimise (plastic) pollution, waste, discards, and catches caused by ghost fishing gear.
Chemicals	The Stockholm Convention on Persistent Organic Pollutants (Stockholm Convention)	The Stockholm Convention oversees the production, utilization, and disposal of additives present in plastics identified as persistent organic pollutants. This regulatory framework came into effect in 2004

(continued)

²⁹ Table 1 is based on OECD, *Global Plastics Outlook: Economic Drivers, Environmental Impacts and Policy Option*, 2022, https://read.oecd-ilibrary.org/environment/global-plastics-outlook_e01d60f3-en#page3.

Table 1 *continued*

Waste trade	The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Basel Convention)	The Basel Convention establishes requisites and restrictions for the transboundary movement of hazardous and other (plastic) wastes. It came into force in 1992, and in 2020, amendments specifically addressing the trade of plastic waste were introduced
Non-binding agreements		
Domain	Agreement	Objective
Pollution	FAO Code of Conduct for Responsible Fisheries	Adopted in 1995, the Code establishes legal principles for responsible fishing, encompassing measures to address issues such as ghost fishing gear.
	Global Programme of Action for the Protection of the Marine Environment from Land-based Activities	The GPA serves as an intergovernmental forum providing guidelines on addressing land-based sources of marine (plastic) pollution.
	Global Partnership on Marine Litter (GPML)	The GPML serves as a collaborative platform for sharing best practices and fostering cooperation on instruments designed to tackle marine plastic pollution. This initiative was inaugurated at the UN Conference Rio+20
	Clean Seas Pact	Within the framework of the Clean Seas Pact, nations committed to diminishing pollution originating from single-use plastics, safeguarding their national waters, and promoting recycling efforts. This pact gained endorsement in 2017.
	Honolulu Strategy	The Honolulu Strategy establishes a comprehensive global framework, suggesting strategies and potential actions to mitigate the quantity and repercussions of plastic litter. Notably, the strategy refrains from prescribing specific targets or actions
Waste trade	The Plastic Waste Partnership (PWP) of the Basel Convention	An initiative aimed at fostering environmentally sound management of waste trade, the PWP was inaugurated in 2019.

Source: OECD, *Global Plastics Outlook: Economic Drivers, Environmental Impacts and Policy Option*, 2022.

Scholars of law, and in the field of plastics, have conducted thorough examinations of the deficiencies of the existing regulatory frameworks. However, as Johnson et al.³⁰ demonstrated convincingly, due mainly to the catastrophic repercussions

³⁰ H. Johnson et al., 'Conceptualizing the Transnational Regulation of Plastics: Moving Towards a Preventative and Just Agenda for Plastics', *Transnational Environmental Law*, (2022) 11(2), pp. 325–355, <https://doi.org/10.1017/S2047102521000261>.

of plastics for marine ecosystems, most doctrinal proposals for shaping novel legal mechanisms tend to concentrate on the reduction of pollution. It is imperative that other critical problems be acknowledged too. Firstly, no international or transnational instrument addresses plastics comprehensively within the context of justice and human rights.³¹ Secondly, international plastics law chiefly concerns pollution-related issues, which has resulted in waste management regulation being prioritised, often at the expense of the proactive prevention of production. Target 12.5 of UN Sustainable Development Goal (SDG) 12 (sustainable consumption and production) should be relevant to the prevention of plastics production. However, the indicator for measuring progress ‘is wholly focused on national recycling rates and the weight (tonnes) of materials recycled.’³² Similarly, the abstract metric definition of Target 12.2, which is directed at the sustainable management and efficient use of natural resources, ‘could be met without any prevention at all.’³³ Therefore, all analyses indicate that SDG 12 is ‘overly focused on end-of-pipe solutions.’³⁴

The legal framework should promote the phasing-out of plastics, as opposed to reinforcing the established patterns of plastics production and consumption that are governed by international economic law.³⁵ Against this backdrop, this contribution’s analysis focuses on a particularly contentious multilateral investment law instrument – the ECT. Its provisions extend protection to investments in fossil fuels, thereby fostering the production of plastics.

3.1. THE ENERGY CHARTER TREATY, FOSSIL FUELS, AND PLANS FOR MODERNISATION

The ECT was signed in Lisbon on 17 December 1994, and entered into force in 1998.³⁶ Its scope is wide,³⁷ and its purpose is to promote ‘long-term cooperation in the energy field, based on complementarities and mutual benefits, in accordance with the objectives and principles of the Charter.’³⁸ As

³¹ Ibid.

³² Ibid.

³³ Ibid.

³⁴ Ibid.

³⁵ Ibid.

³⁶ Energy Charter Secretariat, *The Energy Charter Treaty – A Reader’s Guide*, Energy Charter Secretariat, 2002, https://is.muni.cz/el/1422/jaro2017/MVV2368K/um/ECT_Guide_ENG.pdf (hereinafter ‘ECT Reader’s Guide’). Energy Charter Treaty, 16 April 1998 (2080 UNTS 95), OXIO 221.

³⁷ See Art. 2 ECT, as well as *Cem Cengiz Uzan v. Republic of Turkey*, SCC Case No. V 2014/023, Award on Respondent Bifurcated Preliminary Objection, 20 April 2016, 151–152.

³⁸ *Eiser Infrastructure Limited and Energía Solar Luxembourg S.à r.l. v. Kingdom of Spain*, ICSID Case No. ARB/13/36, Award, 4 May 2017, 378–379.

an instrument of international economic law, the ECT has fossil resources in its DNA. It has been said to be a liberalising measure³⁹ whose content was shaped chiefly by geopolitical concerns.⁴⁰ It originates from a time when few objectives were thought to be sufficiently important to override the imperative to invest, and it has been subjected to intensive criticism. For example, the environmental assessments described in Article 19 are unlikely to be Paris-proof, and the environment and sustainability seldom feature in the proportionality analyses of the arbiters who are tasked with applying the Charter.⁴¹ A modernisation effort that began in 2009 culminated in a political declaration about a new treaty, which resulted in the adoption of the political declaration of an International Energy Charter, on 20 May 2015. However, this effort has not proven to be sufficient, and several states have threatened to withdraw from the Treaty; some have even made good on their threats.⁴² A fresh attempt was launched in 2015, and it produced an Agreement in Principle, in June 2022. That Agreement will enter into force 90 days after three-quarters of the contracting parties ratify it. However, even after the Agreement in Principle, several EU Member States withdrew or expressed their intention to withdraw from the ECT.⁴³ This decision generated much pressure across the Union, and that pressure eventually prompted the European Commission to announce and orchestrate the collective withdrawal of the Union from the system, in July 2023.⁴⁴ The following paragraphs provide an overview of the proposed amendments pertaining to fossil fuels.

The ECT covers all energy sources, including renewables and fossils, as well as an unusually wide range of activities, from exploration and extraction to marketing and sales.⁴⁵ The list of ‘energy materials and products’ to which its provisions are relevant includes nuclear energy, coal, natural gas, petroleum, petroleum products, electrical energy, fuel wood, and wood charcoal.⁴⁶ The ECT

³⁹ M. Magnarelli, A. Monti and M. Fermeglia, ‘Expert Roundtable: The Energy Charter Treaty at a Crossroads’, *Kluwer Arbitration Blog*, 18 November 2022, <http://arbitrationblog.kluwerarbitration.com/2022/11/18/expert-roundtable-the-energy-charter-treaty-at-a-crossroads/>.

⁴⁰ A. Belyi, ‘The Energy Charter process in the face of uncertainties’, *Journal of World Energy Law and Business*, (2021) 14(5), pp. 363–375, <https://doi.org/10.1093/jwelb/jwab032>.

⁴¹ L. Reins, ‘Article 2: Purpose of the Treaty’ in R. Leal-Arcas (ed.), *Commentary on the Energy Charter Treaty*, Edward Elgar Publishing, 2018, pp. 49–58.

⁴² European Parliament resolution of 24 November 2022 on the outcome of the modernisation of the Energy Charter Treaty (2022/2934(RSP)), OJ C 167, 11.5.2023, pp. 68–73., [https://oeil.secure.europarl.europa.eu/oeil/popups/ficheprocedure.do?lang=en&reference=2022/2934\(RSP\)](https://oeil.secure.europarl.europa.eu/oeil/popups/ficheprocedure.do?lang=en&reference=2022/2934(RSP)).

⁴³ *Ibid.*

⁴⁴ European Commission, ‘Proposal for a Council Decision on the withdrawal of the Union from the Energy Charter Treaty’, Brussels, 07.07.2023, COM(2023) 447 final, 2023/0273.

⁴⁵ *Electrabel S.A. v. Republic of Hungary*, ICSID Case No. ARB/07/19, Decision on Jurisdiction, Applicable Law and Liability, 30 November 2012, para. 5.50.

⁴⁶ Annex EM I, based on the Harmonised System of the World Customs Organization and the Combined Nomenclature of the European Communities.

does not, however, account for new trends in carbon-neutral energy, energy efficiency and digitalisation.⁴⁷ The Agreement in Principle covers sustainable fuels, such as hydrogen, anhydrous ammonia, biomass, biogas and synthetic fuels. Brauch has argued that these additions do not improve sustainability, but instead merely serve to constrain the ability of states to legislate on the matter.⁴⁸ It has also been argued that it would have been better for the ECT to have included interpretative guidance for arbitral tribunals, and for a distinction to have been drawn between investments into the energy transition and investments into fossil fuels.⁴⁹

The modernised list of materials and products is to be reviewed at least once every five years. At present, fossil fuel investments are not excluded from it. This proposition is subject to one qualification: the contracting parties can derogate from their obligation to protect those investments, by using the Annex NI mechanism. If that mechanism is employed, fossil fuel investments can be phased out after 10 years, which is an improvement on the cooling-off period under the current version of the ECT, which is 20 years. This flexibility mechanism is also to be reviewed every five years. Only the EU and the UK are expected to avail themselves of it. Even there, fossil fuel investments will be protected into the 2030s.⁵⁰ The decision to retain investment protection for fossil fuels has been called unscientific, and has been described as ‘climate madness’.⁵¹

Article 10(4) of the modernisation package establishes climate change mitigation as a legitimate objective that the contracting states may pursue. Article 19 reaffirms the validity of the international agreements to which the contracting states are party. It also describes various requirements for environmental impact assessments, which may now account for a wider range of policy desiderata. Thus, the contracting parties are to consider the effect of energy investment projects on human health, the land, the soil, the air, the climate and water, as well as on cultural heritage and the need to protect natural landscapes. Moreover, Article 19 requires impact assessments to be accompanied with public participation processes. However, the commitment in question is vague, and no reference is made to the Aarhus Convention. Perhaps more critically, fossil fuel subsidies are not prohibited under the Agreement in Principle – Article 17 only

⁴⁷ O. Quirico, *Investment Governance between the Energy Charter Treaty and the European Union: Resolving Regulatory Conflicts*, Brill Nijhoff, 2021, pp. 75 *et seq.*

⁴⁸ M.D. Brauch, ‘The Agreement in Principle on ECT “Modernization”: A Botched Reform Attempt that Undermines Climate Action’, *Kluwer Arbitration Blog*, 17 October 2022, <http://arbitrationblog.kluwerarbitration.com/2022/10/17/the-agreement-in-principle-on-ect-modernization-a-botched-reform-attempt-that-undermines-climate-action/>.

⁴⁹ Magnarelli *et al.*, *supra*, note 38.

⁵⁰ Brauch, *supra*, note 47.

⁵¹ T. Fisher, ‘The Modernised Energy Charter Treaty: The New Text’, *Kluwer Arbitration Blog*, 15 October 2022, <http://arbitrationblog.kluwerarbitration.com/2022/10/15/the-modernised-energy-charter-treaty-the-new-text/>.

requires them to be non-arbitrary.⁵² Finally, the Agreement in Principle contains a new provision on the energy transition, which will appear after the current Article 19, if and when the treaty is ratified. This provision is neither ambitious nor especially novel: for the most part, it refers to the Paris Agreement⁵³ and the United Nations Framework Convention on Climate Change (UNFCCC).⁵⁴ Beyond that, its content is vague, and the obligations that it creates are couched in highly abstract terms.

Conceptually, the ECT is underlain by a dilemma: at the present juncture, it is obvious that investment into sustainable development must be accelerated; however, international investment law and the treaties that comprise it are liable to obstruct progress towards sustainable development.⁵⁵ Environmental issues only began to permeate that domain of law very recently,⁵⁶ and only because they were inserted into international investment agreements in response to societal concerns.⁵⁷ In this regard, the ECT is wholly conventional. Like other treaties of its kind, it relies on investor–state dispute settlement for the adjudication of disagreements between governments and private entities. That mechanism is of doubtful legitimacy, due to the use of privately appointed arbitrators,⁵⁸ and because it can be misused to halt the energy transition. The Charter has served as a basis for at least 46 challenges to renewable energy incentives⁵⁹ and coal phase-outs.⁶⁰ Presumably, a more institutionalised form of investor–state dispute settlement would accommodate environmental objectives more easily than the present version of the mechanism. In investor–state dispute settlement, pro-environmental concerns can function both as a sword (when investors complain about breaches of environmental commitments) and as a shield (when states use the environment to justify interferences or takings).⁶¹ That said, although the legal importance of this proposition is self-evident, the practical influence

⁵² Brauch, *supra*, note 47.

⁵³ Paris Agreement to the United Nations Framework Convention on Climate Change, 12 December 2015, T.I.A.S. No. 16-1104.

⁵⁴ *Ibid.*

⁵⁵ M.C. Cordonier Segger, ‘Innovative Legal Solutions for Investment Law and Sustainable Development Challenges’ in Y. Levashova, T. Lambooy and I. Dekker (eds.), *Bridging the Gap between International Investment Law and the Environment*, Eleven International Publishing, 2015.

⁵⁶ *Ibid.*

⁵⁷ *Ibid.*

⁵⁸ C. Baltag and Y. Dautaj, ‘Investors, States, and Arbitrators in the Crosshairs of International Investment Law and Environmental Protection’, *Brill Research Perspectives in International Investment Law and Arbitration* (2020) 3(1), 1–77.

⁵⁹ M. Fermeglia, ‘Cashing-In on the Energy Transition? Assessing Damage Evaluation Practices in Renewable Energy Investment Disputes’, *Journal of World Investment and Trade* (2022) 23, pp. 982–1019, <https://doi.org/10.1163%2F22119000-12340276>.

⁶⁰ *Ibid.*

⁶¹ *ibid.*

of the ECT may be doubted: it was recently shown that legal protections have no demonstrable impact on foreign investment in, among other things, renewable energy.⁶² On the whole, it appears that the changes to the ECT, regardless of whether they are considered in isolation or in their totality, are cosmetic, and further entrench fossil fuel lock-in.

3.2. THE UN TREATY ON PLASTIC POLLUTION

After more than a decade of policymaking efforts,⁶³ on 2 March 2022 the UNEA adopted a resolution that initiated an international lawmaking process intended to combat pollution from plastics, including marine plastic pollution. That process is expected to bear fruit by 2024.⁶⁴ A zero draft of the instrument's text was published in September 2023.⁶⁵ This historical mandate to negotiate a UN Plastics Treaty has been hailed as 'the beginning of the end of the scourge of plastic pollution',⁶⁶ and as the 'Paris of the plastic debate'.⁶⁷ The Resolution breaks new ground in three ways: first, it reflects a full-life-cycle approach to the problem. Second, it contains a set of basic objectives that should be incorporated into the future treaty. Those objectives include sustainable production and consumption, waste management, periodical assessments, and the conduct of research on plastics pollution. Third, the Resolution calls for international cooperation, and hints at synergies between the proposed convention and other international law instruments.⁶⁸ That said, the Resolution has not been spared criticism, especially in light of the vagueness of some of the principles being mooted, such as the full-life-cycle approach, and common but differentiated responsibility.⁶⁹ These issues have been left to the Intergovernmental Negotiating

⁶² L. Mehranvar and S. Sasmal, 'The Role of Investment Treaties and Investor-State Dispute Settlement (ISDS) in Renewable Energy Investments', *Columbia Center on Sustainable Investment (CCSI)*, December 2022, https://scholarship.law.columbia.edu/cgi/viewcontent.cgi?article=1004&context=sustainable_investment; M. Aydos et al., 'Scaling Investment in Renewable Energy Generation to Achieve Sustainable Development Goals 7 (Affordable and Clean Energy) and 13 (Climate Action) and the Paris Agreement: Roadblocks and Drivers', *Columbia Center on Sustainable Investment*, December 2022, <https://dx.doi.org/10.2139/ssrn.4309067>.

⁶³ See G. Nagtzaam, 'Crafting a Global Plastics Treaty' in G. Nagtzaam, G. van Calster, S. Kourabas and E. Karateva (eds.), *Global Plastic Pollution and its Regulation*, Edward Elgar Publishing, 2023, for an overview of the historical negotiation context.

⁶⁴ Resolution adopted by the United Nations Environment Assembly on 2 March 2022, UNEP/EA.5/Res.14.

⁶⁵ Zero draft text of the international legally binding instrument on plastic pollution, including in the marine environment, UNEP/PP/INC.3/4.

⁶⁶ Nagtzaam, *supra*, note 61, p. 304.

⁶⁷ *Ibid.*

⁶⁸ S. Wang, 'International Law-Making Process of Combating Plastic Pollution: Status Quo, Debates and Prospects', *Marine Policy*, (2023) 147, 105376.

⁶⁹ *Ibid.*

Committee. The same is true of other matters, such as the definition of ‘plastics’, the treatment of microplastics, the bindingness of the various obligations that the treaty is expected to contain, and coordination with the extant international law on chemicals and the recycling of plastics.⁷⁰ The parts of the zero draft that cover definitions, principles and the scope of the instrument remain blank.

It has been emphasised that the Plastics Treaty must be merged effectively with the other treaties on environmental matters, which are fairly voluminous. Although those treaties do not target plastics directly, their provisions do intersect with those of the prospective instrument, which is a matter that the Intergovernmental Negotiating Committee will have to consider.⁷¹ The piecemeal approach to plastics that has predominated historically is in evidence in the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (the London Convention) and the International Convention for the Prevention of Pollution from Ships (MARPOL), which only regulate pollution from vessels. Another marine convention that may overlap with the proposed treaty is the United Nations Convention on the Law of the Sea (UNCLOS). The danger is particularly pronounced in the context of Articles 194 and 207 of UNCLOS.⁷² Several other (non-binding) international initiatives⁷³ also concern plastics. For example, some have inquired whether plastic may be a form of ‘hazardous waste’ under the Basel Convention on Hazardous Waste of 1992, or whether it may be classified as a persistent organic pollutant under the Stockholm Convention on Persistent Organic Pollutants of 2004.⁷⁴

It is evident from the foregoing that the interactions between various legal regimes will be critical to the success of the future Plastics Treaty. That treaty will have to possess a wide range of jurisprudential virtues, including cohesion and effectiveness; it will also have to be unusually wide in its scope – it must cover land, air and sea.⁷⁵ It has been argued that it should contain binding, measurable and time-bound global reduction targets,⁷⁶ as well as a mixture of binding and voluntary provisions.⁷⁷ Whether the framework approach that was adopted in the UN Convention on Biological Diversity, the Montreal Protocol and the UN Framework Convention on Climate Change (UNFCCC) could serve as a model is the subject of a heated debate. According to some, these agreements provide tools that are sufficiently flexible. However, it has also been argued that ‘a different

⁷⁰ Nagtzaam, *supra*, note 61.

⁷¹ *Ibid.*

⁷² *Ibid.*, also for a detailed analysis of how these international instruments address plastic pollution.

⁷³ *Ibid.*

⁷⁴ *Ibid.*

⁷⁵ *Ibid.*

⁷⁶ *Ibid.*

⁷⁷ *Ibid.*

type of Treaty,⁷⁸ which focuses on ‘non-harmful solutions’,⁷⁹ is needed. The 1987 Montreal Protocol on Substances that Deplete the Ozone Layer is a viable model, because of its commitment to phasing-out the substances that are listed in its Annex A, which is accompanied with specific regulations aimed at the gradual prohibition of their use, and because of its sensitivity to the needs of developing nations. Both ozone-depleting chemicals and plastics are synthetic materials that persist when they are released into the environment. Furthermore, the Montreal Protocol conveys a clear message to state and non-state actors, and urges them to revise policies and products. At the same time, its model is such that it allows for an adaptation period in which alternative materials or operational methods can be explored. However, according to Kirk, the Montreal Protocol approach may have drawbacks. Some states might oppose stringent standards, advocating an approach that is instead grounded in the principle of common but differentiated responsibility. This principle assigns varying obligations to parties on the basis of their level of development and their capabilities.⁸⁰ The associated risk is that a treaty that combines progressive bans on plastics with waste management could inadvertently prioritise the latter. Such prioritisation might entail less disruption to existing systems of plastic production and consumption, potentially undermining efforts to address the root causes of the problem.⁸¹

Kirk has suggested the inclusion of a mechanism that would make the removal of plastics from the ocean a key milestone. The funds and techniques that are employed to combat oil pollution, such as those that feature in the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (Fund Convention), supply a salient analogy.⁸² In addition, Kirk has recommended guidance that would ensure progress ‘toward[s] new ways of organizing the production and distribution of goods.’⁸³ UNEP Resolution 5/14 refers to the principles of the 1992 Rio Declaration, but does not elaborate on them,⁸⁴ which is likely to precipitate an animated debate during the negotiations, especially in the context of the principle of common but differentiated responsibility.⁸⁵ In the zero draft, the Rio Declaration is mentioned in the notes of the secretariat, and in the chair’s explanatory note, but not in the main text.

⁷⁸ E. Kirk, ‘The Montreal Protocol or the Paris Agreement as a Model for a Plastics Treaty?’, *American Journal of International Law*, 2020 (114), p. 212, <https://doi.org/10.1017/aju.2020.39>.

⁷⁹ Ibid.

⁸⁰ Ibid.

⁸¹ Johnson et al., *supra*, note 29.

⁸² International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (Fund Convention), 18 December 1971, 1110 UNTS 57.

⁸³ Kirk, *supra*, note 76, p. 212.

⁸⁴ Wang, *supra*, note 66.

⁸⁵ Ibid.

The content of the new Treaty is far from clear. The first round of treaty negotiations has been marred by disagreements about procedure and timetables, and by poor organisation.⁸⁶ So far, the negotiations have not turned to the substance of the treaty, or to its interaction with other regimes. During the second meeting of the Intergovernmental Negotiating Committee (INC-2), which took place in May and June of 2023, in Paris, the delegates agreed that they should proceed from a zero draft. That zero draft was published in September 2023, and describes differences in opinion on various matters, including the set of problematic materials and products, the notion of circularity, and implementation techniques.⁸⁷ The text includes alternative formulations of each prospective provision: therefore, how effective the regime will be remains to be seen. The differences between the formulations of the objectives are already pronounced. The first formulation states clearly that the objective of the instrument is ‘to end plastic pollution’, and to protect human health and the environment. The second option emphasises the protection of human health and the environment *from* plastics, but does not explicitly state, in all its suboptions, that plastic pollution should be ended.

3.3. PRELIMINARY OBSERVATIONS ON REGIME INTERACTION

The UN Plastics Treaty and the ECT are parts of different international (sectoral) regimes. They do not refer to each other, and the interactions between them are not obvious. Whereas ‘regime complexities’⁸⁸ and the fragmentation of international law are inevitable in a globalised world,⁸⁹ ‘problem-shifting’⁹⁰ is also a live issue in the context of plastics. As shown in the introduction and in [section 2](#), plastics and fossil fuels are linked in reality. But the law as it currently stands is blind to this link. Here, we analyse the interplay between the ECT and the Plastics Treaty by drawing on Piselli and van Asselt’s⁹¹ work on planetary boundaries and regime interaction. Dunoff defined regime interaction as ‘a more systematic, dynamic and forward-looking perspective on how different international legal

⁸⁶ Ibid.

⁸⁷ International Institute for Sustainable Development (IISD), ‘Earth Negotiations Bulletin’, 5 June 2023, (36–12), <https://enb.iisd.org/sites/default/files/2023-06/enb3612e.pdf>.

⁸⁸ K. Raustiala and D.G. Victor, ‘The Regime Complex for Plant Genetic Resources’, *International Organization*, (2004) 58, pp. 277 *et seq.*, <https://doi.org/10.1017/S0020818304582036>.

⁸⁹ D. Piselli and H. van Hasselt, ‘Planetary boundaries and regime interaction in international law’ in D. French and L.J. Kotzé, *Research Handbook on Law, Governance and Planetary Boundaries*, Edward Elgar Publishing, 2021, pp. 125 *et seq.*

⁹⁰ R.E. Kim and H. van Asselt, ‘Global governance: Problem shifting in the Anthropocene and the limits of international law’ in E. Morgera and K. Kulovesi, *Research Handbook on International Law and Natural Resources*, Edward Elgar Publishing, 2016, <https://www.elgaronline.com/display/edcoll/9781783478323/9781783478323.00039.xml>.

⁹¹ Piselli and van Hasselt, *supra*, note 87.

regimes relate to each other.⁹² He focused on relational interactions, as opposed to transactional ones, and distinguished between operational interactions – that is, practical arrangements; regulatory interactions – that is, exchanges between different bodies that produce regulatory guidance; and conceptual interactions, which have the transfer of social knowledge across regimes as their purpose.⁹³ The concept of regime interaction is relevant to lawmaking, the implementation of legal measures, and dispute settlement.⁹⁴ It entails transcending the constraints of black-letter analysis, and the identification of solutions to the problem of conflicting norms.⁹⁵ Understanding regime interaction can thus be a starting point in the development of ‘mutually supportive regimes.’⁹⁶ Since the negotiations are still under way, and the zero draft of the Plastic Treaty remains highly general and contingent, it is not possible to analyse regime interaction in detail. This section instead presents some preliminary observations on the interaction between the ECT and the Plastics Treaty Resolution (and the zero draft).

It is evident from the preceding section that there are numerous conflicts between the norms of the ECT and those of the Plastics Treaty Resolution. Moreover, the operational and regulatory interactions between the two are limited. These interactions are highly important, but lack formal legal recognition. The UNFCCC is intended to fulfil a ‘linking role’ in both regimes. In the Plastics Treaty, it is referred to as a model. The Resolution reaffirms the Convention, as well as many other instruments. The zero draft does not refer to it. The Preamble to the ECT refers to the UNFCCC, and recognises the urgency of climate change issues. The Agreement in Principle contains more extensive references to the UNFCCC, the Paris Agreement and the International Labour Organisation (ILO) conventions, all of which it ‘reaffirms.’ The Preamble also recognises the urgency of environmental concerns. The ECT is thus not divorced from the international agenda,⁹⁷ or blind to the Paris targets. However, it also does not make those targets binding on its signatories. In fact, Article 18 confirms the sovereignty of states over the environment,⁹⁸ and

⁹² J.L. Dunoff, ‘How to Avoid Regime Collisions’ in A. Fischer-Lescano et al. (eds.), *Contested Regime Collisions: Norm Fragmentation in World Society*, Cambridge University Press, 2016, <https://www.cambridge.org/core/books/contested-regime-collisions/how-to-avoid-regime-collisions/0BF34359CA7E1F7AEE0F20A4F185777C>; see also Piselli and van Hasselt, *supra*, note 87.

⁹³ Dunoff, *supra*, note 90.

⁹⁴ M.A. Young, ‘Regime Interaction in Creating, Implementing and Enforcing International Law’ in M.A. Young (ed.), *Regime Interaction in International Law: Facing Fragmentation*, Cambridge University Press 2012, p. 85, <https://www.cambridge.org/core/books/regime-interaction-in-international-law/regime-interaction-in-creating-implementing-and-enforcing-international-law/8F958E230DD068D4E6CE9F1141B9D65B>.

⁹⁵ Piselli and van Hasselt, *supra*, note 87.

⁹⁶ *Ibid.*, p. 142.

⁹⁷ A. Morelli, ‘Preamble’ in R. Leal-Arcas, *supra*, note 40, pp. 6–12, <https://www.e-elgar.com/shop/gbp/commentary-on-the-energy-charter-treaty-9781788117487.html>.

⁹⁸ T. Waelde and A. Kolo, ‘Environmental Regulation, Investment Protection and “Regulatory Taking” in International Law’, *The International and Comparative Law Quarterly*, (2001) 50(4), pp. 811–848.

reserves for them the right to regulate energy exploration and development on their territories (Art 18 (3)).⁹⁹ Both regimes also mention sustainable development and the Rio Declaration. The vagueness of the notion of ‘sustainable development’ has been said to be a diplomatic stratagem, in that the ambiguity of the principle can be harnessed to promote agreements on economic, social and environmental issues.¹⁰⁰ However, this ambiguity has also prevented the emergence of firm global commitments to social equity and ecological sustainability.¹⁰¹ The informality of the concept also perpetuates the same hierarchy of international relations that produced the present state of affairs.¹⁰² On the whole, the role of sustainable development in the ECT is such that the probability of it producing significant change, in practice, is highly remote.¹⁰³ The same is true of the Plastics Treaty. The concept of sustainable development is mentioned explicitly in the Resolution, which also emphasises the role of sustainability in the governance of plastics. The Resolution thus refers to ‘sustainable alternatives and technologies available to address the full cycle of plastics’, the ‘importance of promoting sustainable design of products and materials’ for reuse and recycling, and research on the development of ‘sustainable, affordable, innovative and cost-efficient approaches’. However, no mention is made of the proposition that plastic production should be prevented.

4. EARTH SYSTEM LAW FOR THE TRANSNATIONAL REGULATION OF PLASTICS

The production, utilisation and disposal of plastics have become so pervasive that they are now recognised as a geological indicator of the Anthropocene.¹⁰⁴ Plastics have recently garnered scientific attention as a potential threat to the

⁹⁹ Hunter, T. “Article 18 Sovereignty over Natural Resources.” In *Commentary on the Energy Charter Treaty*, edited by Leal-Arcas, R., 259–68. Cheltenham: Edward Elgar Publishing, 2018.

¹⁰⁰ Vinales, Jorge E., *The Rise and Fall of Sustainable Development* (13 January, 2013). Available at SSRN: <https://ssrn.com/abstract=2200083> or <http://dx.doi.org/10.2139/ssrn.2200083>.

¹⁰¹ A. Cardesa-Salzmann and E. Cocciolo, ‘Global Governance, Sustainability and the Earth System: Critical Reflections on the Role of Global Law’, *Transnational Environmental Law*, (2019) (8–3), pp. 437–461, <https://doi.org/10.1017/S2047102519000098>.

¹⁰² M. Koskenniemi, ‘Empire and International Law: The Real Spanish Contribution’, *University of Toronto Law Journal*, 2011, (61–1), pp. 1–36; K. Miles, ‘International Investments Law: Origins, Imperialism and the Conceptualizing the Environment’, *Colorado Journal of International Environmental Law and Policy*, 2010 (21), pp. 1–48, <https://www.cisd.org/wp-content/uploads/2018/05/CJ-Vol.21.1-2010.pdf>.

¹⁰³ N. Bernasconi-Osterwalder and M.D. Brauch, ‘Redesigning the Energy Charter Treaty to Advance the Low-Carbon Transition’, *Transnational Dispute Management*, February 2019, p. 3, <https://www.transnational-dispute-management.com/article.asp?key=2632>.

¹⁰⁴ P. Villarrubia-Gómez, S.E. Cornell and J. Fabres, ‘Marine plastic pollution as a planetary boundary threat – The drifting piece in the sustainability puzzle’, *Marine Policy*, (2018) (96), p. 213, <https://doi.org/10.1016/j.marpol.2017.11.035>.

planetary boundaries. Planetary boundaries define the ‘safe operating space’ for humanity, on the basis of the intrinsic biophysical processes that regulate the stability of the Earth system.¹⁰⁵ Studies have lately pointed out that human activity has caused at least six of these nine planetary boundaries to be exceeded, namely climate change, loss of biosphere integrity, land use, biogeochemical cycles, freshwater change and other ‘novel entities’ (NE).¹⁰⁶ The NE concept refers to chemical pollution. It is defined as ‘new substances, new forms of existing substances and modified life forms’, including ‘chemicals and other new types of engineered materials or organisms not previously known to the Earth system as well as naturally occurring elements’.¹⁰⁷ Plastic pollution is regarded as a significant issue within the broader context of the NE planetary boundary.¹⁰⁸ Extensive research has shown that chemicals, including plastics, possess the defining attributes of NE, which means that they merit attention and concern.¹⁰⁹

Against the planetary boundaries framework, Earth system governance (ESG) has emerged. ESG, a social science, is not about ‘governing the Earth, or the management of the entire process of planetary evolution. Instead, ESG is about the human impact on planetary systems. It is about the societal steering of human activities with regard to the long-term stability of geobiophysical systems’.¹¹⁰ Nevertheless, as Collins has argued, ‘even if the planetary boundary framework is scientifically valid, ethically viable and political persuasive, it is not – as lawyers would say – “self-executing”’.¹¹¹ Thus, it is pertinent that Earth system law (ESL), the legal dimension of ESG, is being developed. ESL provides a

¹⁰⁵ J. Rockström et al., ‘Planetary Boundaries: Exploring the Safe Operating Space for Humanity’, *Ecology and Society*, 2009 (14–2:32), <https://www.ecologyandsociety.org/vol14/iss2/art32/>; L. Persson et al., ‘Outside the Safe Operating Space of the Planetary Boundary for Novel Entities’, *Environmental Science and Technology*, 2022, (56–3), pp. 1510–1521, <https://doi.org/10.1021/acs.est.1c04158>. K. Richardson et al., ‘Earth beyond six of nine planetary boundaries’, *Science Advances*, (2023) 9(37), <https://doi.org/10.1126/sciadv.adh2458>.

¹⁰⁶ Persson et al., *supra*, note 101.

¹⁰⁷ W. Steffen et al., ‘Planetary boundaries: Guiding human development on a changing planet’, *Science* (2015), 347 (6223), 1259855–1259855, <https://doi.org/10.1126/science.1259855>.

¹⁰⁸ M. MacLeod et al., ‘Identifying chemicals that are planetary boundary threats’, *Environmental Science and Technology*, (2014), 48(19), 11057–11063; H. Arp et al., ‘Weathering Plastics as a Planetary Boundary Threat: Exposure, Fate, and Hazards’, *Environmental Science and Technology*, (2021), 22(11), 7246–7255.

¹⁰⁹ Persson et al., *supra*, note 101.

¹¹⁰ F. Biermann, ‘The Anthropocene: A governance perspective’, *The Anthropocene Review*, (2014) 1(1), p. 57. See also F. Biermann, “‘Earth system governance’ as a crosscutting theme of global change research”, *Global Environmental Change*, (2007) 17(3–4), 326–337, <https://doi.org/10.1016/j.gloenvcha.2006.11.010>; F. Biermann et al., ‘Navigating the Anthropocene: Improving Earth System Governance’, *Science*, (2012), 335, issue no. 6074, <https://doi.org/10.1126/science.1217255>; F. Biermann, ‘The future of “environmental” policy in the Anthropocene: time for a paradigm shift’, *Environmental Politics* (2021) 30, nos. 1–2, pp. 61–80, <https://doi.org/10.1080/09644016.2020.1846958>.

¹¹¹ L. Collins, ‘Science, law and planetary uncertainty’ in D. French and L. Kotzé, *supra*, note 87, p. 93.

holistic analytical lens, normative perspectives, a new paradigm for lawmaking,¹¹² and operations, such as implementation and enforcement, that may enable the problems of mainstream international legal regimes to be overcome.¹¹³ In fact, the emergence of a global *polis*,¹¹⁴ and the ecological transformation that it has entailed, call for new regulatory thinking.¹¹⁵ ESL has been developed to improve the connectivity¹¹⁶ between different branches of law and science.¹¹⁷ It is intended to generate means of assessing legal orders by reference to the needs of Earth as a system, and to identify measures that would enable socio-ecological processes to continue reproducing. In this sense, it coheres with global law,¹¹⁸ and with the transformative law episteme.¹¹⁹ ESL can also complement Dunnoff's regime interaction. All of these concepts are necessary to plug the 'Anthropocene gap';¹²⁰ that is, to address the uncertainties and interdependencies of our day at the structural level, a task to which Holocene law has proven unequal.¹²¹ If it reaches maturity, the ESL project would yield laws that provide for 'governance by and for all living beings'.¹²²

ESL can facilitate the integration of concepts such as the planetary boundaries. As Kim and Kotzé have noted, the planetary boundaries framework points to important reasons for addressing the misfit between the complexity of

¹¹² G. Frisso and E. Kirk, 'Changing role of law-making in responding to planetary boundaries' in D. French and L. Kotzé, *supra*, note 87, pp. 147–166.

¹¹³ Piselli and van Hasselt, *supra*, note 87; H. Schellnhuber et al., *Earth System Analysis for Sustainability*, MIT Press, 2004; C. Hamilton, 'The Anthropocene as rupture', *The Anthropocene Review*, (2016) (3:2), <https://doi.org/10.1177/2053019616634741>.

¹¹⁴ J. Jaria Manzano, *La Constitución del Antropoceno*, Tirant lo Blanch/Tirant Humanidades, 2020.

¹¹⁵ L.J. Kotzé and R.E. Kim, 'Earth system law: The juridical dimensions of earth system governance', *Earth System Governance* (2019) 1, 100003, <https://doi.org/10.1016/j.esg.2019.100003>.

¹¹⁶ This contribution transfers the notion of 'connectivity', which was elaborated by Paul Kjaer in relation to global law, to ESL. According to Kjaer, from an inter-systemic perspective, connectivity norms function so as to increase the probability of transfers of condensed social component (*Sinnkomponente*), as scientific knowledge, from a legally structured context to another context, positioned within world society: P.F. Kjaer, 'Constitutionalizing Connectivity: The Constitutional Grid of World Society', *Journal of Law and Society*, 2018 (45), S114–S134, <https://doi.org/10.1111/jols.12106>.

¹¹⁷ L.J. Kotzé et al., 'Earth system law: Exploring new frontiers in legal science', *Earth System Governance* (2022) 11, 100126, <https://doi.org/10.1016/j.esg.2021.100126>.

¹¹⁸ Cardesa-Salzmänn and Cocciolo, *supra*, note 97.

¹¹⁹ P.F. Kjaer, 'What is transformative law?', *European Law Open*, (2022) (4–1), pp. 760–780, <https://doi.org/10.1017/elo.2023.1>.

¹²⁰ V. Galaz, *Global Environmental Governance, Technology and Politics*, Edward Elgar Publishing, 2014.

¹²¹ Kotzé et al., *supra*, note 113; Kotzé and Kim, *supra*, note 111; L.J. Kotzé, 'Earth System Law for the Anthropocene', *Sustainability* (2019) 11(23), <https://doi.org/10.3390/su11236796>; L. Du Toit and L.J. Kotzé, 'Reimagining international environmental law for the Anthropocene: An earth system law perspective', *Earth System Governance* 2022 (11), 100132, <https://doi.org/10.1016/j.esg.2022.100132>.

¹²² Kotzé and Kim, *supra*, note 111, pp. 6–7.

the Earth, as a system, and the fragmentation of the extant regulatory systems.¹²³ Furthermore, the Anthropocene calls for planetary integrity to be elevated to the status of a legal principle.¹²⁴ Human hierarchies sustained by the global neo-liberal legal order must assume responsibility for the global climate crisis.¹²⁵ ESL can be instrumental to that end, because, as Lenton has observed, it is capable of precipitating transformation ‘across coupled social-technological-ecological systems.’¹²⁶

The application of the ESL paradigm to the *problématique* of this chapter reveals the existence of a research agenda that can address the complex regulatory interdependencies of the fossil chemical industry and plastic pollution, and their impacts on the planetary boundaries. This agenda is important because the ECT prevents the environmental impacts of energy investments from being taken seriously. In essence, the ECT aims to serve as a stable legal framework for liberalisation and competition in the energy trade. At the same time, SDG 12, which should guide political and regulatory action on sustainable consumption and production patterns, at all levels of government, has been articulated into targets and indicators shaped by the neo-liberal business interests that are embedded in the concept of sustainable development.¹²⁷

5. CONCLUSIONS

In this contribution, we explained the relationship between the plastics-producing petrochemical industry and fossil energy resources. There is a link between the growth of the plastics industry and fossil fuel investments. The underlying international regulatory regimes do not account for this reality. They are fragmented and tend to shift problems from one legal regime to another. Despite the efforts to modernise it, the ECT entrenches the fossil fuel lock-in, and thus contributes indirectly to plastic pollution. The UN Resolution promotes a life-cycle approach to plastics, and aims to change the current

¹²³ R. Kim and L.J. Kotzé, ‘Governing the complexity of planetary boundaries: a state-of-the-art analysis of social science scholarship’ in D. French and L. Kotzé, *supra*, note 87, pp. 54 *et seq.*

¹²⁴ L.J. Kotzé et al., *supra*, note 113.

¹²⁵ A. Grear, ‘Deconstructing *Anthropos*: A Critical Legal Reflection on “Anthropocentric” Law and Anthropocene “Humanity”’, *Law Critique*, (2015) 26, p. 227, <https://doi.org/10.1007/s10978-015-9161-0>.

¹²⁶ T.M. Lenton et al., ‘Operationalising positive tipping points towards global sustainability’, *Global Sustainability*, (2022) (5–1), pp. 1–16, <https://doi.org/10.1017/sus.2021.30>.

¹²⁷ L.J. Kotzé et al., ‘Planetary Integrity’ in F. Biermann, T. Hickmann, and C.-A. Sénit (eds.), *The Political Impact of the Sustainable Development Goals: Transforming Governance Through Global Goals?*, Cambridge University Press, 2022, p. 145, <https://doi.org/10.1017/9781009082945.007>.

international regulatory framework, which focuses on waste management. It is too early to say whether the new regime will prove effective. We argued that, in the course of the negotiations of a UN Plastics Treaty, attention should be paid to regime interaction between both regimes of plastics and energy investments, so that problem-shifting can be avoided. Finally, we concluded that adopting an Earth system perspective to the regulation of plastics could facilitate a new type of lawmaking, and a new approach to regime interaction that would prioritise planetary integrity and the creation and maintenance of a safe and just operating space for humanity.