# Legal front-lines in the geopolitics of the energy transformation

Jorge **Vinuales**

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**Jorge E. Viñuales**
Cambridge Centre for Energy, Environment and Natural Resources Governance, University of Cambridge, UK

Contact:
Jorge E. Viñuales
Cambridge Centre for Energy, Environment and Natural Resources Governance, University of Cambridge, UK
University of Cambridge
Cambridge, UK
jev32@cam.ac.uk

# Legal front-lines in the geopolitics of the energy transformation

J. E. Viñuales*

## 1. The internationalisation of energy transactions

The history of energy can be written from myriad perspectives, depending on the object emphasised in each account. A household, a river, an activity, an event, a specific resource, a given technology, a country, a region, a global process or combinations thereof are some of the objects around which an energy narrative has been built.[1] As a result, the periodisation used, and the inflexion points selected as milestones are naturally not the same, nor is their relevance for other disciplines. From the standpoint of the social practice and discipline we call international law, three broad inflexion points are particularly noteworthy.

The first is the slow and multifaceted process known as the Industrial Revolution, which unfolded from the late XVIII[th] century onwards in England.[2] The Industrial Revolution is of critical importance for the study of the international law of energy first and

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* Harold Samuel Professor of Law and Environmental Policy, Cambridge. This article relies on and is in many ways a preview of my book *The International Law of Energy* (Cambridge University Press, forthcoming 2021), mainly chapters 1 and 8.

1 Selected examples of this varying focus include: P. Warde, 'The Hornmoldt Metabolism : Energy, Capital, and Time in an Early Modern German Household' (2019) 24 *Environmental History* 472; R. White, *The Organic Machine: The Remaking of the Columbia River* (New York: Hill and Wang, 1995); C. F. Jones, *Routes of Power: Energy and Modern America* (Cambridge: Harvard University Press, 2014); M. I. Santiago, *The Ecology of Oil: Environment, Labor, and the Mexican Revolution, 1900–1938* (Cambridge University Press, 2006); D. Yergin, *The Prize: The Epic Quest for Oil, Money, and Power* (New York: Free Press, 2009); G. Hecht, *The Radiance of France: Nuclear Power and National Identity after World War II* (Cambridge: MIT Press, 1998); E. A. Wrigley, *The Path to Sustained Growth: England's Transition from an Organic Economy to an Industrial Revolution* (Cambridge University Press, 2016); A. Kander, P. Malanima, P. Warde, *Power to the People: Energy in Europe over the Last Five Centuries* (Princeton: Princeton University Press, 2013) ; J. R. McNeill, P. Engelke, *The Great Acceleration: An Environmental History of the Anthropocene since 1945* (Cambridge: Belknap Press, 2016) or V. *Smil, Energy Transitions: History, Requirements, Prospects* (Santa Barbara: Praeger, 2010).

2 On this major – and highly debated – subject of historiographical research see: R. C. Allen, *The British Industrial Revolution in a Global Perspective* (Oxford University Press, 2014) ; E. A. Wrigley, *Energy and the English Industrial Revolution* (Cambridge University Press, 2010).

foremost because it marked the transition from a mainly 'organic' (human-, animal-, wood- or charcoal-based) to a mainly 'mineral fuel' coal-based economy.[3] Even though the search for 'stocks' of mineral energy resources in foreign lands for use in the metropolis remained limited, the Industrial Revolution added a measure of internationalisation in energy transactions both directly and indirectly. Directly, the turn to coal and, starting in the second half of the XIX$^{th}$ century, the increasing use of oil meant that energy resources had to be extracted where their deposits were found. As long as that location fell within a territory controlled by a State, including colonial possessions, that measure of legal internationalisation remained limited. However, energy transactions were also internationalised in an indirect manner, through the possibilities coal offered for long distance transportation (for market access, resource extraction and military expeditions) and the heavy reliance on slaves as part of the human energy supporting the 'triangular trade' mechanism that enabled and sustained the Industrial Revolution in England. In an influential book,[4] economic historian K. Pomeranz asks why the Industrial Revolution happened in England rather than the Yangzi Delta, despite propitious conditions in both regions. His answer rests on two main factors, namely the fortuitous availability of large coal reserves in England[5] and, no less importantly, the triangular trade between England (exporting manufactures to its American colonies and former colonies), West Africa (from which slaves were sent to the Americas) and the Americas (which relied on cheap slave labour to produce the raw materials acquired by Britain in exchange for manufactures). These two factors, the abundance of coal in England and the 'natural bounty' imported from abroad enabled a capital and manufacture intensive path, with a growing population fed by natural resources from overseas grown/extracted by slaves. Thus, slavery as a form of traded human energy served as a catalyst for the transition to the fossil fuel energy matrix.

The second inflexion point relevant for an international law perspective also unfolded over several decades, but mainly in the aftermath of the Second World War. The post-war reconstruction effort required growing amounts of energy resources, mainly coal and oil, which could not be satisfied only by domestic inland deposits. The assertion of sovereign powers over the resources of the continental shelf, triggered by US President Truman's proclamation of 1945,[6] and the internal allocation of powers over oil in submerged lands between the federal government and the States of the Union,[7] both illustrate an increasingly

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[3] Wrigley, *The Path to Sustained Growth*, at 2-3.

[4] K. Pomeranz, *The Great Divergence: China, Europe, and the Making of the Modern World Economy* (Princeton: Princeton University Press, 2000).

[5] This is a classic line of argument epitomised by the work of W. S. Jevons, *The Coal Question* (London: Macmillan, 1865).

[6] Proclamation 2667 of September 28, 1945: 'Policy of the United States with Respect to the Natural Resources of the Subsoil and Sea Bed of the Continental Shelf', 10 Fed. Reg. 12305 (1945). See D. C. Watt, 'First steps in the enclosure of the oceans: The origins of Truman's proclamation on the resources of the continental shelf, 28 September 1945' (1979) 3 *Marine Policy* 211.

[7] See *United States v. California*, 322 U.S. 19 (1947), at 38-39; *United States v. Texas*, 339 U.S. 707 (1950); *United States v. Louisiana*, 339 U.S. 699 (1950). The principle stated in these cases was eventually reversed

acute understanding of this imperative. More generally, the exploitation of fossil fuel resources in foreign lands was an extremely profitable activity, and it was essentially under the control of international oil companies from either the US or colonial powers.[8] In a post-1945 decolonisation context characterised by the emergence of numerous newly independent States eager to use their own resources for their national development, this configuration led to a further degree of internationalisation of energy transactions. Two main questions arose, which have driven the legal aspects of oil and gas geopolitics ever since. One was the question of entitlements over energy and, more generally, the determination of the rules conferring such entitlements and allocating powers in case of competing claims. The other was the organisation of the energy transaction based on such entitlements. The geographical mismatch between the countries where energy deposits were mainly located and those where they were mainly consumed required indeed substantial amounts of foreign investment by the latter in the former in order to exploit the relevant deposits. It also rested on the assumption that the movement of capitals, equipment and the energy resources (or the refined product) thus produced would be enabled and protected.

At present, a third inflexion point is unfolding before our very eyes as a result of much more profound and long neglected implication of 'mineral fuel' economy, namely its environmental implications, of which climate change is the most salient manifestation.[9] This multifaceted process of transition from carbon-intensive to low-carbon forms of energy and processes, often called the low-carbon transition, has very important implications for the international law of energy. The financial and technological manifestations of the transition are complex.

## 2. The energy transition

Total final energy consumption has followed a medium- and long-term upward trajectory, interrupted in 2020 by the measures to manage the COVID-19 pandemic, but likely to continue. The increase in energy consumption has led to an increase in the overall consumption of fossil fuels, nuclear and traditional biomass (again, with the important caveat of the pandemic, which has massively affected transportation). A 2020 Report by REN21, an international multi-stakeholder network registered in Germany and based in Paris, quantifies this increase at approximately 5.7%, which is lower than the increase of 7.2% in

by statute, with the adoption in 1953 of the Submerged Lands Act, 43 U.S.C. §§ 1301-15 (1953). R. B. Krueger, 'The Background of the Doctrine of the Continental Shelf and the Outer Continental Shelf Lands Act' (1970) 10 *Natural Resources Journal* 442, at 452-453.

[8] A vivid account of the struggle for oil is provided in Yergin's classic book *The Prize*.

[9] See J. R. McNeill, 'Cheap Energy and Ecological Teleconnections of the Industrial Revolution, 1780-1920' (2019) 24 *Environmental History* 492.

overall energy demand over the same period (2013-2018), but an increase nevertheless.[10] It is therefore not in the absolute figures that the transition is most visible but in the relative shares. In the same period, modern renewables (mainly solar and wind) grew much faster (21.5%) than both energy consumption and other energy sources. When one looks at new financial investment (annual) in new energy generation capacity, the growth of modern renewables is also striking. Between 2018 and 2019, the capacity to generate electricity (measured in gigawatts) increased from 512 to 627GW for solar photovoltaic (22%) and from 591 to 651GW for wind power (10%). The leading country at the level of investment and new capacity in solar PV and wind is China, followed by the United States, and then other countries such as Japan (for overall investment and solar PV), India (for overall investment, solar PV and wind power) and the UK (only for wind power).

According to the *World Energy Outlook* 2020, an influential annual report produced by the International Energy Agency (IEA), solar power schemes in most major countries can now produce electricity at a cost which is lower than coal and gas.[11] Another important conclusion from this report is that the gains from cheaper and cleaner electricity (with electricity gaining ground in the provision of thermal and transportation services)[12] puts great pressure on the need for suitable electricity networks (grids and transmission lines), at a time when the COVID-19 shock has financially weakened the utilities undertaking such infrastructure developments. Thus, 'electricity grids could prove to be the weak link in the transformation of the power sector'.[13] The technological transition is therefore clear when seen from the perspective of modern renewable energies. The broader implications of the transition, however, are far more difficult to determine.

# 3. From transition to transformation

## 3.1. Geopolitics of the energy transformation

An attempt at mapping the profound implications or, in other words, the 'transformation' driven by the energy transition is provided in a 2019 Report from the Global Commission on the Geopolitics of the Energy Transformation,[14] convened by the Director of the

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[10] See generally REN21, *Renewables 2020. Global Status Report* (2020) [REN21, *Renewables 2020*].

[11] IEA, *World Energy Outlook* (2020), Executive Summary, at 18.

[12] On this specific issue see M. Grubb, P. Drummond, N. Hughes, *The Shape and Pace of Change in the Electricity Transition: Sectoral Dynamics and Indicators of Progress* (UCL/We mean business coalition, October 2020).

[13] IEA, *World Energy Outlook* (2020), Executive Summary, at 19.

[14] Global Commission on the Geopolitics of the Energy Transformation, *A New World: The Geopolitics of the Energy Transformation* (IRENA, 2019) [The Geopolitics of the Energy Transformation].

International Renewable Energy Agency (IRENA) and chaired by the former President of Iceland, Ólafur Ragnar Grímsson.

This is an important attempt to map and assess the implications of the ongoing energy transition from the perspective of global power redistribution. As noted in the introduction to the report:

> '[t]he accelerating deployment of renewables has set in motion a global energy transformation that will have profound geopolitical consequences. Just as fossil fuels have shaped the geopolitical map over the last two centuries, the energy transformation will alter the global distribution of power, relations between states, the risk of conflict, and the social, economic and environmental drivers of geopolitical instability.'[15]

The drivers of this transformation, according to the report (which summarises a wider body of work published in major peer-reviewed outlets), are the declining costs of electricity produced from non-hydro renewable sources, the problems of pollution and climate change caused by fossil fuels, the spread of renewable energy promotion policies, technological innovation, shareholders' increasing demands, and a major shift in public opinion.[16]

Regarding the reasons why this transformation affects geopolitics, they relate to the broader availability of renewable energy resources (by contrast with the geographically concentrated fossil fuels), the fact that they are 'flows' rather than 'stocks' (hence not exhaustible), the ability to deploy renewables at any scale, from a macro to a micro level (the so-called 'democratizing effects' of renewable energies), and their rapidly decreasing marginal costs, which requires however stable regulatory and market conditions.[17]

## 3.2. The geopolitics of stranded fossil fuel assets

An example can bring these rather abstract geopolitical considerations into focus. A widely reported study published in 2018 in *Nature Climate Change* showed that, due specifically to the diffusion of renewable energy, electric transportation systems and efficiency measures, the demand (not the supply) for fossil fuels may peak and then decline sometime between 2030 and 2040.[18] From the perspective of countries producing at a comparatively high cost, such as Canada and Venezuela but also the United States and Russia, the decline in demand is estimated to have major effects on the viability of their entire fossil fuel industry, as such demand will be satisfied by low-cost producers (e.g. Gulf countries). By contrast, for net fossil fuel importers such as China and Japan, the effect of this phenomenon on their gross domestic product would be positive. These results were based on the use of high-resolution

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15 *The Geopolitics of the Energy Transformation*, at 12.

16 *The Geopolitics of the Energy Transformation*, at 18-23.

17 *The Geopolitics of the Energy Transformation*, at 23-24.

18 J.F. Mercure et al, 'Macroeconomic impact of stranded fossil fuel assets' (2018) 8 *Nature Climate Change* 588.

non-equilibrium integrated assessment modelling techniques.[19] The study identified possible 'winners' and 'losers' of this transition.

Unlike previous studies, the projections in this study are not based on whether new climate policies are adopted but entirely driven by decisions that have *already been made in the past, and which have set the world into a broad and possibly irreversible technological trajectory*. Yet, if new climate policies to reach the 'well below' 2C target of the Paris Agreement are indeed adopted and low-cost fossil fuel producers continue their production at current levels, the adverse impact on high-cost fossil fuel producers would be much deeper and more disruptive (the entire fossil fuel industries of Canada, Russia and the US may collapse). The study was widely reported in the media, retweeted by figures such as former US Vice-President Al Gore, taken up in domestic political processes (e.g. divestment campaigns and opposition to new fossil fuel development), and relied upon in major institutional reports such as the *Special Report on the 1.5C target* issued by the Intergovernmental Panel for Climate Change (IPCC),[20] the 2018 *New Climate Economy Report*,[21] and the aforementioned 2019 *Report on the Geopolitics of the Global Energy Transformation*.[22] It remains, of course, an attempt at anticipating possible future scenarios and, as such, subject to caution. But it is, at the very least, worth considering.

Two potential extensions of this study concern power redistribution at the international and domestic levels. At the international level, China would gain significantly from accelerating the energy transition, not only because it would help it address its critical air pollution problem but also because it would promote the competitiveness of its own renewable energy industry abroad and, by undermining the economic strength of the US and Russia, it would strengthen its strategic position with respect to two key geopolitical competitors. The EU, as a major importer of fossil fuels and a resolute supporter of the low-carbon transition through its industrial policy would also gain much from the acceleration of the transition, both in terms of cheaper imports and competitiveness in international markets. However, domestically, the structural adjustment entailed by the energy transition in countries with (comparatively) uncompetitive fossil fuel industries may severely affect certain specific sectors of the population, particularly workers in these industries. Depending on which political forces are supported by these constituencies, these important implications of the transition could generate a fertile ground for populist politics in key countries, with the attendant volatility for international relations. Even in countries such as China, which have spearheaded the move to renewables, the massive implications of moving away from fossil fuels would have a massive impact on domestic workers in this sector.

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[19] J.-F. Mercure et al, 'Environmental impact assessment for climate change policy with the simulation-based integrated assessment model E3ME-FTT-GENIE' (2018) 20 *Energy Strategy Reviews* 195.

[20] IPCC, *Special Report : Global warming of 1.5°C* (2018), Chapter 4, at 319, 373-375.

[21] Global Commission on the Economy and Climate, *New Climate Economy: Unlocking the inclusive growth story of the 21st century: Accelerating climate action in urgent times* (2018), at 12, 39.

[22] *The Geopolitics of the Energy Transformation*, at 64-65, 82.

## 3.3. The geopolitics of critical raw materials

A dimension of the new energy geopolitics which is not adequately captured in the work discussed so far concerns so-called 'critical raw materials' (CRMs), namely certain mineral components which are strategically important for renewable energy technologies (Li-ion batteries, fuel cells, wind energy, electric traction motors, PV technology), artificial intelligence, the digital economy and defence. The EU, Japan and the US have established specific lists of CRMs, which are regularly updated.[23] The geographical distribution of the production of CRMs is highly concentrated in a number of countries. That introduces an important dimension of mineral geopolitics, akin to the concentrations of oil and gas in certain large producers. Between 2021-2016 China alone was the main global supplier of 66% of CRMs[24] and of 44% of those supplied to the EU.[25]

For certain CRMs, widely used in wind energy and electric vehicles,[26] such as Heavy Rare Earth Elements (HREEs[27]) and Light Rare Earth Elements (LREEs[28]), China alone accounted for 86% of global supply and for almost all (98-99%) of those imported by the EU.[29] As regards PV technology, it relies on CRMs such as borate, gallium, germanium, indium and silicon metal.[30] With the exception of borate, whose main global supplier is Turkey, the main global supplier of all these other CRMs is China (gallium: 80%, germanium: 80%, indium: 48%, silicon metal: 66%).[31] To manage risks of potential supply disruption, the EU sources most of these CRMs from countries other than China (Turkey, Germany, Finland, France and Norway).[32] As for batteries, which is a key technology for both electricity storage and electric vehicles, their production relies on materials such as cobalt, lithium, natural graphite, niobium, silicon metal and titanium, as well as on non-critical materials such as copper, manganese and nickel.[33] The main global suppliers of these inputs

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[23] EU: European Commission, *Critical Raw Materials Resilience: Charting a Path towards greater Security and Sustainability*, 3 September 2020, COM/2020/474 final; G.-A. Blengini et al, *Study on the EU's List of Critical Raw Materials* (European Commission, 2020) [*Study on the EU CRMs List*]; S. Bobba et al, *Critical Raw Materials for Strategic Technologies and Sectors in the EU. A Foresight Study* (European Commission, 2020) [*CRMs Foresight Study*]; Japan: Resource Securement Strategies, Prime Minister of Japan and His Cabinet, 2012, http://www.kantei.go.jp/jp/singi/package/dai15/sankou01.pdf (in Japanese); H. Hatayama, K. Tahara, 'Criticality Assessment of Metals for Japan's Resource Strategy' (2015) 56 *Materials Transactions* 229; US : Department of the Interior, Final List of Critical Minerals 2018, 18 May 2018, Federal Register, vol. 83, No. 97, pp. 23295-23296; M. Humphries, *Critical Materials and US Public Policy* (Congressional Research Service, 18 June 2019).

[24] *Study on the EU CRMs List*, at 6.

[25] *Study on the EU CRMs List*, at 8.

[26] *CRMs Foresight Study*, at 17, 29-33 (wind energy), 34-37 (electric vehicles).

[27] Dysprosium, erbium, europium, gadolinium, holmium, lutetium, terbium, thulium, ytterbium, yttrium.

[28] Cerium, lanthanum, neodymium, praseodymium and samarium.

[29] *Study on the EU CRMs List*, at 5 and 8.

[30] *CRMs Foresight Study*, at 17, 38-42.

[31] *Study on the EU CRMs List*, at 5.

[32] *Study on the EU CRMs List*, at 8.

[33] *CRMs Foresight Study*, at 17, 19-23.

are scattered around the globe, but not all are equally important. Cobalt and nickel (as a base for cathodes), lithium (as an electrolyte material) and natural graphite (as a base for anodes) are key. China is the main global supplier of natural graphite (69%) and the Democratic Republic of the Congo that of cobalt (59%).[34] Regarding the latter, there have been concerns that China's Belt and Road Initiative (BRI) may lead to Chinese economic control over the reserves of strategic minerals in Africa, including cobalt in the DRC.[35] Lithium, which is a key component, is mainly produced in Argentina (16%), Australia (29%) and Chile (40%), but 45% of the lithium hard rock mineral refining is based in China.[36]

The latter point raises a dimension which is well covered in the reports commissioned by the EU to update its CMRs list, namely flow disruption as a result of bottlenecks in the supply chain. Keeping with the example of batteries, China has a pre-eminent role not only at the level of raw material supply but, even more so at those of material processing (for cathodes and anodes), component development (cathodes, anodes, electrolytes, separators) and assemblies (e-ion cells).[37] In such a context, the governance of the continued flow of materials within the global supply chains remains a major issue, much like in the classical geopolitics of oil and gas. The claims against China's export restrictions of raw materials and rare earths brought in the last decade before WTO dispute settlement organs, some foreign investment disputes relating to prospection of rare earths, and the scramble for the deep seabed mining of such minerals are but some illustrations, discussed next, of the role of international law with regard to the new geopolitics of the energy transformation.

# 4. Governing the energy transformation

## 4.1. Legal 'front-lines'

In the power shifts described in the foregoing paragraphs, international law (and law in general) is a critical 'battlefront'. The broad process of energy transformation can be especially turbulent from a legal standpoint. At present, an important issue is to identify, with some degree of specificity, which are the main legal 'front lines' where the power struggle is finding expression in legal terms. Such identification is a necessary starting-point for a systematic legal strategy, a 'foreign juridical policy',[38] to be developed with respect to the geopolitics of the energy transformation and to explore adequate routes for international co-operation.

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[34] *Study on the EU CRMs List*, at 5.

[35] See J. Lee et al, 'Reviewing the material and metal security of low-carbon energy transitions' (2020) 124 *Renewable and Sustainable Energy Reviews*, https://doi.org/10.1016/j.rser.2020.109789 (at 8).

[36] *CRMs Foresight Study*, at 19.

[37] *Study on the EU CRMs List*, at 20.

[38] See G. de Lacharrière, *La politique juridique extérieure* (Paris: Economica, 1983).

In the following paragraphs, I provide a few illustrations selected from different legal contexts. These examples can be grouped in three broad categories, namely the use of international law in relation to: tensions arising from resource control; challenges to the energy transformation; the stability of renewable energy support policies.

## 4.2. Control over new resources

Struggles over the control of the key resources underlying the energy transition have found expression in a range of international legal contexts.

One set of disputes concern the dominant position of China as the main global supplier of a wide range of both critical and non-critical raw materials. Even when certain raw materials have other major suppliers, China often plays a major role in subsequent stages of their supply chain, such as material processing and/or component development and/or assemblies. The more a supply chain for a given raw material is dominated by one country, the higher the risk of bottlenecks and flow disruptions. Hence the importance, as in the geopolitics of oil and gas, of the regulation of exports. The three main cases brought before WTO dispute settlement organs in this area concern export measures, and they were triggered by complaints from either the US, in *China – Raw Materials*[39] and *China – Rare Earths*,[40] or the EU, in *China – Duties on Raw Materials*.[41] The materials at stake in each case include some which are key inputs of energy transition technologies, such as silicon metal and indium (for solar PV), rare earths (for wind energy and electric vehicles), and cobalt and graphite (for batteries). Yet, the disputes cannot be said to be linked only to the energy transition given the broader set of materials involved and their much wider application beyond energy transition technologies. For example, the metal molybdenum, at stake in *China – Rare Earths*, is mostly used in metallurgy to make metal alloys for a range of uses including drills, jet engines and power-generation turbines. In the chemical industry, molybdenum is also used a catalyst for petroleum processing. Fluorspar, at stake in *China – Raw Materials*, is used for batteries but also for the production of aluminium and in the chemical industry to produce hydrogen fluoride, a raw material for refrigerants, gasoline, plastics and herbicide, among other applications.

The same important caveat applies to certain foreign investment claims arising from mining projects relating to some critical and non-critical raw materials. In three of them

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[39] *China – Measures Related to the Exportation of Various Raw Materials*, AB Report, 30 January 2012, WT/DS394/AB/R WT/DS395/AB/R WT/DS398/AB/R 30.

[40] *China - Measures Related to the Exportation of Rare Earths, Tungsten, and Molybdenum*, AB Report, 7 August 2014, WT/DS431/AB/RWT/DS432/AB/RWT/DS433/AB/R.

[41] *China - Duties and other Measures concerning the Exportation of Certain Raw Materials - Request for the establishment of a panel by the European Union*, 27 October 2016, WT/DS509/6.

(*Stans Energy v. Kyrgystan*[42]; *Cortec v. Kenya*[43] and the notice of dispute filed by Montero Mining against Tanzania[44]), rare earths mining featured prominently. But often, the focus on metallurgical inputs, such as molybdenum (*Metal-Tech v. Uzbekistan*[45]; *Stans Energy v. Kyrgystan*) or manganese (*Nabodaya Trading v. Gabon*[46]), significantly blurs the connection between the dispute and the energy transition. In all cases, however, the underlying transaction illustrates the search for new deposits of these materials in countries (e.g. Kenya, Kyrgystan, Tanzania, Uzbekistan) other than the main suppliers, mostly China (for rare earths and molybdenum). A more detailed analysis of these and possibly many other disputes could bring into focus another manifestation of the energy transition at the level of mining disputes. By way of illustration, in late 2018, a dispute arose between Chile and a US investor, *Albemarle Corp ALB.N*, regarding the discounted price offered by the latter to companies producing battery metals in Chile. Lithium is a key component in battery production and both Chile and Albemarle are major global players in the lithium supply chain. Chile threatened to bring a commercial arbitration claim to enforce the terms of a 2016, which required the discounted price, but eventually the dispute was managed through negotiations.[47] Yet, in 2020, tensions arose again, this time in a way that more clearly unveils the deep geopolitical implications of such disputes. As noted by a commentator: 'The high-stakes feud comes as Albemarle pushes to expand production in Chile and take control of Australia's Greenbushes, the world's largest lithium mine, to meet an expected tripling in demand for the key battery metal by 2025 as automakers produce more electric vehicles'.[48] Lithium reserves are highly concentrated in South America within the so-called 'Lithium triangle' (Argentina, Bolivia and Chile), followed by Australia and China.[49] A dispute such as this one and the legal regime applicable to it have therefore wider significance for the energy transition, and hence for the energy transformation.

A final illustration is provided by the regime of deep seabed mining, i.e. mining of the 'Area', which is the seabed and subsoil beyond national jurisdiction.[50] The main targets are polymetallic nodules (PMN), cobalt-rich ferromanganese crusts (CFCs) and seafloor massive sulphides (SMS), containing a range of critical and non-critical materials from cobalt,

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[42] *Stans Energy Corp. and Kutisay Mining LLC v. Kyrgyz Republic*, PCA Case No. 2015-32, Award (20 August 2019).

[43] *Cortec Mining Kenya Limited, Cortec (Pty) Limited and Stirling Capital Limited v. Republic of Kenya*, ICSID Case No. ARB/15/29, Award (22 October 2018).

[44] *Montero Mining and Exploration Ltd. v. United Republic of Tanzania* (Canada-Tanzania BIT), Notice of Intent to Submit a Claim to Arbitration (17 January 2020).

[45] *Metal-Tech Ltd. v. Republic of Uzbekistan*, ICSID Case No. ARB/10/3, Award (4 October 2013).

[46] *Navodaya Trading DMCC v. Gabon*, UNCITRAL Rules (OIC Investment Agreement), filed in 2018, pending.

[47] A. De la Jara, 'Exclusive: Chile to delay arbitration with top lithium producer Albemarle', *Reuters* (27 December 2018).

[48] D. Sherwood, 'Exclusive: Lithium giant Albemarle locks horns with Chile over reserves data', *Reuters* (10 September 2020).

[49] See S. Kalantzakos, 'The Race for Critical Minerals in an Era of Geopolitical Realignments' (2020) 55 *The International Spectator* 1, at 7.

[50] United National Convention on the Law of the Sea, 10 December 1982, 1833 UNTS 397 [UNCLOS], Part XI.

manganese, nickel and tungsten to lithium, germanium, molybdenum and rare earths used in batteries, renewable energy technologies and electric vehicles. Mining of such resources is expensive, hazardous and environmentally harmful. However, the growing geopolitical importance of some of the minerals found in the Area has stimulated investment in this activity.[51]

## 4.3. Challenging the energy transformation

The challenges to the socio-economic transformation driven by the energy transition are unveiling a range of potentialities of existing legal institutions, both international and domestic, which thus appear as particularly relevant front lines in this process.

One prominent illustration is provided by the debate on the trade-compatibility of, on the one hand, subsidies to fossil fuels and, on the other hand, subsidies to renewable energies. According to a study from IRENA,[52] the world's total direct (financial transfers) energy subsidies to fossil fuels, renewables and nuclear energy amounted to at least USD 634 billion in 2017. Fossil fuel subsidies accounted for USD 447 billion, whereas subsidies to renewable energy accounted for USD 128 billion (for electricity generation) and USD 38 billion (for biofuels). Unpriced negative externalities from subsidies to fossil fuels (negative effects caused by fossil fuel transactions and not borne – internalised – by transaction participants) amounted to a staggering USD 3.1 trillion in the same year, which is 19 times the subsidies to renewable energies (electricity and biofuels taken together). In this context, one would expect trade law to either favour the shift away from fossil fuel subsidies or, at least, to place them legally and practically on an equal footing with subsidies to renewable energy. Yet, the conclusions of a detailed study on the treatment of these two types of subsidies under trade law suggest that trade law is more permissive and lenient for subsidies to fossil fuels than for subsidies to renewable energy.[53] In essence, renewable energy subsidies are more vulnerable to challenges under trade law because the support schemes used are more specific (hence more 'actionable' in trade law terminology) and they often rely (for political reasons) on local content requirements (LCRs).[54] By contrast, fossil fuel subsidies are consumer-

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[51] On the exploration contracts concerning these resources see the website of International Seabed Authority (ISA), listing the contracts for PMN, CFCs and polymetallic sulphides: https://www.isa.org.jm/exploration-contracts (visited on 20 December 2020). On deep seabed mining see: European Commission, *Communication: Blue Growth – Opportunities for marine and maritime sustainable growth*, 13 September 2012, COM(2012) 494 final, Section 5.4; ECORYS, *Study to investigate the state of knowledge of deep-sea mining* (2014).

[52] M. Taylor, *Energy subsidies: Evolution in the global energy transformation to 2050* (Abu Dhabi: IRENA, April 2020) [Taylor, *Energy subsidies*], at 8ff.

[53] See H. B. Asmelash, 'Energy Subsidies and WTO Dispute Settlement: Why only Renewable Energy Subsidies are Challenged' (2015) 18 *Journal of International Economic Law* 261 [Asmelash, *Energy Subsidies*].

[54] See *Canada — Certain Measures Affecting the Renewable Energy Generation Sector* (Complainant - Japan), Request for consultation (Japan), 13 September 2010, AB Report, 6 May 2013, WT/DS412/AB/RWT/DS426/AB/R (proceedings also addressed a separate complaint from the EU filed 2011) ; *India – Certain Measures Relating to Solar Cells and Solar Modules* (Complainant: US), Request for

targeted and introduce no clear differentiation across recipients, which makes them more difficult to challenge under existing trade law. These conclusions illustrate how trade law may not only support but also hinder the energy transformation although, as the author notes, fossil fuel subsidies have been addressed to some extent in WTO accession negotiations.[55] For present purposes, the different regime – in practice – of fossil fuel subsidies and of certain renewable energy subsidies in use suggest that some core rules of trade law (e.g. the national treatment standard,[56] the more specific prohibition of LCRs[57] or the Agreement on Subsidies and Countervailing Duties[58]) are being construed in such a way as to restrict industrial policy, including the so-called 'green industrial policy', i.e. the policies adopted by a State to provide targeted support to certain industries and sectors as a way of realising latent comparative advantages.[59] By contrast, the sweeping fossil fuel subsidies provided by many States have been overlooked or implicitly grandfathered or, still, deliberately left unclearly regulated under the trade regime.

Another front line is illustrated by certain investment claims brought by companies adversely affected by energy transformation policies. It is difficult to ascertain exactly whether the measures at stake in different disputes are aimed to pursue the energy transition or are triggered by other considerations. Here, I provide two possible examples of such disputes, which concern nuclear energy and coal-fired electricity generation. The first example concerns a protracted set of claims by Swedish investor Vattenfall against Germany in connection with measures restricting its coal-fired electricity generation activities[60] and the phase-out of nuclear energy.[61] The first claim has been settled and the second is still pending, but they both reflect the use of certain legal instruments, *in casu* the investment protection standards of the Energy Charter Treaty,[62] to challenge regulatory change at the level of domestic, EU and international law. The pending claim arises, more specifically,

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consultations, 6 February 2013, AB Report, 16 September 2016, WT/DS456/AB/R, WT/DS456/AB/R/Add.1.

55 Asmelash, *Energy Subsidies*, at 281-282.

56 General Agreement on Tariffs and Trade 1994, 15 April 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1A, 1867 UNTS 187 [GATT], Article III.

57 GATT, Article III(4)-(5), and Agreement on Trade-Related Investment Measures, 15 April 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1A, 1868 UNTS 186, Articles 2.1, 2.2 and Annex (Illustrative List), para. 1(a).

58 Agreement on Subsidies and Countervailing Measures, 15 April 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1A, 1869 UNTS 14, Article 3.1(b).

59 See generally M. Wu, J. Salzman, 'The Next Generation of Trade and Environment Conflicts: The Rise of Green Industrial Policy' (2014) 108 *Northwestern University Law Review* 401.

60 *Vattenfall AB, Vattenfall Europe AG, Vattenfall Europe Generation AG v. Federal Republic of Germany*, ICSID Case No. ARB/09/6, Award (11 March 2011) (embodying the parties' settlement agreement of the same date).

61 *Vattenfall AB and others v. Federal Republic of Germany*, ICSID Case No. ARB/12/12, pending.

62 Energy Charter Treaty, 17 December 1994, 2080 UNTS 100.

from the nuclear phase-out enacted by Germany in 2011, following the Fukushima accident,[63] which set 2022 as the deadline to shut down all remaining nuclear energy reactors, including those of Vattenfall. On 29 September 2020 the German Constitutional Court ruled[64] in favour of Vattenfall, concluding that the compensation clause of the nuclear phase-out law was partially unconstitutional and that a 2018 amendment to this law,[65] required by a 2016 decision, was not sufficient to bring the law into conformity with the constitution. In its December 2016, the Court had considered that the fixed shut down dates set in 2011 were inconsistent with the right to property protected by Article 14(1) of the German Constitution[66] because *inter alia* it did not provide adequate compensation for unused residual electricity volumes. Aside from some significant procedural aspects, the heart of the decision lies in a proportionality assessment. According to the Court, subordinating compensation for unused residual electricity volumes (unsold electricity as a result of the shutdown) to reasonable efforts by Vattenfall to sell that capacity to another company was only admissible if the conditions of the sale were sufficiently clear, which they were not under the law. The second example provides a clearer illustration of how foreign investment law may be used to seek to recoup the value of assets which have lost value as a result of the low-carbon transition. It concerns a US coal mining company, Westmoreland Coal Co., which as other coal mining companies, has struggled financially as a result of the transition away from coal.[67] The complaint[68] challenges a climate change-driven policy by the government of Alberta, in Canada, which shortens the lifespan of coal-fired electricity generation and thereby affects the profitability of mines supplying coal to adjacent power generation plants. Of particular note, the investor does not seem to challenge the phase-out itself but rather the allegedly discriminatory compensation policy: 'Westmoreland recognizes and does not dispute that Canada and Alberta are entitled to enact regulations for the public good. However, when they do, the must be fair to foreign investors'.[69] It claims a minimum of USD 470 million, plus interest.[70] The dispute is pending and, irrespective of its merits, which will be evaluated in due course, it provides a very clear illustration of how foreign investment claims can be used specifically to recoup investments made without sufficiently take into account the rapid pace of the energy transformation. This is but one manifestation of a what

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63 Thirteenth Act Amending the Atomic Energy Act (13. Gesetzes zur Änderungdes Atomgesetzes, 31 July 2011, Bundesgesetzblatt 2011 Seite 1704).

64 Order of the Federal Constitutional Court (29 September 2020), 1 BvR 1550/19.

65 Sixteenth Act Amending the Atomic Energy Act (16. Gesetz zur Änderung des Atomgesetzes – 16. AtG-Novelle, 16th AtG Amendment), Article 1.

66 Judgment of the Federal Constitutional Court (6 December 2016), BVerfGE 143, 246, paras. 1, 2 and 4 (operative part).

67 See 'Westmoreland emerges from Chapter 11', Westmoreland News Release, 15 March 2019, KL2 3116482.5.

68 *Westmoreland Coal Company v. Government of Canada*, UNCITRAL Rules (NAFTA Dispute), Notice of Arbitration and Statement of Claim, 19 November 2018 [*Westmoreland NoA*], paras. 4-6.

69 *Westmoreland NoA*, para. 12.

70 *Westmoreland NoA*, para. 105.

appears to be an emerging type of investment claims brought against energy transformation policies.[71]

## 4.4. Stability of renewable energy support policies

Between 1972 and 2020, at least 178 foreign investment claims with environmental components were filed,[72] out of a total of 1061 known disputes (concluded and pending).[73] Claims with environmental components are defined as those which arise from the operation of foreign investors (i) in environmental markets (e.g. waste treatment, renewable energy, nature conservation, etc.) and/or (ii) in other activities, where their impact on the environment is part of the dispute and/or (iii) when the application of domestic or international environmental law is at stake.[74] Approximately 80% (143) of these disputes have been brought after 2008, and over half of them (76) concern the energy transition, mostly (61) modern renewable energy projects (solar, wind and geothermal).

The main legal issue at stake in the overwhelming majority of these disputes are the challenges involved in navigating the changing conditions of markets, such as the renewable energy generation market, which is not only regulated but rests on a market built by regulation. There are over seventy foreign investment disputes challenging adjustments of the renewable energy regulatory framework in countries such as Albania, Bulgaria, Canada, the Czech Republic, Germany, Italy, Kenya, Romania, Spain or Tanzania,[75] and possibly many more undisclosed ones. The geographically wide span of the countries facing such challenges provides an indication of the scope of the phenomenon. Despite their many differences, the broad underlying question raised by these disputes is the same. In the aftermath of the 2008 economic crisis, when good investment opportunities were scarce, many companies but also financial intermediaries invested heavily in renewable energy projects supported by green industrial policies. These policies were seen as offering a relatively predictable, safe and very significant return on investment, particularly when compared to the underwhelming investment alternatives available at the time. The uptake was so high that several countries struggled to pay the subsidies, which in some cases represented genuine windfall profits for investors at a time of national economic restraint. In such a context, a range of measures were adopted to limit the return on investment to

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[71] See e.g. D. Charlotin, 'Netherlands poised to face its first investment treaty claim, over closure of coal plants', *IAR Reporter* (7 September 2019). See also *TransCanada Corporation and TransCanada PipeLines Limited v. The United States* of America, ICSID Case No. ARB/16/21, discontinued on 24 March 2017 (but possibly reignited by the executive orders signed by the Biden administration in January 2020).

[72] The figures in this section are based on a dataset compiled by the author.

[73] See UNCTAD's Investment Dispute Settlement Navigator (as of 5 January 2021): https://investmentpolicy.unctad.org/investment-dispute-settlement

[74] See J. E. Viñuales, *Foreign Investment and the Environment in International Law* (Cambridge University Press, 2012), at 17.

[75] For an overview of some of these disputes see M. Scherer, C. Amirfar (eds.), *International Arbitration in the Energy Sector* (Oxford University Press, 2018).

more sustainable levels. Such measures included taxes, levies as well as adjustments in the tariff rate, volume and time-horizon of the investments. That, in turn, hit the profitability of many investors, who sought to rely on investment agreements to recoup the expected profits.

The outcomes of these cases vary significantly across countries, measures, legal instruments relied upon and specific factual circumstances. Overall, however, they provide two indications which are important to understand the link between international law and the energy transformation. First, foreign investment claims are increasingly being brought by the sectors embodying the emerging low-carbon sectors. In most cases, they do not concern the lawfulness under international law of measures constraining the transaction to limit its negative externalities but, quite to the contrary, they concern the protection of a new type of energy transaction against fluctuations in the regulatory framework on which they rely. This sets energy transformation disputes apart from the broader set of investment disputes with environmental components. Secondly, the main focus of these disputes is the stability of the rules that facilitate the advent and consolidation of renewable energy generation and, thereby, the demand for equipment, technology and labour in this sector.

## 5. Some proposals

By way of conclusion, I would like to formulate some basic proposals arising from the considerations made in this article, which I hope may be of interest to the broad circle of readers of the *Revue européenne de droit*.

The first conclusion concerns the ongoing energy transformation. I have reviewed some of the evidence relevant both to establish whether a transformation is taking place and its multiple facets. Clearly, the transformation has many interlocked drivers, including the energy 'transition' as a technological process but also the much wider dimensions arising from environmental degradation (climate change and its impacts), economic considerations (e.g. the financial risks of stranded fossil fuel assets) and social imperatives (both the demand for a cleaner environment and the fears raised by structural adjustment and unemployment in some sectors of the population).

The second conclusion is that this broad process of transformation is increasingly finding expression on the legal plane. I have concentrated in this article on international law, given its relevance for global geopolitics. The manifestations of the energy transformation from this perspective are extremely diverse and scattered around different legal contexts. Trade and investment law are, quite intuitively, major front-lines but so are other legal contexts, such as the legal regime of the seabed and subsoil beyond national jurisdiction. Many other front-lines not examined in this article would include, unsurprisingly, environmental law (from climate change negotiations to emissions regulation of air and maritime traffic to nature conservation and biodiversity protection) but also respect for

human rights (in support of, but also as safeguard against certain energy transformation policies), competition law (with the efforts to unbundle energy supply and transmission), intellectual property law (with the fast-tracking of 'green patents'), and many other front-lines where the struggle is finding expression.

Much like the foreign legal policies that were developed by a range of producer and consumer countries with respect to oil and gas from the 1950s onwards, a foreign legal policy specifically addressing the energy transformation with its new geopolitical dimensions would be useful. Much work has been done to chart some of these dimensions from an empirical standpoint. But there is a major gap on the legal aspects of this transformation, particularly as regards the legal front-lines to be prioritised at the level of a State or a group such as the EU.

An initiative to chart such front-lines, understand their deeper political configuration, prioritise action and, on this basis, set a clear and coherent foreign legal policy is, in my view, necessary, indeed pressing for many countries. For the EU specifically, whose socio-economic but also geopolitical future is heavily committed to the energy transformation, an integrated foreign legal policy of this type would be fundamental. Much work has been done by the European Commission in this regard, which could be relied upon in a mapping, integration and prioritisation effort. Energy is highly but not clearly regulated in international law, and the legal implications of the energy transformation from this standpoint can only be assessed by taking an integrative approach.