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Article

## Access to Minerals: WTO Export Restrictions and Climate Change Considerations

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**Abstract:** In the past few years, the Chinese government opted to restrict the export of selected minerals on environmental and health grounds, subsequently leading to an uproar in countries and regions that rely heavily on imports from China to develop their renewable industry sector. This paper places the focus on the law and policy of the Chinese export restrictions of critical minerals, and its implications for the global renewables energy industry. The paper critically assesses how such export restrictions have been dealt with under the dispute settlement system of the World Trade Organisation (WTO). Drawing on this WTO jurisprudence, we posit that litigation on export restrictions of the kind imposed by China poses a threat to the legitimacy of the WTO. We therefore conclude by exploring whether there are any alternatives to litigation as a means to deal with countries choosing to impose mineral export restrictions.

**Keywords:** climate change; WTO; renewables; minerals; exports; rare earth elements; China

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## 1. Introduction

In the past few years, the Chinese government has restricted exports of selected minerals on environmental and health grounds. These Chinese restrictions led to an uproar in countries and regions that rely heavily on imports from China to (amongst other sectors) develop their renewable industry sector. These concerns are succinctly summarised in a headline from the Guardian in January 2012:

“Rare minerals dearth threatens global renewables industry. China’s near-exclusive access to terbium and yttrium sent prices soaring in 2011, potentially hobbling clean energy industry” [1].

Previous research has already focused on the economics of these mineral export-restrictions [2]. In this paper, the focus is on the impact of the law and policy of the Chinese export restrictions of critical minerals on the global renewables energy industry. Section two explores the linkages between climate change and selected minerals deemed “critical” for the renewables energy industry. We then draw the attention to the so-called *China—Raw Materials* and *China—Rare Earths* disputes that have been brought before the World Trade Organisation (WTO) by countries affected by the Chinese export restrictions. Section three begins with a brief introduction on how disputes are solved before the WTO, followed by a more lengthy discussion on the findings of the WTO dispute settlement body in respect of the *China—Raw Materials* and *China—Rare Earths* disputes. We then utilise the theoretical framework provided by contract theory to discuss the aftermath of the *China—Raw Materials* WTO Panel [3] and Appellate Body [4] findings and *China—Rare Earths* WTO Panel [5] and Appellate Body [6] findings before offering some comments regarding the lack of flexibility available to China under WTO law to take certain measures to protect human life and health. Finally, and linked to our findings in Section three, we explore whether there are any alternatives to litigation as a means to deal with countries choosing to impose mineral export restrictions. We conclude in Section four [7].

## 2. Climate Change and Minerals

### 2.1. Climate Change...

The Intergovernmental Panel on Climate Change (IPCC), the most respected international scientific body to deal with the science of climate change, has made it exceedingly clear that current climate change trends are due to anthropogenic interference [8]. Climate change effects vary from loss of biodiversity, serious threats to human health and, in some extreme scenarios, even loss of land due to a rise in sea levels [8]. In the past, some communities have considered climate change as a human rights issue [9], others addressing the issue as a matter of security [10], albeit discrepancies between countries arise as to whether this should be the case [11].

Regardless of whether climate change is considered solely as an environmental matter, or more comprehensively as a sustainable development issue, if not also as a security issue, what the IPCC calls for is an urgent and ambitious international mitigation effort aimed at avoiding global temperatures from increasing more than 2.0 °C from pre-industrial levels [8]. Translated into carbon dioxide reduction efforts, this would imply a 40% to 70% reduction (based on 2010 levels) by 2050 and a complete decarbonisation of our economy by 2100. When taking into account the predominant

role of the current energy mix in the contribution to current climate change trends [12], it should not come as a surprise that what is actually needed can only be described as “an industrial/energy revolution”, as defined by the United Nations Framework Convention on Climate Change (UNFCCC) Executive Secretary, as to what is needed to adequately tackle climate change [13]. Interestingly she focuses on the need not only of an economic transformation, but also of a “social” transformation, which reinforces the understanding that in order to mitigate climate change, a move towards a low carbon “economy” is not enough. What needs to be postulated by States, and indeed all stakeholders, is a move towards a low carbon “society” [14], which—importantly—does not imply a “world free of hydrocarbons” [13]. Such a view would be naïve and unrealistic [15]. However, while Figueres does not mention it explicitly, a future world in which the current energy mix is not changed, and where hydrocarbons continue to be the predominant source of climate change emissions, thereby furthering the negative effects of climate change, would be unfair (in particular to those least developed countries who contributed less to climate change and most suffer its consequences) and lead to potentially disastrous consequences. Unfortunately, an assessment of the international community’s efforts, as currently reflected in the development of the international climate change legal regime, as well as analyses from leading international agencies [16], indicates that we are heading precisely for this kind of world.

In the past few years, the future of the international climate change legal regime has moved from a top-down to a bottom-up approach [17], in which soft law is replacing hard law [18–20]. Greater flexibility is encouraging more countries to participate in the international climate change regime, but this is done at the expense of precision regarding the commitments therein. The Kyoto Protocol had established a top-down approach where a binding target had been established (albeit too low to prevent dangerous climate change) [21]. This approach has now been supplanted by a system based on pledges (currently framed as INDCs—Intended Nationally Determined Contributions), in which every country has the right to determine its own level of climate change mitigation ambition. This bottom-up approach, first suggested in the Copenhagen Accord [22], has been confirmed in the Cancun Agreements [14] and is currently one of the main options regarding the content and substance of the ADP (*Ad-Hoc* Durban Platform) negotiations leading up to COP21 in Paris [23]. Those who advocate towards such a bottom-up approach will argue that the Kyoto Protocol system, while binding, was also weak as it did not include major developing economies and because countries were always free to abandon the Kyoto Protocol altogether, as has been the case with Canada. With the new “softer” approach, major developing economies have now for the first time committed (albeit only through voluntary pledges) to climate change mitigation targets.

Whether the international climate change regime is framed as a top-down or bottom-up system, the reality is that, even if all the pledges were to be met, this would still not prevent average global temperatures from increasing by more than 2.0 °C [16]. This has been acknowledged by independent research [24] and has also been raised as a foremost issue in the international climate change negotiations themselves [25]. Not only are the countries’ foreseeable contributions in the future international climate change legal regime not sufficient, but recent analysis shows that the energy mix picture in 2050 will not be that different from that of today [26]. While science requires the international community to reduce greenhouse gas emissions by 85% by 2050, business as usual scenarios, as predicted by the Organisation for Economic Co-Operation and Development (OECD), tell quite a different story, with emissions actually rising by 50%. What this means in terms of ultimate climate

change effects is self-explanatory—instead of limiting global average temperatures to 2.0 °C, we are quite stubbornly heading towards a projected average global temperature of 3.0 to 6.0 °C above pre-industrial levels by the end of the century [27].

## 2.2. ...and Minerals

If an industrial/energy revolution is needed in order to adequately tackle climate change [13], then the international community must move towards a low carbon society as acknowledged in the Cancun Agreements [14]. A low carbon society will be one in which renewables will play an important role in the provision of energy. In some countries, the contribution of renewables will be greater than in others. For example, some studies envision the possibility that Europe and North Africa could be completely reliant on renewables for electricity provision by 2050 [28]. Whilst these regions may be considered to be setting the example, it is not realistic that other countries, especially major developing economies with significant population growth, can follow the same example. However, their reliance on renewables must grow.

Some renewables, such as wind and solar energy, require specific minerals in their production process. In this regard, “Rare Earth Elements” (REEs) are especially noteworthy. These elements comprise a group of 17 chemical elements in the periodic table that include lanthanum, cerium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, lutetium, scandium and yttrium. Due to their unique chemical, electrical, metallurgical and magnetic properties, REEs are extremely versatile in their industrial application and, at present, near impossible to substitute with alternative materials ([3], para. 2.1). The elements terbium, yttrium, dysprosium, europium and neodymium, in particular, are indispensable in the manufacture of wind turbines and solar panels. Moreover, these elements are also crucial for a number of energy efficient products, as well as the manufacture of many other products that do not have any relevance for climate change mitigation [29].

Despite its description as “rare”, most of the above elements are not geologically scarce by any means of the word and are, in fact, quite abundant. The challenge in securing supplies of REEs rather results from these elements generally only occurring in relatively small deposits. The extraction of these deposits are often not economically feasible, that is to say, the costs involved in extracting these minerals exceed the value of the deposits. Consequently, the number of producers is generally limited to those which can facilitate extraction whilst subject to such “high cost, low value” conditions. Many of these producers are Chinese based, owned or controlled which, due to less strict environmental and safety standards, were historically capable of extracting REEs at a much lower cost than their Western contemporaries, thus rendering many producers incapable of competing on the open market.

Given the above, since renewables are important for climate change mitigation policies, and some specific minerals are crucial for the development of the renewable energy industry, then access to these minerals will be relevant for any country wishing to move towards a low carbon society. This link leads to the next section in which a specific obstacle to the access to these minerals is explored, namely export restrictions. We explore the WTO *China—Raw Materials* dispute first, before moving on to examine the *China—Rare Earths* dispute. While the former dispute is not at first sight relevant to our

later discussion on REEs, it raises similar legal issues to the *China—Rare Earths* dispute and so merits further examination.

### 3. The Law and Policy of Mineral Export Restrictions

#### 3.1. Mineral Export Restrictions at the WTO

In 2009, the European Communities (EC), the United States and Mexico requested consultations with China regarding 40 Chinese domestic measures ([3], para. 2.3) that amounted to allegedly illegal export restrictions of specific minerals [30] “critical” to the European renewables industries, as well as to other high tech products [31]. China’s export restrictions on the export of raw materials took four forms: (i) export quotas; (ii) export duties; (iii) minimum price requirements upon export and; (iv) export licences ([3], para. 2.1; [4], paras. 1–2). Other areas of China’s export regime, such as the way in which it allocated and moreover administered export licences, quotas as well as a lack of transparency regarding the (non-) publication of particular export measures, were also raised by the complainant countries ([3], para. 2.1; [4], paras. 1–2). It was alleged that these measures were inconsistent with the obligations China had undertaken in its Protocol of Accession to the WTO and the associated Working Party Report as well as with GATT Articles VIII:1 (a), VIII:4, X:1, X:3(a), and XI:1 ([4], para. 2).

Of note for our purposes is the allegation that certain of the Chinese measures at issue were in breach of its Accession Protocol and the associated Working Party Report. China acceded to the WTO in 2001, following many years of protracted negotiations. Under Article XII of the Marrakesh Agreement, accessions to the WTO take place “on terms to be agreed” between the acceding country and the rest of the WTO Membership. In China’s case, the specific terms agreed, as set out in its Accession Protocol and the relevant Working Party Report, were in many respects over and above the obligations owed by the rest of the membership of the WTO. Accordingly, at least in respect of certain of its obligations, China signed up to so-called WTO-plus obligations in its Accession Protocol; *i.e.*, commitments that go over and above those agreed by other WTO Members [32–34]. We return to this point in due course.

Consultations are but the first phase of a dispute according to the WTO Dispute Settlement Understanding (DSU) [35]. Whilst some disputes are resolved at this stage, many culminate in litigation. A first hearing of the dispute is conducted by a Panel and, if Parties appeal, by the WTO Appellate Body. Decisions of both bodies require adoption by the WTO Dispute Settlement Body (DSB) ([35], Article 16.4, 17.14). Three types of remedies are then available to the winning complainant. The first involves the Member in breach of their obligations bringing itself into compliance with the findings of the DSB. Accordingly, DSU Article 19 directs that the Member, “bring the measure into conformity with that agreement”. If the losing party does not bring itself into compliance “within a reasonable period of time” ([35], Article 21.3), the winning party may seek compensation. Compensation is, however, voluntary ([35], Article 22.1) and such voluntariness has led some commentators to criticize its effectiveness as a remedy [36]. In the absence of agreement, the DSB may authorize “retaliation” by the losing party ([35], Article 22.3, 22.4). Retaliation involves the winning Member suspending concessions or other obligations. The level of retaliation which the DSB will permit is, “equivalent to the level of the nullification or impairment” [37].

What should be stressed from the above overview of the operation of the DSU is that punishment of the offender, to use the words of McRae, is not the main aim of the dispute settlement system ([38], p. 7). In McRae's view, while sanctions are available, they focus not so much on punishing the offender but rather on bringing the offender into compliance with the adverse ruling ([38], p. 7). Hence, while compensation is available should the losing party to the dispute not bring itself into compliance with a ruling of the DSB, this should not be considered as equivalent to the remedies granted in the domestic sphere for breach of contract ([38], p. 7). This emphasis upon compliance may help to explain why when compared to other international courts the WTO dispute settlement system is considered "a body with teeth" [39]. In addition, and as outlined above, the WTO DSU allows for the possibility of trade retaliation. In technical terms, this is considered to be lawful suspension of trade obligations, but effectively amounts to economic sanctions that can ultimately encourage a country to amend its policies in order to make them WTO compatible as per the recommendations of the WTO DSB [40].

The *China—Raw Materials* dispute went through all the phases of the WTO DSU procedure. A Panel was established, which ruled mostly in favour of the complainants [3]. The Panel found that the export duties which China had imposed on certain raw materials, with the exception of yellow phosphorous, were in breach of its commitments under its Accession Protocol, specifically Paragraph 11.3. Pursuant to this, China had committed to eliminate all taxes and charges on exports except in respect of those products listed under Annex 6 of its Accession Protocol. In its defense, China attempted to invoke GATT Article XX (b) and (g) [41] to justify the export duties on certain of the raw materials at issue ([3], Section V).

In brief, GATT Article XX provides a defined list of "General Exceptions" to the rules of the GATT, allowing Members to take measures which would otherwise be inconsistent with the GATT. In order to avail of the GATT Article XX safe harbour, the measure at issue must fall firstly within one of the protected interests listed in the subparagraphs of GATT Article XX. GATT Article XX(b) and (g), respectively, allow Members to take GATT-inconsistent measures which are "necessary to protect animal, human and plant life or health", as well as "relating to the conservation of exhaustible natural resources if such measures are made effective in conjunction with restrictions on domestic production or consumption". Assuming a GATT-inconsistent measure passes muster under one of the subparagraphs of GATT Article XX, it must then satisfy the requirements of the chapeau to GATT Article XX; that is, the measures in question must "not be applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination...or a disguised restriction on international trade".

In *China—Raw Materials*, the Panel found that China could not invoke GATT Article XX exception to justify measures inconsistent with Paragraph 11.3 of China's Accession Protocol. The reasoning of the Panel for this finding was that GATT Article XX can only provide a justification for violations of GATT itself or in situations where the exception has been incorporated in some way into a non-GATT provision. Accordingly, in the view of the Panel, "[i]f China and WTO Members wanted the defense of GATT Article XX to be available to violations of China's export duty commitments, they could have said so in Paragraph 11.3 or elsewhere in China's Accession Protocol" ([3], para. 7.140). Without some sort of reference to the effect that GATT Article XX applied to China's obligations under Paragraph 11.3 of its Accession Protocol, China could hence not rely upon it to justify the contested export duties ([3], paras. 7.116–7.160). In the view of the Panel, "[t]o allow such exceptions to justify a violation when no exception was apparently envisaged or provided for, would change the

content and alter the careful balance achieved in the negotiation of China's Accession Protocol. It would thus undermine the predictability and legal security of the international trading system" ([3], para. 7.159). The Panel, however, went one step further and analysed whether, assuming that GATT Article XX *did* in fact apply to Paragraph 11.3, China's defense would have been legitimate. In this regard the Panel found that China had not in fact met the criteria applicable to the GATT Article XX defense ([3], paras. 7.350–7.617).

The Panel was also tasked to consider China's imposition of export quotas on certain raw materials. Export quotas, as a form of quantitative restriction, are usually prohibited by GATT Article XI [42]. China, however, argued that the export quotas imposed on one product, "refractory-grade bauxite", were justifiable pursuant to GATT Article XI:2(a) which permits "temporarily applied" export quotas designed to "prevent or relieve a critical shortage". The Panel found that China had not met the conditions of GATT Article XI:2(a) to avail itself of this defense. This is because China's export quotas on refractory-grade bauxite were not considered to be temporarily applied or designed to prevent a critical shortage ([3], paras. 7.350–7.354). At the time of the dispute, for example, the export quotas in question had already been in place for around ten years and were seemingly intended to stay in place until such times as China's reserves had been depleted ([3], para. 7.350). The imposition of export quotas on this basis could therefore not be considered as "temporarily applied", the Panel found. Similarly, China had estimated that its reserves of refractory-grade bauxite would likely run out in around sixteen years. This, observed the Panel, was not sufficient to, "demonstrate a situation 'of decisive importance' or one that is "grave", rising to the level of a "crisis" ([3], para. 7.351). Finally, the Panel also found that in respect of refractory-grade bauxite and the other raw materials at issue, China had not met the criteria under GATT Article XX (g) to avail of this as a defense. To expand, the Panel was not convinced as to the purported conservation goal of the Chinese measures, finding that a policy restricting extraction rather than exportation would be "more in line with a policy to achieve conservation" ([3], para. 7.428).

China appealed the findings of the Panel claiming, *inter alia*, that the Panel had erred in finding that China could not have recourse to GATT Article XX to justify violation of its export duty commitments under Paragraph 11.3 of its Accession Protocol. China also claimed that the Panel erred in its interpretation of GATT Article XI:2 (a) in respect of its findings that China's export quota on refractory-grade bauxite was not "temporarily applied" to relieve or prevent "a critical shortage" ([4], para. 207). The Appellate Body largely upheld the findings of the Panel, holding that GATT Article XX could not be used as a defense to a breach of Paragraph 11.3 of China's Accession Protocol ([4], paras. 292–307) and that export restrictions on refractory-grade bauxite were not temporarily applied to prevent or relieve a critical shortage ([4], paras. 318–44).

The *China—Raw Materials* dispute was not, however, the end of the road for China's programme of export restrictions on raw materials. In March 2012, the EU, Japan and the US each requested consultations under the WTO dispute settlement system with China over various export duties and quotas imposed on certain rare earths [43] as well as tungsten, and molybdenum ([5], para. 2.1). The consultation stage did not resolve the dispute and so, in 2012, a Panel was established to hear what became known as the *China—Rare Earths* dispute. At issue were allegations broadly similar to those raised by the complainants in the *China—Raw Materials* dispute; namely that China had imposed export duties on certain rare



earth elements and tungsten and molybdenum in breach of its commitments under Paragraph 11.3 of its Accession Protocol; and that it had imposed export quotas in breach of GATT Article XI:1.

Before the Panel, China again attempted to justify its export duties under GATT Article XX ([5], paras. 7.49–7.114). This time, however, reliance was placed upon GATT Article XX (b) which, as noted above, permits Members to take measures *necessary* to protect human, animal or plant life or health (emphasis added). In the view of China, its export duties were necessary to protect human and animal life and health from the polluting effects of such mining. In a majority finding, the Panel once again held that violations of Paragraph 11.3 of China's Accession Protocol could not be justified by reference to GATT Article XX ([5], paras. 7.118–7.138). One Panellist, however, disagreed, arguing that GATT Article XX should be available to all GATT-related obligations, of which Paragraph 11.3 of the Accession Protocol was undoubtedly one such obligation ([5], paras. 7.118–7.138).

While the Panel was divided in respect of whether GATT Article XX could be used as a defense to a violation of Paragraph 11.3 of China's Accession Protocol, it went on to answer the hypothetical question as to whether, assuming that GATT Article XX (b) *could* be used as a defense, China had in fact made out such a defense. On this the Panel was unanimous; not only had China failed to establish a link between the application of export duties to the materials at issue but, moreover, China had not been able to rebut the contention of the complainants that the duties, "in conjunction with other measures maintained by China...serve to incentivize their domestic use for the production of value-added products, as opposed to their exportation" ([5], para. 7.169). Indeed, China's Ministry of Industry and Information Technology also stated that the export duties are designed to:

"...encourage the export of high value-added products and deep processing products and at the same time strictly control the export of...rare metal products involved in national strategic security" ([5], para. 7.169).

On the issue of its imposition of export quotas, China did not argue that they were compliant with GATT Article XI:1 but instead sought to justify the quotas under GATT Article XX (g) because they relate to the conservation of exhaustible natural resources and are made effective in conjunction with restrictions on domestic production or consumption ([5], para. 7.200). In its analysis, the Panel largely side-stepped the issue of what is meant by an exhaustible natural resource under GATT Article XX (g) and instead focused upon the other aspects of GATT Article XX (g), particularly the meaning of the word "conservation". Drawing insights from the principle of the permanent sovereignty over natural resources as relevant to its interpretation of GATT Article XX (g), the Panel observed that, "Members are entitled to develop conservation policies on the basis of, or taking into account, a full range of policy considerations and goals, including the need to preserve resources in their current state as well as the need to use them in a sustainable manner" ([5], para. 7.266). What this means, explained the Panel, was that it was for Members to decide upon how much, for example, of a resource should be used today and how much should be reserved for future generations ([5], para. 7.267). In its analysis of the other components of GATT Article XX (g), the Panel found that while there were numerous references to conservation in China's *Foreign Trade Law* ([5], para. 7.395), other key documents such as China's *Twelfth Five-Year Development Plan for New Materials Industry* suggested that the imposition of export quotas pursued industrial rather than conservation goals ([5], para. 7.401). Moreover, the Panel had difficulties reconciling the end result of export quotas, which reduce the cost of a product

domestically and hence stimulate supply, with the proposed goal of conservation ([3], para. 7.534; [5], para. 7.451). Accordingly, as was the case in *China—Raw Materials*, the Panel found that the conditions of GATT Article XX (g) had not been met by China.

On appeal to the Appellate Body, the findings of the Panel were largely upheld. Again, the Appellate Body found that GATT Article XX would not automatically be available as a defense to breaches of China's Accession Protocol. Rather, this issue would be decided on a case-by-case basis ([6], para. 5.57). Indeed, in the prior WTO dispute of *China—Audiovisuals* [44], the Appellate Body had in fact found that GATT Article XX *could* be used as a defense to a violation of Paragraph 5.1 of its Accession Protocol ([41], p. 16; [44], paras. 215–31). The Appellate Body in *China—Rare Earths* denied, however, that the GATT Article XX defense should be more broadly available, as had been argued by China. In respect of the Panel's reasoning under GATT Article XX (g), which China had advanced as a justification for its use of export quotas, while the Appellate Body did not agree with all aspects of the Panel's reasoning, it did not overturn its central finding that China had failed to make out a successful GATT Article XX (g) defense.

In conclusion, in both the *China—Raw Materials* and *China—Rare Earths* disputes, the complainants argued that the export quotas imposed by China were in violation of GATT Article XI and that the relevant provisions of its Accession Protocol did not allow for exceptions under GATT Article XX. We discuss the implications of this in the next section.

### 3.2. *The Aftermath of the WTO Disputes on Mineral Export Restrictions*

The above series of WTO disputes leads us to make a few remarks. Of perhaps greatest concern is the rejection of the GATT Article XX defense to the violation of Paragraph 11.3 of China's Accession Protocol. To expand, while the Panel and latterly the Appellate Body in *China—Rare Earths* gave explicit recognition to the principle that States have permanent sovereignty over their natural resources and that export restrictions may be one way in which to exercise such sovereignty, China, by dint of the unavailability of GATT Article XX, was nonetheless denied any sort of defense to the imposition of export duties in breach of Paragraph 11.3 of its Accession Protocol. While China's policy would undoubtedly not have passed muster under GATT Article XX, in a slightly different situation where China did in fact have a conservation policy for minerals which export duties were an intrinsic component of, the Panel/Appellate Body would have no alternative but to adopt "strict liability" approach.

The Panel/Appellate Body's jurisprudence in both *China—Raw Materials* and *China—Rare Earths* has, perhaps unsurprisingly, sparked a large outpouring of concern. Qin [45], for example, notes that while on the one hand the Appellate Body has singularly failed to clarify the nature of the relationship between China's Accession Protocol and the Multilateral Trade Agreements ([45], pp. 648–49), it has nevertheless made clear that GATT Article XX will be unavailable for breaches of Paragraph 11.3 of China's Accession Protocol. Given the "de facto" precedential status of Appellate Body reports [45], China's legal position in respect of the availability of GATT Article XX as a defense to violation of Paragraph 11.3 of its Accession Protocol is hence now very much clear. In this regard, Bronckers and Maskus note that China's lack of a public policy exception to justify the imposition of export duties on a large number of products stands in stark contradistinction to other WTO members, including recently acceded Members such as the Ukraine ([32], p. 400) and Russia ([34], pp. 1412–13). Not only does

this pose a risk to the notion of the WTO compact as a “single undertaking” ([32], p. 400) but, as argued by Bronckers and Maskus, is, “objectionable if and to the extent generally accepted public policies, such as environmental protection, to justify possible deviations from a WTO obligation cannot be invoked by all WTO Members in respect of the same type of obligation” ([32], p. 400). Similarly, Gu, writing in the aftermath of the *China—Raw Materials* report, articulates that the Appellate Body, “showed inappropriateness when interpreting the relationship between the GATT 1994 and Paragraph 11.3 of the Protocol” ([46], p. 1026), and ignored the fact that both Paragraph 11.3 and the GATT *are* integral parts of the WTO Agreement, with both regulating trade in goods ([46], p. 1027). As a consequence of this “link”, GATT Article XX should have been available to China to invoke as a defense to a breach of Paragraph 11.3 of its Accession Protocol, in the view of Gu ([46], p. 1027).

### 3.3. The WTO Contract

Having iterated upon the jurisprudence of the WTO dispute settlement system in respect of *China—Raw Materials* and *China—Rare Earths*, we now turn our attention to the concept of the WTO as a “contract”. Many commentators construct the WTO as an incomplete contract [47] with such incompleteness manifesting in a number of ways, not least that there are significant “gaps” in the WTO contract. According to Mahlstein and Schropp,

“A defining feature of incomplete contracts is that they contain gaps: Important contingencies (future conditions, or ‘states of nature’) are not considered in the terms of the original contract, and thus are not exhaustively and unambiguously specified *ex ante*, *i.e.*, at the time of the conclusion of the contract. *Ex post*, during the performance phase of the contract, gaps may leave gains from trade unrealized. This, in return, may create room for ‘regret’ (Goetz and Scott 1981) whenever unanticipated and unforeseen developments, or shocks, occur, such as a protectionist backlash within a country...In order to seize gains from *ex post* regret and to deflate the build-up of domestic pressure against trade liberalization, the WTO contract provides for certain trade policy flexibility instruments that permit one party (the ‘injurer’) to partially default, *i.e.*, to step back, or withdraw, temporarily from contractual performance as previously agreed...” ([47], pp. 1–2).

Drawing on the work of Guan, we posit that the WTO is constructed upon the idea that *ex ante* commitment needs to be balanced against some sort of *ex post* discretion in how the commitments of Members are enforced and implemented [48]. What this means is, in order to ensure the effective functioning of the multilateral trading system, an appropriate balance has to be struck between upfront commitment and *ex post* flexibility ([48], pp. 219–20). It is often challenging to fully anticipate future events and thus, when Members commit to trade liberalization, some reassurances are required that if the unforeseen happens—an import surge, or a famine for instance—that there will be flexibility in terms of how their obligations are enforced ([48], p. 228). We can see this, for example, in provisions on safeguards and indeed in GATT Article XX itself ([48], p. 220).

In the view of Guan ([48], p. 220), what the *Raw Materials* and *Rare Earths* disputes tell us is that there is a lack of WTO compliant *ex post* discretion on the part of China to seek to balance its trade obligations against concerns such as conservation of exhaustible natural resources or indeed, the

protection of human life or health. This is problematic for a number of reasons. Firstly, and as opined by Qin, export duties on natural resources may be necessary to manage the negative externalities associated with raw materials extraction [49]. Hence, allowing low cost materials to be sold abroad may provide a commercial benefit for overseas producers but the environmental costs of such production are borne internally by the producing country [49]. An export duty is the very thing that, to use the words of Qin, "...can correct the mispricing and offset the potential subsidy to the importing countries" [49]. Accordingly, China's commitments under Paragraph 11.3, taken together with the unavailability of GATT Article XX as a defense, mean that China is denied an important tool to exercise *ex post* discretion.

Given the foregoing, the specter of a "pressure cooker" WTO seems a particularly apposite description whereby a breach of the WTO contract is not permitted on the part of China [48]. Indeed, and very much linked to this, is the idea that the asymmetry of obligations noted above could result in, "...respect for the WTO system [being] eroded over time if some countries are denied the flexibility to deal with public-policy goals, using the same instruments, that other countries enjoy" ([32], pp. 405–6). Given this threat, and combined with the importance of certain minerals to the renewable energy industry, we contend that alternatives to litigation should be explored so as to avoid the risk of "pressure cooker" WTO. While these concerns are certainly not unique to the minerals industry, we contend that they nevertheless provide a timely case study on potential alternatives to litigation.

It should be underscored that the authors do not seek to argue that either the Panel or the Appellate Body should have read something into the text of China's Accession Protocol that simply is not there. Hence, while we have identified certain aspects of the jurisprudence as troubling, this is more due to its effects—that is, denying China an exit route—than the legal reasoning itself. Accordingly, we do not wish to paint a one-sided picture of the *Raw Materials and Rare Earths* dispute [41]. We are, however, of the view that given the importance of certain minerals to the renewable energy industry, alternatives to litigation should be explored so as to avoid the legitimacy of the WTO being undermined. We thus engage in this search for alternatives to litigation below.

#### **4. Alternatives to International Litigation**

As illustrated in the discussion above, rare earth elements constitute a critical component in a wide range of modern technologies, including communication technologies, weapons technologies, catalysts for petroleum refining and, within the context of this paper, technology relating to the construction of renewables technologies [50].

When considering alternatives to international litigation, two basic but critical considerations need to be borne in mind with regard to security of supply of mineral and metals commodities, irrespective of the particular commodity that is being considered. These are firstly geology, and secondly, economic feasibility [51]. The importance of geology is quite apparent, simply because extraction of a particular commodity can only take place where the commodity occurs. Some countries can be said to have won the proverbial jackpot with relation to geology, and thus have more-or-less direct access to a mineral resources. Other countries have far less access to domestic mineral resources, either as a result of existing deposits being exhausted, or simply because there were none to begin with. Regardless, non-access to domestic resources necessitates the need for diversification of supply, either through alternative, non-conventional sources, or through imports via international trade. The second

consideration—that of economic feasibility—simply means that in order to extract a particular commodity, the process needs to be viable from an economic consideration. The incredibly capital intensive nature of mining operations, coupled with long development times, often means that years will pass before a mine is able to deliver a particular commodity to the market [52].

Bearing these two considerations in mind, the question thus arising is that, should a country desire access to mineral commodities in order to either develop or grow its domestic industries, and it is unable to gain access to such commodities as a result of the actions of another country, what alternatives to international litigation are available to facilitate such access? Considered within the context of this paper, if specific minerals critical to the development of the renewables energy industry can mainly be found in one country, and the latter encumbers or limits its exports, what alternatives are available *if* international litigation fails? In the course of this research, we have considered four broad principal alternatives, with potential advantages and considerations particular to each.

#### 4.1. Diversified Suppliers

The first option that a country can consider to gain direct access to a particular commodity, is simply to attempt to diversify its suppliers—that is to say, in the case of REEs looking to an alternative provider other than China. In 2011 Chinese production of REEs accounted for nearly 95% of global production. This included production by Chinese owned or controlled operations, as well as domestic production [53]. It would therefore appear that China holds a near monopoly with regards to REE production. However, rare earth element deposits are certainly not restricted to China [54] and more reserves are continuously being discovered in other countries [55]. Some countries, particularly those with an existing reliance on REE for high-tech industries, such as Germany and Japan have already proceeded to initiate attempts at doing so, and in some cases have already signed trade agreements with potential source countries, such as India, Vietnam, Mongolia and Kazakhstan, in relation to rare earths [56].

Following on from the above, as a further means to diversify REE supply, end-user countries could consider investing in exploration and development of *non-domestic* resources. As noticeable REE deposits are present in approximately 34 countries [57], state sponsored or owned mining companies could consider diversifying their portfolios to include joint ventures with foreign operations, aimed at gaining direct access to REE reserves.

However, in both instances, this can prove more difficult than stated, as this approach relies on the host country having firstly the necessary regulatory and legal framework to facilitate favourable investment, and secondly the required infrastructure to either allow for extraction of the primary source material, or to allow for domestic secondary processing, and shipping of processed REEs. Additionally, the circumstances surrounding current rare earth supply, that is to say a near monopoly over global production by China, could lend a certain political element to negotiations for access by host countries, either by rightly taking advantage of a scarce market, or with regards to its own foreign relations to China. The potential political implications regarding such developments fall outside of the scope of this paper, but nonetheless bear mentioning.

#### 4.2. Domestic Development

*In lieu* of established trade instruments, a second possibility is for an end-user country to invest in exploration and development of REE resources within its *domestic* borders, instead of relying on an external provider such as China or an alternative foreign supply. This is perhaps the least realistic approach as, despite the global abundance of REEs, development of such resources is very much dependent on the geological distribution of particular REEs. An example is that of Japan, which even though possessing established REE-reliant industries, is having to rely on mineral imports to satisfy its REE requirements, simply because of the absence of domestic REE deposits [58]. A further challenge to domestic development is presented by the presence of extensive legislative frameworks that are not conducive to the establishment of new mining operations, often in the form of severe environmental restrictions [59].

Should a country indeed be fortunate to discover feasible deposits within its own borders, or having a generous legislative regime, the most pressing challenge arising is one of timing—the long lead-in times, and investment, between exploration, discovery and eventual extraction of the mineral resource, might render such efforts too little, too late in light of the time sensitive nature of the climate change debate. Thus, should an end-user opt to develop domestic deposits as an alternative to international trade, we would argue that it would potentially be more effective to *re-develop* existing or previously abandoned mines, rather than investing and developing technology that would allow for alternative and indirect sourcing of REEs [60].

#### 4.3. Technological Solutions and Alternative Sources

Technological solutions and access to alternative sources possibly presents the best potential for facilitating access to REEs over the long term. In essence, technological solutions relate to the application of technologies to the efficiency of REEs supply through firstly substitution, and secondly recycling and reuse. In particular, the former refers to when one type of mineral is developed as a substitute for another. History is scattered with examples—the Stone Age, Bronze Age, and Iron Age being examples where one type of mineral or metal was substituted for another due to improvements in technology. However, the unique properties of REEs make it extremely challenging to develop viable substitutes, with none developed as of yet. At the time of writing, various projects were still on-going, with the aim of developing end-uses that were less reliant on the REEs [61].

Conversely, recycling and reuse relate to the access to resources through recycling and winning of these elements from previous use. Given the established use of REEs in a variety of consumer related products, a perhaps more viable solution lies in sourcing REEs through recycling. Within this context, several countries, including Japan, Vietnam, South Korea, USA, and the UK, have launched research initiatives towards increasing the efficacy of recycling of these commodities.

The other important factor that we need to consider is alternative sources. Within the context of the paper, this relates closely to the discussions on diversifying supply, as well as domestic development—however, extraction and exploitation of such alternative sources is critically depend on technology to make it economically feasible, and/or to gain access to resources in the first place. Examples include the reworking of mining tailings and, an area that is rapidly developing, the mining of seabed resources.

Especially in case of the latter, technology can be seen as a potential game changer given that advances in deep drilling and excavation technologies are increasing the feasibility of developing such deposits. For example, recent studies have identified substantial deposits of REE in the eastern South Pacific and the Central North Pacific which could potentially lead to a significant shift in the global REE supply chain [62]. However, technological constraints of operating at such extreme depths remain and, coupled with the uncertainty surrounding the potential environmental impact of such operations on deep-sea ecosystems, excavation of these alternative sources are yet to be realised [63,64].

#### 4.4. Cooperative Multi-Lateral Approaches

Instead of relying on bilateral confrontation framed as a WTO dispute, a more cooperative multilateral approach could perhaps be suggested. If these minerals are indeed so critical for the future of the renewables energy industry, and if renewables are so essential for overall global climate change mitigation, it follows that there may be scope for a multilateral framework to accommodate a way forward in relation to mineral export restrictions. However, there are two complications in this respect. Firstly, what would be the nature of such a suggested framework? Plainly a blanket ban on mineral export restrictions does not seem to be the way forward, as the WTO disputes against China seem to indicate. A possibility could be to allow for exports, but in such a way that it is mutually beneficial for the producer and supplier. However, the devil lies in the details, and how this could be operationalised lies outside the scope of this paper.

A second, possibly greater, obstacle relates to which multilateral institution should be at the helm of negotiating such a framework? Whilst it does not seem reasonable to add more content to the WTO Doha Round, which are already quite challenging and time-consuming negotiations, some commentators suggest that mineral export restrictions will be dealt with in future international trade negotiations [65]. However, we have argued in this paper that the WTO seems at odds with matters related to minerals that are deemed critical for climate change mitigation.

Similar problems to the ones faced by current international trade negotiations would arise if we were to try to insert negotiations on a multilateral framework for mineral export restrictions within the international climate change regime. This may seem the right forum due to the importance of specific minerals for climate change mitigation, but it can be argued that international climate change negotiations already deal with possibly too many matters. To add even more content to these negotiations could be, once again, counterproductive.

Finally, an argument could be made in favour of bringing a discussion on mineral export restrictions within mineral specific international institutions. However, what is required is reliance on creative public-private frameworks where *all* key stakeholders (states, private companies and civil society) in a specific metal related industry participate, rather than on a traditional inter-governmental international organisation anchored on state sovereignty. Having said this, we recognise past failures to develop mineral specific institutions, such as the Tin Cartel example [66]. However, the international community should consider such failures a learning experience, and not use its lack of success as an excuse for non-action.

#### 4.5. Direct Engagement with China

The final option could be for countries, or regions like the EU, to engage more directly with China, or countries with similar concentrations of minerals in the future, in order to assist those countries in designing adequate regulatory structures capable of ensuring the necessary domestic supply of mineral resources, without hindering countries that rely on mineral exports for the development of their renewables energy industry. This is a delicate and difficult option, particularly given the discriminatory nature of the Chinese measures examined in the *Raw Materials* and *Rare Earths* disputes. While difficult, however, this option is one that could reap benefits in the long term.

In the past few years, the Chinese government has set up a Rare Earth Association (REA) [67]. The latter is aimed at 155 members, including some of the biggest producers of rare earths, and it will report to the Ministry of Industry and Technology. The creation of an REA may offer an opportunity for countries to engage with China and move towards more cooperative, global approaches, offering an important alternative to challenging Chinese mineral export restrictions before the WTO.

In conclusion, there is potential for political, technological and legal resolutions to address access to minerals related conflicts. All of them may have their advantages or disadvantages, and all of them may be taken on energy security or climate change mitigation grounds.

### 5. Conclusions: Access to Minerals, Energy Security and Climate Change

The environmental, health and security effects caused by climate change, caused itself by the world's excessive reliance on fossil fuels in its current (and most likely also future) energy mix, cannot simply be disregarded and set aside. Within this context, some minerals, specifically rare earth elements, have the potential to act as a technological game changer due to their "critical" role in the manufacture of renewable energy products, such as wind turbines and solar panels.

These minerals are currently heavily concentrated in China, as a result of both foreign and domestic production. When the latter implemented export restrictions on REEs based on environmental and health grounds, the EU and other WTO Members challenged these measures. Subsequently, the WTO DSB concluded that the Chinese measures were illegal. These developments raise certain considerations as to the efficacy of international litigation, and of the WTO, to deal with conflicts related to access to minerals. Both China and, moreover, those countries impacted by mineral export restrictions could explore other approaches and policy frameworks in order to facilitate increased REE supply. These options range from diplomatic and industrial policy efforts leading to supply diversification of REEs, either through access arrangements with other countries, or by investing in the (re)development of domestic REE resources; technological solutions linked to increased recycling and use, and the development of unconventional sources of supply, such a resources located in areas such as the deep seabed; and, finally, through multilateral legal approaches, either in international fora or within the countries that apply mineral export restrictions themselves. As set out above, climate change should be the main policy driver in relation to access to minerals critical for greenhouse gas emissions reductions.



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## Author Contributions

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## Conflicts of Interest

The authors declare no conflict of interest.

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26. Fossil fuels will remain the dominant source, accounting for a staggering 85% of the world’s total energy. Renewables, including biofuels, will be responsible for just over 10%, with the balance being provided for by nuclear power generation. If we translate this into greenhouse gas emissions, the OECD projects a 50% increase in greenhouse gas emissions, primarily due to a 70% growth in energy related CO<sub>2</sub> emissions. If we compare these figures with what the IPCC calls for in order to prevent dangerous climate change, the picture is gloomy [25].
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