

9. Global Energy Governance - Strategic Weapon or Tool for Peace?

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Exiting the Energy Charter Treaty under the law of treaties

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1. INTRODUCTION

The origins of the Energy Charter Treaty ('ECT')¹ lie in the collapse of the Soviet Union in the early 1990s, which led Western European states to seek to secure supplies of hydrocarbon energy from countries in the former Soviet bloc, where these resources were located; in exchange, these countries would receive foreign investment, technical cooperation and be able to trade more easily with Western Europe.² To this end, the ECT set out provisions on free trade and transit, based on the General Agreement on Tariffs and Trade ('GATT') 1947, as well as provisions on investment promotion and protection in the energy sector. Despite its original focus on Europe and countries of the former Soviet Union, the ECT's final geographical coverage was broader: it was open to states from all parts of the globe, and these came to include, in addition to Western European countries and those of the former Soviet bloc, Afghanistan, Australia, Japan, Jordan, Mongolia, Turkey and Yemen.³

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¹ Energy Charter Treaty, signed 17 December 1994, in force 16 April 1998.

² The idea underlying the ECT was first proposed to the EEC Council on 25–26 June 1990. This led to the European Energy Charter, signed 17 December 1991, which is referenced in the preamble to the ECT. See, generally, Julia Doré, 'Negotiating the Energy Charter Treaty' in Thomas Wälde (ed), *The Energy Charter Treaty: An East-West Gateway for Investment and Trade* (Kluwer 1996), at 138–39; Kaj Hobér, *The Energy Charter Treaty: A Commentary* (OUP 2020), at 14–15.

³ The ECT currently has 51 contracting parties, and one signatory (Norway) that is provisionally applying the ECT. Belarus is also a signatory and was provisionally applying the ECT but was suspended on 24 June 2022. See <https://www.energychartertreaty.org/treaty/contracting-parties-and-signatories/>.

In recent years, the ECT's investment regime has come under pressure from different quarters. First Russia, then Italy and most recently Australia withdrew from the treaty,⁴ as part of a policy shift away from investor-state dispute settlement. In the case of Russia and Italy, this was done after being sued under the ECT for claims worth many hundreds of millions of dollars.⁵ In addition, in *Achmea* the EU Court of Justice interpreted the EU treaties as precluding investor-state dispute settlement between EU investors and EU Member States,⁶ requiring the EU and its Member States to implement this ruling at the international level.⁷ Third, and most importantly, the ECT's investment regime has come to be seen as a major obstacle in combatting climate change,⁸ because it radically increases the cost of adopting climate change measures due to potential claims for compensation,⁹ which leads to a regulatory chill in adopting such measures, contrary to the contracting parties' commitments under the Paris Agreement.^{10,11}

Largely as a response to these challenges, in 2017 the ECT contracting parties began discussing a possible modernisation of the ECT, which led, among other things, to proposed reforms to the system of investor-state dispute settlement, a carve out for 'intra-EU' disputes, and time limits on protection for fossil fuel investments.¹² At the same time, however, civil society began to demand a complete withdrawal from the ECT,

4 Russia (termination of provisional application effective 18 October 2009), Italy (withdrawal effective 1 January 2016); Australia (termination of provisional application effective 13 December 2021).

5 Russia was sued in three parallel proceedings: see *Yukos v Russia*, PCA Case No AA 227, *Hulley Enterprises v Russia*, PCA Case No AA 226 and *Veteran Petroleum v Russia*, PCA Case No AA 228, 18 July 2014; each of the three claimants claimed \$114bn. Italy was sued in *Blusun et al v Italy*, ICSID Case No ARB/14/3, Award 27 December 2016, prior to notifying its withdrawal; the claimants claimed €188m.

6 Case C-284/16, *Slovak Republic v Achmea BV*, ECLI:EU:C:2018:158 (6 March 2018). Specifically with reference to the ECT, Case C-741/19, *Republic of Moldova v Komstroy LLC*, ECLI:EU:C:2021:655 (2 September 2021).

7 The situation for the ECT is discussed below *passim*. For intra-EU BITs, see the Agreement for the Termination of Bilateral Investment Treaties between the Member States of the European Union [2020] OJ L169/1.

8 See eg Lea Di Salvatore, *Investor-State Disputes in the Fossil Fuel Industry* (IISD 2021), at 16.

9 See Kyla Tienhaara and Lorenzo Cotula, 'Raising the Cost of Climate Action? Investor-State Dispute Settlement and Compensation for Stranded Fossil Fuel Assets' (IIED 2020) and Kyra Bos and Joyeeta Gupta, 'Stranded Assets and Stranded Resources: Implications for Climate Change Mitigation and Global Sustainable Development' (2019) 56 *Energy Research and Social Science* 1, at 1-15. Leading cases include *Vattenfall et al v Germany*, ICSID Case No ARB/09/6, Award 11 March 2011 settled; *RWE et al v Netherlands*, ICSID Case No ARB/21/4, pending; and *Uniper et al v Netherlands*, ICSID Case No ARB/21/22, withdrawn. In *Rockhopper et al v Italy*, ICSID Case No ARB/17/14, Award 23 August 2022, Italy was reportedly ordered to pay €190m plus interest for costs incurred and potential lost profits.

10 Paris Agreement, signed 12 December 2015, in force 4 November 2016.

11 See, eg, Kyla Tienhaara, 'Regulatory Chill in a Warming World: The Threat to Climate Policy Posed by Investor-State Dispute Settlement' (2018) 7 *Transnational Environmental Law* 229, at 229-250.

12 The 25 topics proposed for modernisation, with comments from ECT contracting parties, are set out in Energy Charter Secretariat, Policy Options for Modernisation of the ECT, CCDEC 2019 08 STR (6 October 2019).

on the grounds that the ECT impairs 'a clean energy transition'¹³ and that governments cannot 'have their hands tied while facing the climate emergency'.¹⁴ The Intergovernmental Panel on Climate Change ('IPCC') also singled out the ECT's investor-state dispute settlement system as a mechanism 'designed to protect the interests of investors in energy projects from national policies that could lead their assets to be stranded'.¹⁵ It is important to note that the ECT is unusual among investment treaties, because it was concluded primarily to protect fossil fuel investments.¹⁶

In June 2022, a final 'Agreement in Principle'¹⁷ on a modernised ECT was reached between the contracting parties,¹⁸ but, due to the objections of some contracting parties,¹⁹ it was notably less ambitious on climate change than the EU and several EU Member States had hoped.²⁰ Two examples are emblematic. First, the EU had proposed an obligation stating that 'each Contracting Party shall ... effectively implement the UNFCCC and the Paris Agreement adopted thereunder, including its commitments with regard to its Nationally Determined Contribution'.²¹ This was watered down to a non-binding provision that merely 'reaffirm[ed] [each contracting party's] respective rights and obligations under multilateral environmental and labour agreements to which it is a party, such as ... the UNFCCC, the Paris Agreement'.²² The EU had also

¹³ End Fossil Protection, 'Open Letter from Climate Leaders and Scientists to Signatories of the Energy Charter Treaty (ECT)' (2020) available at <https://endfossilprotection.org/>.

¹⁴ Friends of the Earth Europe and Climate Action Network, 'Civil Society Organisations' Statement Against the Energy Charter Treaty (2021) available at <http://s2bnetwork.org/wp-content/uploads/2021/07/CSO-Statement-.pdf>.

¹⁵ IPCC, Sixth Assessment Report, 2022 Climate Change: Mitigation of Climate Change (April 2022), Ch 14, at 1505-1506.

¹⁶ This also explains the express reference to sovereignty over natural resources in Article 18 ECT.

¹⁷ Agreement in Principle on the Modernisation of the Energy Charter Treaty, Annex to Energy Charter Secretariat Doc CC 750 Rev, 24 June 2022; contained in EU Council, Working Document, Energy Charter Treaty Modernisation, Doc WK 9218/2022 INIT, 27 June 2022, available at https://www.bilaterals.org/IMG/pdf/reformed_ect_text.pdf.

¹⁸ The UK government welcomed the 'Agreement in Principle', stating that '[t]he modernised treaty ... will have a much stronger focus on promoting clean, affordable energy [and] protect the UK government's sovereign right to change its own energy systems to reach emissions reduction targets in line with the Paris Agreement'. See UK Department for Business, Energy & Industrial Strategy, 'UK Strengthens Protection for Taxpayers in Energy Treaty Negotiations' (Press Release, 24 June 2022) available at <https://www.gov.uk/government/news/uk-strengthens-protections-for-taxpayers-in-energy-treaty-negotiations>.

¹⁹ See eg Japan, which, in a document collecting comments from the contracting parties on the 25 topics considered for modernisation, consistently stated in relation to each topic that it 'believe[d] [it is] not necessary to amend the current ECT provisions'. See above at n 12, at 12.

²⁰ European Union, EU Text Proposal for the Modernisation of the Energy Charter Treaty (19 May 2020), available at https://trade.ec.europa.eu/doclib/docs/2020/may/tradoc_158754.pdf and European Union, Additional Submission to the Text Proposal for the Modernisation of the Energy Charter Treaty (February 2021), available at https://trade.ec.europa.eu/doclib/docs/2021/february/tradoc_159436.pdf. For an analysis, see Lukas Schaugg and Sarah Brewin, 'Uncertain Climate Impact and Several Open Questions: An Analysis of the Proposed Reform of the Energy Charter Treaty' (IISD 2022).

²¹ See 'EU Text Proposal', above at n 20, Part IV, New Article on Sustainable Development – Climate Change and Clean Energy Transition, at 11.

²² Article 19(2) of the Agreement in Principle, above at n 17.

proposed an amendment under which protection for new fossil fuel investments would have ceased on 15 August 2023, and protection for existing investments 10 years after the entry into force or provisional application of the amendment, and by 2040 at the latest.²³ The original proposal would have applied to all of the parties agreeing to the amendment, but in the final version this carveout would only have applied to contracting parties on an elective basis.²⁴ The results were greatly disappointing to many of the EU Member States – in the words of the Dutch Energy and Climate Minister, ‘[w]e do not see how the ECT has been sufficiently aligned with the Paris Agreement’.²⁵

An Energy Charter Conference was scheduled for 22 November 2022, at which the Agreement in Principle was to be submitted for approval. But in the months leading up to this date, events moved quickly. On 10 August 2022, Poland adopted a draft law on withdrawal from the Energy Charter Treaty.²⁶ On 5 October, the European Commission issued a Communication²⁷ proposing an *inter se* agreement²⁸ between the EU²⁹ and its Member States that would clarify that the entire ECT, including its substantive and dispute settlement provisions, and specifically its sunset clause, did not and will not apply ‘in intra-EU relations’ (but grandfathering awards concluded prior to 6 March 2018, the date of the CJEU’s *Achmea* judgment).³⁰ Between 12 October and 18 November, six more Member States announced that they were considering withdrawing from the ECT.³¹ Together with Italy, which had already withdrawn from the ECT in 2016, this represented over 70 per cent of the EU population. On 18 November, a

²³ European Union, Additional Submission, above at n 20, Article 1 Definitions.

²⁴ Agreement in Principle, above at n 17, Annex NI, Sections B and C. See also Johannes Tropper and Kilian Wagner, ‘The European Proposal for the Modernisation of the Energy Charter Treaty – A Model for Climate-Friendly Investments Treaties?’ (2022) 23 *Journal of World Investment and Trade* 813, at 828.

²⁵ Karl Mathiesen, ‘The Netherlands to Leave Embattled Energy Charter Treaty’ (Politico, 18 October 2022), available at <https://www.politico.eu/article/netherlands-leave-embattled-energy-charter-treaty-rob-jetten/>.

²⁶ Draft Law on the Termination of the Energy Charter Treaty (10 August 2022) available in Polish at <https://www.gov.pl/web/premier/projekt-ustawy-o-wypowiedzeniu-traktatu-karty-energetycznej-oraz-protokolu-karty-energetycznej-dotyczacego-efektywnosci-energetycznej-i-odnosnych-aspektow-ochrony-srodowiska-sporzadzonych-w-lizbonie-dnia-17-grudnia-1994-r>.

²⁷ European Commission, Communication on an Agreement between the Member States, the European Union, and the European Atomic Energy Community on the interpretation of the Energy Charter Treaty, COM(2022) 523 final (5 October 2022).

²⁸ Such an *inter se* agreement would reflect the removal of investor-state dispute settlement in the Agreement in Principle as between EU Member States, on which see below at n 30, but it would go further by also removing the application of the ECT’s substantive protections as between EU Member States. The treaty law aspects of this *inter se* agreement are discussed below in Section 3.

²⁹ The EU and Euratom are both ECT contracting parties but are referred to here as the ‘EU’.

³⁰ The EU proposed an amendment to the ECT that would clarify that the ECT’s provisions on investor-state and state-state dispute settlement ‘shall not apply among Contracting Parties that are members of the same Regional Economic Integration Organisation [ie the EU] in their mutual relations’. See draft Article 24(3) of the Agreement in Principle, above at n 17.

³¹ Spain said this on 12 October 2022, followed by the Netherlands on 19 October 2022, France on 21 October 2022, Slovenia on 10 November 2022, Germany on 11 November 2022 and Luxembourg on 18 November 2022. France, Germany and Poland formally notified their withdrawal in December 2022. See below at n 34.

European Commission proposal to adopt the modernised ECT was rejected by the EU Permanent Representatives Committee (Coreper), and the Commission promptly requested the removal of the topic from the agenda of the Energy Charter Conference scheduled for 22 November.³² On 24 November, the European Parliament adopted a resolution calling for the EU and the Member States' 'coordinated exit' from the ECT.³³ In December, France, Germany and Poland notified in writing their withdrawal from the ECT.³⁴ In February 2023, the European Commission issued a non-paper stating that the EU's withdrawal appeared to be 'unavoidable'.³⁵

The position of the UK is currently unknown, although there is reason to believe that it may follow suit. A recent study estimates that the UK would be the ECT contracting state benefiting the most from exiting the treaty, 'avoiding liability for \$5.3 billion worth of oil/gas projects on average',³⁶ and it is perhaps not coincidental that, during the modernisation process, the UK drafted a proposed carve out on protection of fossil fuel investments drawing on the EU's proposal, albeit with slightly different timelines for different energy materials.³⁷ There is also domestic pressure to withdraw. On 9 February 2023, a group of over 100 academics called upon the UK government to abandon the treaty, arguing that 'continued membership of the ECT will harm [the UK's] prospects of limiting global warming to 1.5°C because it will prolong the UK's dependence on fossil fuels and impede the transition to renewable energy'.³⁸

This call has been recently reiterated by Chris Skidmore, a former UK Energy Minister and current Chair of the UK's Net Zero Review, who published an opinion piece encouraging the UK to 'begin the process of co-leading an orderly withdrawal from the treaty' alongside 'like-minded partner countries like Germany, France and the

32 The vote on the modernised text has been postponed to April 2023.

33 European Parliament Resolution, Outcome of the Modernisation of the Energy Charter Treaty, 2022/2934(RSP) (24 November 2022), para 18. This was not the first occasion on which some EU Member States had considered the possibility of a 'coordinated withdrawal' from the treaty. In fact, a diplomatic cable dated 6 April 2022 reported that, during the negotiations on the modernisation of the ECT, Spain had already expressed concerns in relation to the ability to adapt the ECT to the Paris Agreement and Germany and Poland had expressly asked the Commission to start investigating options for a coordinated withdrawal. See Trade Policy Committee (Trade and Investment) Meeting on 6 April 2022, ITEM 4: Energy Charter Treaty, available at <https://www.euractiv.com/wp-content/uploads/sites/2/2022/05/ECT-Cable-reports-April-May-2022.pdf>.

34 France's withdrawal will take effect on 8 December 2023, Germany's withdrawal on 21 December 2023, and Poland's withdrawal on 29 December 2023. Energy Charter Secretariat, Written Notifications of Withdrawal from Energy Charter Treaty (22 March 2023), available at <https://www.energycharter.org/media/news/article/written-notifications-of-withdrawal-from-the-energy-charter-treaty/>.

35 Euractiv, 'LEAK: Exit from Energy Charter Treaty 'Unavoidable', EU Commission Says' (8 February 2023) available at <https://www.euractiv.com/section/energy/news/exit-from-energy-charter-treaty-unavoidable-eu-commission-says/>.

36 Kyla Tienhaara et al, 'Investor-State Dispute Settlement: Obstructing a Just Energy Transition' (2022) *Climate Policy*, at 10.

37 Agreement in Principle, above at n 17, Annex NI, Sections B(3) and C(2).

38 Letter to Energy Secretary Grant Shapps Urging UK Government to Exit Energy Charter Treaty (9 February 2023), available at <https://warwick.ac.uk/fac/soc/law/research/centres/chrp/governance/energycharter/>.

Netherlands'.³⁹ Besides arguing that 'the treaty is not suited for twenty-first century challenges' and that it 'is driving up the cost of the energy transition, while slowing it down', he warned that the modernisation of the treaty, previously supported by the UK,⁴⁰ is no longer a viable option.⁴¹ In his words, '[w]ithout support from the UK's traditional allies for the reform process continuing, it will be impossible for the country to push through changes on its own against the remaining, less climate ambitious members.'⁴² On 21 February 2023, 15 MPs from the UK's all-party parliamentary group for the environment endorsed this call for withdrawal from the ECT in a letter addressed to the Minister for Energy Security and Net Zero, on the grounds, *inter alia*, that the 'ECT makes the UK less attractive for clean energy investments ... [and] creates a policy landscape that is tilted against clean energy, and which exposes UK finances to huge litigation risk'.⁴³

2. THE ECT'S 'SUNSET' CLAUSE

One of the key consequences of withdrawing from the ECT⁴⁴ is that protection of existing investments (including fossil fuel investments) will not cease until twenty years after withdrawal becomes effective. Article 47(3) of the ECT – a 'sunset' clause – provides as follows:

The provisions of this Treaty shall continue to apply to Investments made in the Area of a Contracting Party by Investors of other Contracting Parties or in the Area of other Contracting Parties by Investors of that Contracting Party as of the date when that Contracting Party's withdrawal from the Treaty takes effect for a period of 20 years from such date.⁴⁵

There is nothing unusual about sunset clauses: no fewer than 97 per cent of investment agreements contain clauses of this type.⁴⁶ Obviously, from the perspective of the investor, such clauses are important, as they guarantee the long-term value of their investments, and they may even be an underlying condition for making those investments

³⁹ Chris Skidmore, 'Britain Must Leave the Energy Charter Treaty' (Financial Times, 5 March 2023), available at <https://www.ft.com/content/98d3d302-116b-4835-8762-fb9f5a71e855>.

⁴⁰ See above at n 18.

⁴¹ Chris Skidmore, 'Britain Must Leave the Energy Charter Treaty', above at n 39.

⁴² *Ibid.*

⁴³ Chris Skidmore, Energy Charter Treaty Debate, Westminster Hall (21 March 2023), available at <https://www.parliament.co.uk/mp/chris-skidmore/debate/2023-03-21/commons/westminster-hall/energy-charter-treaty>.

⁴⁴ Withdrawal is expressly contemplated under the ECT at Article 47. This is a standard provision on withdrawal providing for an initial minimum period before a party is allowed to withdraw from the treaty (five years from the date on which the ECT has entered into force for that party) and a one-year gap before the withdrawal becomes effective. Articles 47(1) and Article 47(2) ECT.

⁴⁵ Article 45(3)(b) ECT is an equivalent sunset clause for ECT signatories terminating their provisional application of the ECT.

⁴⁶ Kathryn Gordon and Joachim Pohl, 'Investment Treaties over Time – Treaty Practice and Interpretation in a Changing World', *OECD Working Papers on International Investment* (OECD Publishing 2015), at 19.

in the first place. However, in the particular context of climate change, sunset clauses represent a significant obstacle to contracting parties wishing to adopt climate change measures even after they withdraw from the treaty. Indeed, since notifying its withdrawal from the ECT at the end of 2014, Italy was sued five times in the year before withdrawal became effective,⁴⁷ and has been sued another seven times under the sunset clause.⁴⁸ Nine disputes relate to the same regulatory measure.

An important question, then, is whether there is any way for contracting parties withdrawing from the ECT to exclude the application of the sunset clause to existing investments. At present this is a live question for the EU and some of its Member States and it would also be a question for the UK, should the UK decide to leave the ECT.

In a non-paper published on 7 February 2023, the European Commission considered this issue from several perspectives.⁴⁹ Its starting point is specific to the EU, in that the non-paper asserts that the sunset clause does not (and never did) apply as between the EU Member States. Nonetheless, it acknowledges that 'arbitral tribunals have often taken a different view'.⁵⁰ Thus, the non-paper proposes to clarify the matter by means of an *inter se* agreement between the EU and its Member States.⁵¹ Such an agreement would essentially be a continuation (or resurrection) of the *inter se* agreement proposed by the Commission on 5 October 2022. The non-paper also however considers how the sunset clause could be avoided in relations with non-EU ECT contracting parties. It suggests that this could be done by concluding an *inter se* agreement with them.⁵²

This sets the scene for the issues addressed in this article, which are twofold. The first concerns the means by which ECT contracting parties may agree to exclude the operation of the sunset clause *inter se*. The second, which is admittedly more conjectural, is whether an ECT contracting party may be able to withdraw from the ECT, including its sunset clause, on the

⁴⁷ *Greentech Energy Systems A/S et al v Italy*, SCC Case No 095/2015, Award 23 December 2018, amount claimed €25m, awarded in favour of the investor for €12m, enforcement stayed until further notice; *Silver Ridge Power BV v Italy*, ICSID Case No ARB/15/37, Award 26 February 2021, awarded in favour of the state; *Belenergia SA v Italy*, ICSID Case No ARB/15/37, Award 28 August 2019, amount claimed €19m, awarded in favour of the state; *Eskosol SpA in liquidazione v Italy*, ICSID Case No ARB/15/50, Award 4 September 2020, amount claimed €197m, awarded in favour of the state; *CEF Energia BV v Italy*, SCC Case No 158/2015, Award 16 January 2019, amount claimed €10m, awarded in favour of the investor for €9m, enforcement stayed until further notice.

⁴⁸ *ESPF Beteiligungs GmbH et al v Italy*, ICSID Case No ARB/16/5, Award 14 September 2020, amount claimed €28m, awarded in favour of the investor for €16m; *VC Holding II Sarl et al v Italy*, ICSID Case No ARB/16/39, pending; *Sun Reserve Luxco Holdings Sarl et al v Italy*, SCC Case No 132/2016, Award 25 March 2020, amount claimed €40m, awarded in favour of the state; *Veolia Propreté SAS v Italy*, ICSID Case No ARB/18/20, pending; *Hamburg Commercial Bank v Italy*, ICSID Case No ARB/20/3, pending; *Encavis et al v Italy*, ICSID Case No ARB/20/39, pending. See also *Rockhopper et al v Italy*, above at n 9.

⁴⁹ European Commission, Non-Paper from the European Commission: Next Steps as Regards the EU, Euratom and Member States' Membership in the Energy Charter Treaty (Euractiv, 7 February 2023), available at https://www.euractiv.com/wp-content/uploads/sites/2/2023/02/Non-paper_ECT_nextsteps.pdf

⁵⁰ *Ibid.*, at 6.

⁵¹ *Ibid.*

⁵² *Ibid.* The European Commission acknowledged that this could be 'challenging given the current position of non-EU Contracting Parties on the ECT as a whole, and their possible business interests currently covered by the ECT', at 6.

basis of the doctrine of fundamental change of circumstance (*rebus sic stantibus*), which is codified in Article 62 of the Vienna Convention on the Law of Treaties ('Vienna Convention'). As is well known, while treaty parties have occasionally invoked *rebus sic stantibus*, it has almost never been successful. Malgosia Fitzmaurice even calls the plea of *rebus sic stantibus* a 'theoretical possibility'.⁵³ Nonetheless, this is essentially the popular argument for leaving the ECT. As the academics' open letter to the UK Government put it:

The ECT was created almost 30 years ago, in the context of the end of the Cold War and when there was less understanding of and consensus around the human drivers of climate change. The context has changed significantly: we have a very limited time to undertake a drastic reduction in greenhouse gas emissions.⁵⁴

It is therefore worth giving serious consideration to the question whether the strict legal conditions for *rebus sic stantibus* might indeed be satisfied in this case. To complete this analysis, this article considers the legal consequences of withdrawal from the ECT, pursuant to Article 70 of the Vienna Convention for the remaining treaty parties.

3. EXCLUDING THE APPLICATION OF THE ECT SUNSET CLAUSE *INTER SE*

3.1. Options

As noted, simply withdrawing from the ECT does not exclude the operation of its sunset clause; indeed, this is precisely the trigger for its application for twenty years after withdrawal becomes effective. This is equally true of a 'coordinated withdrawal' by several ECT contracting parties. What is required is an express agreement that excludes the operation of the sunset clause as between the parties to that agreement. Such an agreement, it should be said, would not be an agreement to terminate the ECT, even between the parties to the agreement. The termination of the ECT would require agreement by all ECT contracting parties, and this is not presently foreseeable.⁵⁵

This leaves two options. The first is an agreement to amend the ECT, which is the route that was chosen for the Agreement in Principle. This would also require a unanimous decision by all ECT contracting parties (and signatories) within the Energy Charter Conference,⁵⁶ even if the amendment only applies, relevantly, to a subset of ECT

⁵³ Malgosia Fitzmaurice, 'Exceptional Circumstances and Treaty Commitments' in Duncan Hollis (ed), *The Oxford Guide to Treaties* (OUP 2020), at 608.

⁵⁴ Letter to Energy Secretary Grant Shapps, above at n 38.

⁵⁵ There is no concept of termination of agreements *inter se*. Under Article 54(b) of the Vienna Convention, termination (as opposed to withdrawal, whether 'coordinated' or not) requires the agreement of all of the parties, and consultation with contracting states (Norway, in this case). See also Julian Berger, *International Investment Protection within Europe* (Routledge 2021), at 179. State practice on the termination of investment agreements including their sunset clauses by mutual agreement is therefore not relevant to the present discussion.

⁵⁶ Article 36(1)(a) ECT.

contracting parties.⁵⁷ This option would be effective, but is not further considered, as it raises political rather than legal issues, and at present it does not in any event seem that such an agreement would be likely. The remaining option, then, which is considered here, is a modification of the ECT by a subset of ECT contracting parties. As will be described below, this is the option that was advanced by the European Commission in its October 2022 Communication, and again in its February 2023 non-paper, with respect to both 'intra-EU relations' and non-EU contracting parties (eg an EU/MS-UK agreement). This is also the nature of an *inter se* agreement that only involves non-EU ECT contracting parties (eg a UK-Switzerland agreement). These three constellations can be treated together, even though there might be some differences in the results.

3.2. *Inter se* Modification of the ECT Under Article 41 of the Vienna Convention

Article 41 of the Vienna Convention permits the *inter se* modification of a multilateral agreement, and its substantive conditions, as set out in its first paragraph, may be considered to codify customary international law.⁵⁸ It states as follows:

Article 41 ('Agreements to modify multilateral treaties between certain of the parties only')

1. Two or more of the parties to a multilateral treaty may conclude an agreement to modify the treaty as between themselves alone if:
 - (a) the possibility of such a modification is provided for by the treaty; or
 - (b) the modification in question is not prohibited by the treaty and:
 - (i) does not affect the enjoyment by the other parties of their rights under the treaty or the performance of their obligations;
 - (ii) does not relate to a provision, derogation from which is incompatible with the effective execution of the object and purpose of the treaty as a whole.
2. Unless in a case falling under paragraph 1(a) the treaty otherwise provides, the parties in question shall notify the other parties of their intention to conclude the agreement and of the modification to the treaty for which it provides.

3.2.1. *Inter se interpretation agreements: do they exist?*

The first requirement is that the *inter se* agreement must modify the treaty. This is not the same as an agreement that interprets the treaty, which is a matter for Articles 31 and 32 of the Vienna Convention. In this respect, the *inter se* agreement proposed by the European Commission on 5 October 2022, and by implication also in its February

⁵⁷ An amendment comes into force when approved (by ratification) by three quarters of the ECT contracting parties, but only for those contracting parties that approve the amendment: Article 42(4) ECT.

⁵⁸ See, eg, Michael De Boeck, *EU Law and International Investment Arbitration* (Brill 2022), at 87-90.

2023 non-paper (the ‘EU interpretation agreement’), is rather odd. Its preamble contains the following two recitals:

RECALLING that the Member States, the European Union and EURATOM have informed the other Contracting Parties of the ECT of their intention to conclude this subsequent agreement on the interpretation of the ECT in conformity with the rules of customary international law as codified in Article 41(2) VCLT, and

CONSIDERING that Article 41(2) VCLT applies a fortiori to any subsequent agreement within the meaning of Article 31(3)(a) regarding interpretation of the ECT ...⁵⁹

The EU interpretation agreement therefore purports to be a hybrid that both ‘modifies’ and ‘interprets’ the ECT. There is a good reason for wanting this agreement to fall under Article 41, and not under Article 31, which is that Article 31(3)(a) only applies to subsequent agreements that are concluded by *all* of the parties to the original treaty, not merely *some* of their parties.⁶⁰ Article 31(3)(a) does not cover *inter se* interpretation agreements; but nor does it expressly prohibit them. The question then is whether such *inter se* agreements can be authorised rather by Article 41. The preamble to the EU interpretation agreement gives the argument in favour: if Article 41 allows for multilateral agreements to be modified *inter se*, it should a fortiori allow for them to be interpreted *inter se*.

This argument requires consideration of several issues. To begin, some words are necessary on the relationship between interpretation and modification. Interpretation is about establishing the meaning of a text, while modification is about changing the application of the (interpreted) text to a set of facts. Modification involves the formal addition of a new element to the text, or the formal deletion of an existing element in the text. This last condition indicates that there are overlaps. To say that the word ‘cat’ includes (or does not include) ‘panthers’ and that a rule concerning ‘cats’ applies (or does not apply) to ‘panthers’ is functionally the same. One could say that such a rule is a modification because it uses the particular technique of adding to or deleting from the text, even if the result is functionally the same. One could however also say that this is not a modification, but an interpretation in the guise of a modification, because the same result could easily be achieved by interpretation. This makes a difference, because if Article 41 applies to disguised interpretations, it will subvert the unanimity rule in Article 31(3)(a). There is also another difference between interpretation and application, which concerns their temporal effects. As a

⁵⁹ Preamble, Recitals 17 and 18, Subsequent Agreement on the Interpretation of the Energy Charter Treaty, Annex to the European Commission Communication, above at n 27.

⁶⁰ ILC, Draft Conclusions on Subsequent Agreements and Subsequent Practice in Relation to the Interpretation of Treaties, Commentary to Draft Conclusion 4, Paragraph 1, in Report of the Commission to the General Assembly on the Work of its Seventieth Session, UN Doc A/73/10, para 51, contained in *Yearbook of the International Law Commission 2018*, Vol II, Part Two, UN Doc A/CN.4/SER.A/2018/Add.1 (Part 2), at 33. See also *RENERGY Sàrl v Spain*, ICSID Case No ARB/14/18, Award 06 May 2022, para 371. For the contrary view, though not reasoned, see *Green Power Partners K/S et al v Spain*, SCC Case N V2016/135, Award 16 June 2022, para 370.

matter of legal fiction, because interpretation purports to declare on what the parties always intended, an interpretation operates *ex tunc*, while modification operates *ex nunc*. This is important in particular for decisions made on the basis of what is later discovered to have been an erroneous interpretation.

Based on these considerations, it is not at all clear that Article 41 permits the EU interpretation agreement. Article 41 may apply to disguised interpretation agreements, but this agreement openly purports to be an interpretation. It restates at several points that 'for greater certainty' the parties 'confirm' that the interpretations set out in the agreement apply and always applied *ex tunc*. And while it does create an exception for arbitration awards completed before 6 March 2018, this merely proves the point. Thus, even if Article 41 might cover modifications that are really disguised interpretations, due to the difficulty in distinguishing between the two, this does not mean that it also covers agreements that do not even purport to be modification agreements. To allow for that would be openly contrary to the unanimity rule in Article 31(3)(a). It might finally be noted that this has no effect on the CJEU's interpretation of the ECT, shared now by one investment tribunal,⁶¹ according to which the ECT does not apply to 'intra-EU relations' (and never did); it just means that is not possible to reiterate such a conclusion in treaty form by only a subset of ECT contracting parties.

3.2.2. *Inter se modification agreements*

A different problem arises for *inter se* agreements that actually do modify the law (which, according to several investment tribunals, includes the EU Treaties). For these agreements, it is necessary to consider whether the conditions in Article 41(1)(b) are met.

3.2.2.1. *Inter se agreement must not be prohibited.* The first of these conditions is that an *inter se* agreement must not be prohibited by the multilateral treaty. In this context, it is necessary to consider the implications of Article 16(2) of the ECT, which states that:

Where two or more Contracting Parties have entered into ... a subsequent international agreement, whose terms ... concern the subject matter of Part III or V of this Treaty, ... (2) nothing in such terms of the other agreement shall be construed to derogate from any provision of Part III or V of this Treaty or from any right to dispute resolution with respect thereto under this Treaty, where any such provision is more favourable to the Investor or Investment.

There are two different ways in which Article 16(2) can require treaty interpreters to 'construe' a subsequent agreement so as to ensure that it does not derogate from an ECT provision granting more favourable treatment to investors or investments. First, it might be possible to interpret the rules in the subsequent agreement in such a

⁶¹ *Green Power Partners, ibid*, para 469.

manner ('construe' meaning 'interpret').⁶² But this might not be possible, for example, where there is a 'conflict' between the two agreements. This is what *Vattenfall v Germany* concluded when it said that Article 16(2) was a 'conflict rule' that prioritises the ECT over less favourable subsequent agreements (the Treaty on the Functioning of the European Union, 'TFEU', in that case).⁶³ In such cases, Article 16(2) requires these tribunals to *disapply* these agreements, to the extent that they are less favourable ('construe' in the more potent sense of 'understand').⁶⁴ But it does not prohibit them. Article 16(2) does not therefore have the effect specified in Article 41(1)(b) of expressly prohibiting subsequent *inter se* agreements, even where they accord less favourable treatment than the ECT. And nor does any other provision in the ECT.⁶⁵

Importantly, the opening clause of Article 41(1)(b) does not cover *implicit* prohibitions. This is not, however, contrary to what is sometimes said,⁶⁶ because this is evidenced in the drafting history, within the International Law Commission, of what became Article 41(1)(b). It is true that the members of the International Law Commission agreed to reject the phrase 'expressly or impliedly', which might be thought evidence that they wanted to exclude the application of Article 41 to implicit prohibitions. However, a closer look at the record of the relevant meeting reveals that the members of the Commission had quite opposite reasons for wanting to delete the reference to implicit prohibitions. Some members (the majority) were of the view that the word 'prohibited' had to be limited to express prohibitions, because implied prohibitions were provided for in the two subparagraphs (i) and (ii), but

⁶² In *SoIEs Badajoz GmbH v Spain*, ICSID Case No ARB/15/38, Decision on Annulment 16 March 2022, para 122, Spain unsuccessfully argued before the Annulment Committee that '[a]rticle 16 of the ECT is not a conflict resolution rule but an interpretative precept'.

⁶³ *Vattenfall AB et al v Germany*, ICSID Case No ARB/12/12, Decision on the *Achmea* Issue, 31 August 2018, paras 222-229. This reasoning has been followed by subsequent awards. Specifically concerning the Treaty on the Functioning of the EU (TFEU) as a subsequent *inter se* agreement, some tribunals have found that the TFEU does not concern the same subject matter (eg, *ESPF*, above at n 48, para 308).

⁶⁴ We are grateful to Federico Ortino for suggesting this alternative meaning for 'construe'. An analogy can be drawn to Article XX of GATT 1994, which states that 'nothing in this Agreement shall be construed to prevent the adoption or enforcement ... of measures: ... necessary to protect public morals ...'. This language has always been interpreted as meaning that a measure that is described in Article XX is permitted, notwithstanding the fact that it might also violate a GATT 1994 obligation. Functionally, this means that Article XX empowers WTO tribunals to disapply otherwise applicable obligations when its specific conditions are met; it does not however require them to nullify those obligations (nor would this be possible).

⁶⁵ See Energy Charter Secretariat, Letter to European Parliament in Response to Resolution 2022/2934, SG/23/E/0047 (13 February 2023), available at https://www.energycharter.org/fileadmin/DocumentsMedia/News/0047-SG-13022023-EP_President.pdf, in which the Energy Charter Secretariat gave several reasons why the EU interpretation agreement would not be permitted by Article 41(1) VCLT. One was that such an *inter se* agreement 'could be considered as a reservation (which is not allowed by Article 46 ECT)'. This is wrong, because a reservation must be made, at the latest, at the time of ratifying, accepting, approving or acceding to a treaty (Article 2(1)(d) VCLT), and a subsequent *inter se* agreement could therefore not be a reservation, prohibited or otherwise. It also said that reliance on Article 41 was not possible because the EU is not a party to the Vienna Convention. This overlooks the customary international law status of Article 41(1) VCLT.

⁶⁶ See, eg, Michael De Boeck, *EU Law and International Investment Arbitration*, above at n 56, at 89.

others (a small minority) thought that the phrase could be deleted because it was superfluous.⁶⁷ That said, the arguments of the majority are persuasive, and generally accepted by writers on the topic.⁶⁸

3.2.2.2. *Inter se agreement must not affect rights of other treaty parties.* On this basis, the next question is whether, as per Article 41(1)(b)(i), an *inter se* agreement excluding the application of the ECT or just its sunset clause would 'affect the enjoyment by the other parties of their rights under the [ECT] or the performance of their obligations'. It is difficult to see that this would be the case.⁶⁹ The investors and investments of other ECT contracting parties remain unaffected. This means that, for example, Japanese investors and investments in an EU member state would still be protected. More difficult is the next condition, set out in Article 41(1)(b)(ii), which prohibits *inter se* agreements that 'relate to a provision, derogation from which would be contrary to the execution of the object and purpose of the [ECT] as a whole'. This requires a consideration of the object and purpose of the ECT.

3.2.2.3. *Inter se agreement must not undermine object and purpose of the treaty.* The starting point in identifying these is Article 2, entitled 'Purpose of the Treaty', according to which '[t]his Treaty establishes a legal framework in order to promote long-term cooperation in the energy field, based on complementarities and mutual benefits, in accordance with the objectives and principles of the [European Energy] Charter'. That Charter states, *inter alia*, that '[the signatories] undertake to pursue the objectives of creating a broader European energy market and enhancing the efficient functioning of the global energy market by joint or coordinated action under the Charter in the following fields: ... promotion and protection of investments'.⁷⁰ Later, the signatories also 'affirm that it is important for the signatory States to negotiate and ratify legally binding agreements on promotion and protection of investments which ensure a high level of legal security'.⁷¹ These references have occasionally been cited as context when interpreting ECT provisions, mainly to preclude a retrospective application of the denial of benefits carve out in Article 17(1) of the ECT,⁷² but so far no tribunal has concluded

⁶⁷ ILC, Summary Records of the Sixteenth Session (765th meeting), in *Yearbook of the International Law Commission 1964*, Vol I, UN Doc A/CN.4/SER.A/1964, at 271-274. Those speaking in favour of the first interpretation were Verdross (para 81), Rosenne (para 82), Lachs (para 93). Those against were Yasseen (para 86), and Bartoš (para 99). Others were indeterminate.

⁶⁸ De Boeck, above at n 58, at 89, with further references; Anne Rigaux et al, 'Article 41' in Olivier Corten and Pierre Klein (eds), *The Vienna Conventions on the Law of Treaties: A Commentary* (OUP 2011) 986, at 996.

⁶⁹ See also *Greentech*, above at n 45, para 354.

⁷⁰ European Energy Charter, Title I, preamble.

⁷¹ European Energy Charter, Title II, para 4.

⁷² See Hobér, above at n 2, at 143.

from these provisions alone that the object and purpose of the ECT includes the protection of investors and investments, including the investor's right to enforce these protections by means of investor-state dispute settlement.⁷³

This is not however determinative, because the object and purpose of a treaty can be identified not only in its stated objectives but also in its operative provisions,⁷⁴ including, in the case of the ECT, those relating to enforceable investor protection. But here one needs to exercise care not to treat every derogation from a provision in a multilateral treaty as contrary to its object and purpose. There must be some level of abstractable principle. As to this, the argument has been made that, just as the treaty rights of other treaty parties are protected by Article 41(1)(b)(i), it makes sense to protect the treaty rights of individuals benefitting from the treaty under Article 41(1)(b)(ii).⁷⁵ That said, it might be questioned whether this means that there is no room for reducing any investor protections without contradicting the object and purpose of the agreement. In this respect, it is relevant that the sunset clause did not feature in the draft ECT text circulated in 1991,⁷⁶ and was only included in a later draft upon Japan's express request.⁷⁷ The sunset clause does not therefore appear to have been fundamental to the ECT's object and purpose, except perhaps to Japan. Against this, however, it might be suggested that, by virtue of both the most favoured nation obligation in Article 10(1) and Article 16(2), the ECT enshrines an abstractable principle that investors and investments are to be accorded the most favourable treatment available, even when that treatment is contained in another agreement entirely. If this is accepted, then an *inter se* agreement derogating from the sunset clause, and hence the ECT's extended substantive and dispute settlement protections,⁷⁸ would be incompatible with the effective execution of the object and purpose of the ECT as a whole.

⁷³ *Green Power*, above at n 58, at paras 402–403, was careful to say that these objectives were 'too unspecific' to conclude that the object and purpose of the ECT would be undermined by the non-application of investor-state dispute settlement to intra-EU investment disputes. This does not necessarily mean that outside of this context an *inter se* agreement limiting investor state protections would not contradict the ECT's object and purpose. The tribunal specifically noted a reference in the preamble of the European Energy Charter to the completion of the EU's internal energy market, even if its reasoning was based on a lack of overall specificity rather than the existence of a countervailing objective.

⁷⁴ Isabelle Buffard and Karl Zemanek, 'The "Object and Purpose" of a Treaty: An Enigma?' (1998) 3 *Austrian Review of International and European Law* 311, at 343.

⁷⁵ Maja Smrkolj, 'The Use of the "Disconnection Clause" in International Treaties' (2008), at 10 available at <https://ssrn.com/abstract=1133002>; also, citing Smrkolj, Christian Tietje, 'The Applicability of the Energy Charter Treaty in ICSID Arbitration of EU Nationals vs EU Member States' in Christian Tietje and Gerhard Kraft (eds), *Beiträge zum Transnationalen Wirtschaftsrecht*, No 78, at 12.

⁷⁶ European Energy Charter, Draft Treaty, Basic Protocol to the European Energy Charter (20 August 1991), Article 42.

⁷⁷ European Energy Charter, Basic Agreement, Doc 4/92 BA 6 (21 January 1992), Art 43, para 3 and Note, at 73.

⁷⁸ On investor state dispute settlement as an essential element of the ECT, see *Silver Ridge*, above at n 45, para 229.

3.3. Conclusion

The following summary conclusions can be reached about an *inter se* agreement purporting to exclude the application of the sunset clause in Article 47(3) as between the parties to that agreement. First, an *inter se* agreement that merely interprets the ECT is unlikely to amount to a modification of the ECT within the meaning of Article 41 of the Vienna Convention. Such an interpretation agreement should rather be adopted by all of the ECT contracting parties as required by Article 31(3)(a) of the Vienna Convention. Second, a potential *inter se* agreement that does modify the ECT in this way would neither be permitted nor prohibited by the ECT, but while it would not affect the rights of third parties contrary to Article 41(1)(b)(i) of the Vienna Convention, it would be likely to derogate from provisions – namely the sunset clause and other substantive provisions – that would result in it being incompatible with the effective execution of the object and purpose of the treaty as a whole contrary to Article 41(1)(b)(ii).

4. WITHDRAWAL FROM THE ECT DUE TO FUNDAMENTAL CHANGE OF CIRCUMSTANCE

4.1. Introduction

If the foregoing analysis is correct, then it is not possible for ECT contracting parties to exclude the application of the sunset clause by an *inter se* modifying agreement.⁷⁹ In any case, even if this were possible, the application of the sunset clause would remain unaffected with respect to existing investors and investments of non-participating ECT contracting parties.

The European Commission's non-paper does not consider whether there is any way an ECT contracting party can withdraw from the ECT in a way that excludes the application of the sunset clause to such non-participating contracting parties other than via an express agreement with them, but one possibility might be to withdraw from the ECT, including its sunset clause, on the basis that there has been a fundamental change of circumstance, in accordance with the doctrine of *rebus sic stantibus* codified in Article 62 of the Vienna Convention. The argument would be that the need to drastically and urgently abandon fossil fuels in order to combat the worst effects of climate change represents a fundamental change of circumstance that was not foreseen at the time the ECT was concluded in 1994 and that now makes it

⁷⁹ The Energy Charter Secretariat, above at n 63, is wrong to doubt that a *former* contracting party (Italy) is not able to conclude an *inter se* agreement modifying its obligations under the ECT, to which it is no longer a party. It is true that Article 41 VCLT does not apply. However, the matter is regulated by Article 30(4)(b) VCLT, according to which, as between a party to both the ECT and the *inter se* agreement (eg Germany) and a party to only the *inter se* agreement (Italy), the *inter se* agreement prevails, provided that the *inter se* agreement relates to the subject matter of the ECT.

unduly burdensome to continue to protect fossil fuel investors and investments for twenty years after withdrawal from the ECT.

As noted, this is a difficult argument to make. The invocation of this doctrine has seldom been successful,⁸⁰ and the *rebus sic stantibus* is, for historical reasons, treated with great scepticism by international lawyers.⁸¹ Nonetheless, the criticisms of the ECT, and the recent notifications of withdrawal from the ECT, are implicitly based on a claim that circumstances have indeed changed, and radically so. It is therefore worth taking seriously the question whether the strict conditions that attach to the doctrine under the Vienna Convention can be said to have been met in this case.⁸²

Article 62(1) of the Vienna Convention reads:

A fundamental change of circumstances which has occurred with regard to those existing at the time of the conclusion of a treaty, and which was not foreseen by the parties, may not be invoked as a ground for terminating or withdrawing from the treaty unless:

- (a) the existence of those circumstances constituted an essential basis of the consent of the parties to be bound by the treaty; and
- (b) the effect of the change is radically to transform the extent of obligations still to be performed under the treaty.⁸³

This can be distilled into the following cumulative conditions: there must be (a) a circumstance that was an essential basis for the conclusion of the treaty, that (b) has now fundamentally changed in a way that (c) was not foreseen at the time of conclusion of the treaty, and (d) the change in circumstance must now make it unduly burdensome for a party to comply with its treaty obligations. In the present case, there is an additional complication, which is that the relevant ‘circumstance’ at issue itself involved a forecast about the future which then turned out to be incorrect. These conditions will now be discussed in turn, first in terms of what was known and foreseen in 1994, when the ECT was concluded, and what is known now; and, secondly in terms of what these different states of knowledge meant for the conclusion of the ECT and for the continuing performance of its obligations.

⁸⁰ Malgosia Fitzmaurice and Olufemi Elias, *Contemporary Issues in the Law of Treaties* (Eleven International Publishing 2005), at 178.

⁸¹ Robert Kolb, ‘The Construction of the *Rebus Sic Stantibus* Clause in International Law: Exception, Rule, or Remote Spectator?’ in Lorand Bartels and Federica Paddeu (eds), *Exceptions in International Law* (OUP 2020).

⁸² The Energy Charter Secretariat itself published a news item, ‘Sunset Clause (Article 47 of the ECT) in relation to Article 62 of the Vienna Convention on the Law of Treaties (VCLT)’, (Energy Charter News, 3 November 2022), available at <https://www.energycharter.org/media/news/article/sunset-clause-article-47-of-the-ect-in-relation-to-article-62-of-the-vienna-convention-on-the-law/> reminding ECT contracting parties of the exceptional character of a potential invocation of a fundamental change of circumstance (Article 62 of the Vienna Convention) as a ground for withdrawing from or terminating the treaty and especially referencing the sunset clause at Article 47(3) ECT.

⁸³ See eg György Haraszti, *Treaties and the Fundamental Change of Circumstances* (1975) 46-III Collected Courses of the Hague Academy of International Law, at 42; Fitzmaurice and Elias, above at n 78, at 175.

4.2. Changed Circumstance

It goes without saying that climate change was a well-known risk in 1994. The IPCC issued its first report in 1990,⁸⁴ which was the basis for the 1992 UN Framework Convention on Climate Change ('UNFCCC'),⁸⁵ and followed this up with a second report in 1992.⁸⁶ What was uncertain, however, was the extent of the risk, and the measures that would need to be adopted in order to combat this risk.

Forecasts of the extent of future climate change can be seen in the 1990 IPCC report, which offered a range of scenarios for greenhouse gas emissions in 2025, depending on government policy measures that might be undertaken.⁸⁷ The figures for the different scenarios, in CO₂ ppm, were as follows: Alternative Accelerated Policies (381 ppm), Accelerated Policies (393 ppm), Control Policies (398 ppm), 2060 Low Emissions (398 ppm), and 2030 High Emissions (437 ppm). This last scenario was based on 'a world in which few or no steps are taken to reduce emissions in response to concerns about greenhouse warming'.⁸⁸

This forecast turned out to be unduly optimistic, because even though significant steps were taken to reduce emissions, including steps beyond those foreseen in the 1992 UNFCCC, the current concentration, in 2023, is 419 ppm,⁸⁹ and will almost certainly reach 424 ppm in 2025. Emissions are also 54% higher than in 1990, and in particular fossil fuel emissions are 65% higher than in 1990.⁹⁰

But along with an underestimate of the degree of the problem, the IPCC, and the 1992 UNFCCC, underestimated what needed to be done. In particular, even though the IPCC already identified energy and in particular fossil fuels as the single largest anthropogenic source of radiative forcing,⁹¹ it thought that climate change could be effectively managed by several options, of which a reduction in the use of fossil fuels was only one. The IPCC's 1990 report, in the section on 'energy and industry', said the following (under the heading 'response strategies'):

Climate change offers an unprecedented challenge to energy policy development. Many uncertainties remain about both the impacts of climate change itself and our response to it. It is very important that countries begin the task of developing flexible and phased

⁸⁴ IPCC, First Assessment Report, *Climate Change: The IPCC Response Strategies* (October 1990).

⁸⁵ United Nations Framework Convention on Climate Change, signed 9 May 1992, in force 21 March 1994.

⁸⁶ IPCC, *Climate Change: The IPCC 1990 and 1992 Assessments* (June 1992).

⁸⁷ IPCC First Assessment Report, above at n 82, at 13-15.

⁸⁸ *Ibid.*, 15.

⁸⁹ NASA, *Vital Signs – Carbon Dioxide* (February 2023), available at <https://climate.nasa.gov/vital-signs/carbon-dioxide/>.

⁹⁰ The 2022 IPCC Sixth Assessment Report, above at n 14, based on 2019 figures, found that global net anthropogenic GHG emissions were 59 (±6.6) GtCO₂-eq (at 57-59), which is 54% higher than in 1990 (at 228). The figure for fossil fuel combustion and industrial processes (CO₂-FFI) is even more dramatic, at 38 (± 3) GtCO₂-eq (at 619), which is 65% higher than in 1990 (at 230). It is also notable that fossil fuel combustion and industrial processes now account for almost two-thirds of total emissions (at 619).

⁹¹ IPCC First Assessment Report, above at n 82, at xxix.

response strategies. The underlying theme of any strategy must be economic efficiency – achieving the maximum benefit at minimum cost. Strategies that focus only on one group of emission sources, one type of abatement option, or one particular greenhouse gas will not achieve this.⁹²

The report also suggested several ways to reduce greenhouse gas emissions from energy systems. It identified ‘the most relevant categories of options’ as follows:

- efficiency improvements and conservation in energy supply, conversion, and end use;
- fuel substitution by energy sources that have lower or no greenhouse gas emissions;
- reduction of greenhouse gas emissions by removal, recirculation, or fixation; and
- management and behavioural changes (e.g. increased work in homes through information technology) and structural changes (e.g. modal shift in transport).⁹³

It is against this background that one can understand the ‘circumstance’ that underpinned the ECT, which was that promoting the production, trade, and use of fossil fuels did not undermine the goals of the UNFCCC. On the contrary, as can be seen from the reference to the UNFCCC in the ECT’s preamble, it was thought that the ECT would contribute to these goals by promoting more efficient techniques in the hydrocarbon life cycle.

This circumstance has now radically changed. The 2015 Paris Agreement has set an objective of keeping temperatures to well below 2°C (and ideally 1.5°C) above pre-industrial levels, and it is now clear that the only way to do this is to urgently and drastically abandon the use of fossil fuels, ideally achieving net zero emissions by the early 2050s. The 2022 IPCC Report explains that:

If the annual CO₂ emissions between 2020–2030 stayed, on average, at the same level as 2019, the resulting cumulative emissions would almost exhaust the remaining carbon budget for 1.5°C (50%), and deplete more than a third of the remaining carbon budget for 2°C (67%). Estimates of future CO₂ emissions from existing fossil fuel infrastructures without additional abatement already exceed the remaining carbon budget for limiting warming to 1.5°C (50%) (*high confidence*). Projected cumulative future CO₂ emissions over the lifetime of existing and planned fossil fuel infrastructure, if historical operating patterns are maintained and without additional abatement, are approximately equal to the remaining carbon budget for limiting warming to 2°C with a likelihood of 83% (*high confidence*).⁹⁴

Further, the 2022 IPCC Report explains that this will result in ‘stranded assets’, which are in-ground fossil resources and human-made capital assets (eg power plants and cars) which ‘suffer from unanticipated or premature write-offs, downward revaluations

⁹² *Ibid*, at 68–9.

⁹³ *Ibid*, at p xxxv.

⁹⁴ IPCC, Synthesis Report of the IPCC Sixth Assessment Report, Summary for Policymakers (March 2023), at 21.

or conversion to liabilities.⁹⁵ These stranded assets are significant both in terms of quantity and value. Welsby et al, estimate the proportion of current reserves that will need to remain in the ground:

Unextractable oil, fossil methane gas and coal reserves are estimated as the percentage of the 2018 reserve base that is not extracted to achieve a 50% probability of keeping the global temperature increase to 1.5°C. We estimate this to be 58% for oil, 56% for fossil methane gas and 89% for coal in 2050. This means that very high shares of reserves considered economic today would not be extracted under a global 1.5°C target.⁹⁶

In terms of value, the IPCC quantifies the consequences for stranded assets, stating that '[p]ractically all long-lived technologies and investments that cannot be adapted to low-carbon and zero-emission modes could face stranding under climate policy – depending on their current age and expected lifetimes.'⁹⁷ It surveys various studies, estimating the value of stranded assets to be in USD trillions.⁹⁸

4.3. The 'Unforeseen' Nature of the Change

In international law, and for reasons of treaty stability, changed circumstances *per se* do not amount to a *rebus sic stantibus*. That change – in this case, the replacement of the assumption that fossil fuels could be relied upon for the foreseeable future with a recognition that fossil fuels need to be phased out as soon as possible, even resulting in stranded fossil fuel assets – must also have been 'unforeseen' at the time the treaty was concluded.

This raises the question of what it means for an event to be 'unforeseen'. The leading case on this issue is *Gabčíkovo-Nagymaros*, in which the International Court of Justice ('ICJ') rejected Hungary's claim to be entitled to terminate a treaty to construct a dam with Slovakia on the grounds that there had been an unforeseen fundamental change of circumstance concerning certain environmental issues. The ICJ said, famously, that it 'does not consider that new developments in the state of environmental knowledge and of environmental law can be said to have been completely unforeseen'.⁹⁹

But this is actually quite a different test. For an event to be *unforeseen* implies a degree of probability somewhere between 0 and 1; for an event to be *completely unforeseen* implies a probability of 0. To put this into relief, the ICJ's test requires that the

⁹⁵ IPCC Sixth Assessment Report, above at n 88, Box TS.8, at 90.

⁹⁶ Dan Welsby et al, 'Unextractable fossil fuels in a 1.5°C world' (2021) 597 *Nature* 230, at 231. They add that '[t]he bleak picture painted by our scenarios for the global fossil fuel industry is very probably an underestimate of what is required and, as a result, production would need to be curtailed even faster. This is because our scenarios use a carbon budget associated with a 50% probability of limiting warming to 1.5°C, which does not consider uncertainties around, for example, Earth system feedbacks; therefore, to ensure more certainty of stabilizing at this temperature, more carbon needs to stay in the ground.' *Ibid*, at 234.

⁹⁷ IPCC Sixth Assessment Report, above at n 88, Box TS.8, at 90.

⁹⁸ *ibid*, at 1582.

⁹⁹ *Gabčíkovo-Nagymaros Project (Hungary/Slovakia)*, Judgment, ICJ Reports 1997, p 7, para 104.

envisaged probability of an event occurring is zero, which is less than the FBI accords to the probability that the world will be visited by flying saucers,¹⁰⁰ or that NASA accords to the likelihood of extra-terrestrial life.¹⁰¹

Since *Gabčíkovo-Nagymaros*, very few authors even consider that ‘unforeseen’ might still involve questions of probability. One exception is Christina Binder, who concurs with an earlier author, Hermann Pott, that the test should be what is ‘possible but improbable’.¹⁰² But this was not so uncommon prior to *Gabčíkovo-Nagymaros*. For example, Gerald Fitzmaurice’s Second Report on the Law of Treaties contains the following draft text for what would become Article 62:

The change must not be one that was foreseen by the parties, or be such as they might, by the exercise of reasonable foresight, have anticipated. It must not, therefore, either expressly or by necessary implication, be a change which is provided for in the treaty, or in any other relevant agreement between the parties, for in that case the treaty or agreement would prevail, and the principle *rebus* would, as such, be inapplicable.¹⁰³

This is instructive on two counts. First, Fitzmaurice treats as ‘foreseen’ any event that was regulated in the treaty at issue. In this respect, the term ‘foreseen’ is not about probability, but about ensuring that the *rebus sic stantibus* rule in the Vienna Convention remains residual. But this drafting also contains an objective probability test, which for Fitzmaurice was what *might* have been foreseen by the exercise of reasonable foresight. Even if Fitzmaurice’s test of ‘reasonableness’ is too generous, as might well be thought today, what is important is that he acknowledges that *rebus sic stantibus* should not be reserved for events that are completely unforeseen, which renders the test of virtually no practical use at all.

Based on the foregoing analysis, it is possible to draw some tentative conclusions about whether the ‘change’ in circumstance at the time of the conclusion of the 1994 ECT was ‘unforeseen’. It is reasonable to assume that governments at the time would have thought that if the indicated measures were adopted – including natural and man-made abatement measures such as enhancing carbon sinks and developing efficient carbon capture and sequestration technologies – they could have continued to rely on fossil fuels for the foreseeable future; this is because results, as projected, would be somewhere near the better-case scenarios. In fact, however, even though those measures were adopted, as well as later, more effective measures, the results are much closer to the very worst – case scenario.

¹⁰⁰ Williams et al, ‘US Intelligence Community Releases Long-Awaited UFO Report’ (CNN Politics, 25 June 2021), available at <https://edition.cnn.com/2021/06/25/politics/ufo-report-pentagon-odni/index.html>.

¹⁰¹ NASA, Search for Extraterrestrial Intelligence (SETI) Institute, ‘About’, available at <https://www.seti.org/about>.

¹⁰² Christina Binder, *Die Grenzen der Vertragstreue im Völkerrecht* (Springer 2013), at 140, cites and concurs with Hermann Pott, *Clausula Rebus Sic Stantibus* (Peter Lang 1992), at 94, though without referring in this context to *Gabčíkovo-Nagymaros*, which had by then been decided.

¹⁰³ ILC, Second Report on the Law of Treaties by Gerald Fitzmaurice, UN Doc A/CN.4/107, contained in *Yearbook of the International Law Commission 1957*, Vol II, UN Doc A/CN.4/SER.A/1957/Add.1, at 33.

From this it follows that, while the ECT contracting parties could (and presumably did) foresee that reliance on fossil fuels would have progressively decreased, they did not (and arguably could not) foresee that such a reduction would have been so urgent and drastic in 2023 as to necessitate 'turning fossil fuel reserves into stranded resources and existing investments into stranded assets'.¹⁰⁴ Put differently, had they foreseen this in 1994, and considering that fossil fuels investments are inherently long term or other they are not profitable, they would, with a high degree of probability, foregone negotiating such a treaty and perhaps negotiated a different treaty (including perhaps a treaty without a sunset clause). And that should be sufficient to demonstrate that the current circumstance, compared to the assumptions current at the time, was an 'unforeseen' change to an essential circumstance within the meaning of Article 62 of the Vienna Convention.

4.4. Consequences for the ECT

Not every unforeseen change in circumstance counts. Rather, what needs to be shown is both that the original circumstance was an essential basis for the treaty, and that the changed circumstance has radically transformed the extent of obligations still to be performed under the treaty. As to the first point, the history of the ECT, as well as its core purpose, described above, show that the very *raison d'être* of the treaty was to promote production and trade in fossil fuels, albeit in as efficient a manner as possible. This purpose, in turn, was based on the assumption that such activity could continue for the foreseeable future, and, based on the sunset clause, certainly for at least twenty years after any contracting party might leave the ECT. That assumption is quite clearly no longer valid, both in terms of the measures that now need urgently to be adopted, and the costs of performing the treaty in order to be able to adopt those measures. Those costs have now been calculated by Tienhaara et al in terms of potential claims under the ECT as potentially amounting to \$2.8bn.¹⁰⁵

The scale and value of these claims, it is suggested, arguably 'radically ... transform the extent of obligations still to be performed under the treaty' within the meaning of Article 62 of the Vienna Convention¹⁰⁶ or, to use the language of the ICJ in *Fisheries Jurisdiction*, have 'increased the burden of the obligations to be executed to the extent of rendering the performance something essentially different from that originally undertaken'.¹⁰⁷ Indeed, the significance of the effect of the change in circumstances can be demonstrated by reference to the fact that it is the prime reason that several ECT contracting states are now withdrawing or considering withdrawing from the ECT.

¹⁰⁴ Kyla Bos and Joyeeta Gupta, above at n 9.

¹⁰⁵ Kyla Tienhaara et al, 'Investor-State Dispute Settlement: Obstructing a Just Energy Transition', above at n 35, at 9.

¹⁰⁶ This does not, of course, mean that it is impossible for the ECT contracting parties to perform their obligations. That would be a question to be treated under Article 61 VCLT, which permits the termination of a treaty in cases of supervening impossibility of performance.

¹⁰⁷ *Fisheries Jurisdiction Case (UK v Iceland)*, Jurisdiction of the Court, Judgment, ICJ Reports 1973, p 3, para 43.

4.5. Conclusion on Fundamental Change of Circumstance

The ECT was concluded on the basis of an assumption that has fundamentally changed, namely, that fossil fuels could continue to be used for the foreseeable future. This turned out not to be true. Not only were the measures indicated at the time less effective than anticipated, but those measures that were adopted have not been sufficient to ward off a serious climate emergency. The result is that ECT contracting parties, like other states, now need to adopt urgent and drastic measures, focused on the stranding of fossil fuel assets, that risk being extremely costly, rendering performance of their ECT investment obligations radically different from what they expected at the time these obligations were undertaken. To put it another way, had the ECT contracting parties known in 1994 what they know now, it is doubtful that they would have concluded the ECT in its current form (including the sunset clause). On this basis, the idea that an ECT contracting party might be able to withdraw from the ECT on the grounds of *rebus sic stantibus* is one that should be taken seriously.

5. SURVIVING RIGHTS AND OBLIGATIONS UNDER ARTICLE 70 OF THE VIENNA CONVENTION

There is one final point to consider, which concerns the consequences of withdrawing from the ECT under Article 62 of the Vienna Convention. In such an event, Article 70 (1)(b) of the Vienna Convention will apply to protect rights (as well as obligations and legal situations) that vested prior to withdrawal from the treaty.

Article 70(1)(b) states as follows:

Unless the treaty otherwise provides or the parties otherwise agree, the termination of a treaty under its provisions or in accordance with the present Convention: ... (b) does not affect any right, obligation or legal situation of the parties created through the execution of the treaty prior to its termination.¹⁰⁸

Contrary to what is sometimes thought,¹⁰⁹ the rights to which Article 70(1)(b) refers are not those of individual investors, but rather those of the treaty parties.¹¹⁰ In the case at

¹⁰⁸ Article 70(2) continues: 'If a State denounces or withdraws from a multilateral treaty, paragraph 1 applies in the relations between that State and each of the other parties to the treaty from the date when such denunciation or withdrawal takes effect'.

¹⁰⁹ Eg *Oostergetel and Laurentius v Slovak Republic*, UNCITRAL, Decision on Jurisdiction 30 April 2010, para 90.

¹¹⁰ Karsten Nowrot, 'Termination and Renegotiation of International Investment Agreements' in Steffen Hindelang and Markus Krajewski, *Shifting Paradigms in International Investment Law* (OUP 2016), at 252, referring to ILC, Commentary to Draft Article 66, Report of the International Law Commission on the Work of its Eighteenth Session – Law of Treaties, UN Doc A/6309/Rev.1, in *Yearbook of the International Law Commission 1966*, Vol II, UN Doc. A/CN.4/SER.A/1966/Add.1, at 265 para 3.

hand, these rights potentially include the ECT contracting parties' rights to the protection of their investors and investments, and their procedural rights to enforce these substantive rights by means of state-to-state dispute settlement under Article 27 of the ECT.¹¹¹ However, Article 70(1)(b) does not protect all rights set out in a treaty; it only protects rights that are 'created through the execution of the treaty'. This second, more limited, category of rights, depends upon the occurrence of an event that is either described in the treaty or that generates consequences described in the treaty. Examples include the creation of property rights¹¹² and financial obligations incurred under a treaty prior to its withdrawal. Relevantly, they also include rights generated by a breach of an obligation owed to a party while the treaty was still in force. As McNair put it in *Ambatlios*, 'such claims acquire an existence independent of the treaty whose breach gave rise to them.'¹¹³

On this basis, it seems clear that any breach of the ECT by a withdrawing party prior to its withdrawal creates a right in the injured contracting party that is protected by Article 70(1)(b) of the Vienna Convention. But this does not mean that the injured contracting party is then able to commence dispute settlement proceedings under Article 27. While Article 27 provides for a right to dispute settlement, that right does not acquire an existence independent of the ECT itself until it is triggered. Thus, it would be necessary for the injured contracting party to commence dispute settlement proceedings in respect of the alleged breach prior to the withdrawal from the agreement under Article 62 coming into effect.¹¹⁴ This is of course independent of the possibility of proceedings in another forum with a current jurisdiction, for example, under an arbitration agreement.

¹¹¹ A 'right' under Article 70 can arguably be understood in a less strict way than in legal theory, to include the power, in Hohfeldian terms, to initiate dispute settlement. See, with reference to an investor's power to initiate investor-state dispute settlement, Bart Smits Duijzentkunst, *The Concept of Rights in International Law*, unpublished PhD, University of Cambridge, 2015, at 158. As noted above, at n 7, the Agreement in Principle would have stated that investor-state and state-state dispute settlement 'shall not apply' as between EU Member States. From the EU's perspective, this wording allows for an interpretation that these norms never applied as between the EU Member States or their investors.

¹¹² *Case Concerning the Northern Cameroons (Cameroon v UK)*, Preliminary Objections, Judgment of 2 December 1963: ICJ Reports 1963, p 15, at 34.

¹¹³ *Ambatlios Case (Greece v UK)*, Preliminary Objection, Judgment of 1 July 1952, ICJ Reports 1952, Dissenting Opinion of President McNair, at 63; *Rainbow Warrior Arbitration Award* (1990) XX RIAA 217, at 266. Generally, see Stephan Wittich, 'Article 70: Consequences of the Termination of a Treaty' in Oliver Dörr and Kirsten Schmalenbach (eds), *Vienna Convention on the Law of Treaties: A Commentary* (Springer 2018), at 1293.

¹¹⁴ There is an exception, perhaps useful in the present context, concerning disputes about the validity of a purported withdrawal from the ECT. Such disputes can still be brought under Article 27, either on the basis that the 'legal situation' includes a procedure by which the same legal situation can be determined, or on the basis that dispute settlement clauses can be severed, as with arbitration agreements, when the validity of the underlying treaty is at issue. See Hervé Ascensio, 'Article 70' in Corten and Klein, above at n 66, at 1609.

6. CONCLUSION

This article has considered several legal aspects of a serious problem facing ECT contracting parties seeking to withdraw from the ECT so that they can adopt measures to combat climate change without being subject to the sunset clause in Article 47(3) of the ECT, which protects investments made prior to the date of withdrawal for twenty years after that date.

The article began by recounting the efforts of ECT contracting parties from 2018 to 2022 to modernise the ECT, in part so as to mitigate the risk of costly compensation claims arising out of climate change measures. It then described the failure of these efforts, the withdrawals of France, Germany and Poland (following Italy's example in 2016), indications by other some other EU Member States and the EU that they are considering withdrawal, as well as suggestions that the UK should follow suit. It then considered several ways that such contracting parties might seek to exclude the application of the sunset clause. One method is to amend the ECT; another is by way of an *inter se* agreement modifying the ECT to exclude the application of the sunset clause as between the parties to that agreement. Amendment is legally possible, but it is at present politically difficult. A *inter se* modification agreement derogating from the sunset clause, on the other hand, would almost certainly be contrary to the object and purpose of the ECT, and therefore be prohibited by Article 41(1)(b)(ii) of the Vienna Convention. It also explained why an interpretation agreement cannot be concluded *inter se*, because that would subvert the unanimity rule for such agreements set out in Article 31(3)(a) of the Vienna Convention.

Against this background, the article went on to consider another possibility, namely whether ECT contracting parties might be entitled to withdraw from the ECT, including its sunset clause, on the basis of the *rebus sic stantibus* doctrine. This doctrine, codified in Article 62 of the Vienna Convention, permits a party to withdraw from an agreement when there has been an unforeseen fundamental change of a circumstance that was an essential basis of the treaty, and that change has radically transformed the extent of the obligations to be performed under the treaty. This is well known to be a difficult test to meet, but it was suggested that, in fact, it may well be met in the present case. This is in particular because of the special nature of the ECT, which, unlike other bilateral investment treaties, was concluded specifically to promote and protect investments in fossil fuels.

The circumstances in which the ECT was concluded in 1994 are quite different from those now. Then, it was assumed that reliance on fossil fuels was a sustainable option for the foreseeable future, and while climate change was well known, what was not known in 1994 was, as now warned by the IPCC and others, that the only way to meet the core Paris Agreement objective of holding global average temperatures to well below 2°C above pre-industrial levels (and ideally no more than 1.5°C) is to leave significant proportions of current reserves of fossil fuels untapped. Moreover, the cost of stranding these and other fossil fuel related assets is likely to lead to compensation claims

worth billions of dollars, a result that is radically different from that which was anticipated in 1994 and that will radically transform the extent of the obligations to be performed under the treaty.

The overall conclusion, then, is that a withdrawal on this basis is the only method available to ECT contracting parties wishing to leave the ECT, for climate change reasons, without being bound by its sunset clause. It remains to be seen whether ECT contracting parties withdrawing from the ECT are prepared to make this case.

DISCLOSURE STATEMENT

No potential conflict of interest was reported by the author(s).

Summer 2023

The Dark Sun Network

Frédéric Gilles Sourgens

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THE DARK SUN NETWORK

FRÉDÉRIC GILLES SOURGENS*

Climate scientists agree that climate change will soon require the deployment of a highly dangerous geoengineering approach known as “solar radiation management.” Solar radiation management uses chemical or physical barriers to solar energy entering the atmosphere and thereby forces global temperatures downwards almost immediately by creating “artificial shade.” Problematically, the unilateral deployment of domestic solar radiation management approaches can have different and potentially devastating effects around the world, even if they help the country deploying the approach to limit the worst climate change consequences at home. So far, there is no global governance framework that can guide the development and deployment of solar radiation management. In this Article, I develop how a networked, bottom-up governance approach can resolve the current solar radiation management global governance deadlock. I argue that such bottom-up governance must be consistent with principles of nondomination developed in civic republican and postcolonial theories of consent.

I submit that the most promising way to jumpstart such a network is to lean into what appears to many as U.S. unilateralism. I argue that U.S. environmental law provides a ready model for global bottom-up solar radiation management governance coordination and collaboration in the National Environmental Policy Act and the Clean Air Act. Centrally, the Dark Sun Network provides a realistic and meaningful governance approach that can be scaled up immediately on the basis of existing law.

INTRODUCTION	682
I. SOLAR SHIELDS AND THEIR COLLATERAL COSTS	691
A. SRM Basics.....	693
B. Local Effects of SRM Approaches	695

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C.	The Environmental Consequences of SRM Approaches	696
D.	The Legal Consequences of SRM Approaches	699
II.	WHAT WE NEED FROM SRM GOVERNANCE.....	700
A.	Flexibility.....	701
B.	Inclusion	704
1.	Thin Conceptions of Consent	704
2.	Strong Conceptions of Consent	706
III.	THE DARK SUN NETWORK	708
A.	Bottom-Up Global Governance	710
B.	Assessing a Bottom-Up Approach.....	712
C.	Bottom-Up Governance and SRM.....	715
D.	The Network Effect	718
1.	Transnational Networks	720
2.	Regulator Responsibilities	722
3.	Law in Action	724
4.	Preliminary Conclusions on Network Effects....	730
E.	Remaining Problems	730
IV.	U.S. DARK SUN NETWORKING	732
A.	Ongoing U.S. SRM Efforts	733
B.	NEPA Plus: Global SRM Diligence	735
C.	The Global Networked SRM Response	737
D.	Practical Responses Within the United States.....	743
1.	Notice-and-Comment Plus: Global Regulatory Dialogue.....	744
2.	Additional Inquiries	752
	CONCLUSION	754

INTRODUCTION

How can we stop time? Policymakers responding to the energy transition challenge could be forgiven for asking that question. On the one hand, it is now increasingly clear that unless greenhouse gas emissions peak in the next four years and drastically fall thereafter, we will set off a catastrophic climate chain reaction.¹ Recently leaked documents from the world's leading scientific body on climate change—the

1. Fiona Harvey, *Greenhouse Gas Emissions Must Peak Within 4 Years, Says Leaked UN Report*, GUARDIAN (Aug. 12, 2021, 9:47 AM), <https://www.theguardian.com/environment/2021/aug/12/greenhouse-gas-emissions-must-peak-within-4-years-says-leaked-un-report> [https://perma.cc/FE39-ANCN].

Intergovernmental Panel on Climate Change (IPCC)—confirm as much.² On the other hand, making the kind of deep changes needed to secure sufficiently sizeable emissions reductions precisely runs counter to what we must do to adapt to climate change. For example, we need more air conditioning and heating to counter heatwaves and arctic vortexes.³ Heating and air conditioning require energy.⁴ Doing both—*drawing down* net greenhouse gas emissions and *increasing* net energy availability—at the same time is a near impossible feat.⁵

The energy transition tragedy is even more vivid when we look below the top-line numbers. The same leaked IPCC report provides a lot of good news: energy policies are beginning to show real fruits.⁶ Renewable energy is both broadly available and price competitive.⁷ Energy efficiency measures are turning the curve of greenhouse gas emissions without negatively impacting global economic growth.⁸ In addition, carbon capture technology is facing political and social (rather than technological) headwinds.⁹ This technology can turn traditional energy infrastructure, such as gas-fired power plants, close to carbon neutral and might even be able to support significant net negative emissions in the future.¹⁰ But all of these developments simply show that we need more time to successfully navigate energy transition. More time is the one thing we do not have.¹¹

Simply “stopping” current greenhouse gas emissions on a dime is not a realistic option.¹² Consider two examples to highlight the pragmatic challenges such a policy would face.

2. INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2022: IMPACTS, ADAPTATION AND VULNERABILITY 18 (Priyadarshi R. Shukla et al. eds., 2022).

3. MATTHEW E. KAHN, ADAPTING TO CLIMATE CHANGE: MARKETS AND THE MANAGEMENT OF AN UNCERTAIN FUTURE 228 (2021).

4. *See id.* at 67–68, 135–36 (discussing the importance of air conditioning and heat and their relationship to electricity).

5. INT’L ENERGY AGENCY, NET ZERO BY 2050: A ROADMAP FOR THE GLOBAL ENERGY SECTOR 56–57 (2021).

6. INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *supra* note 2, at 15.

7. *Id.*

8. *See id.*

9. *See id.* at 17.

10. *See* Leonardo Sempertegui & Frédéric G. Sourgens, *The Importance of the State and Private Oil Sector for Successfully Implementing the Energy Transition* 67 ROCKY MOUNTAIN MIN. L. FOUND. (forthcoming 2022) (on file with the author).

11. *See generally* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *supra* note 2.

12. *See* Frédéric G. Sourgens, *Diligent Zero*, 75 SMU L. REV. 417, 424–25 (2022).

First, the leaked IPCC report singles out “meat-eating . . . for blame.”¹³ What would happen if the United States banned, say, beef tomorrow? A recent study suggests that “the Beef Industry is the third largest economic generator in Texas.”¹⁴ And Texas is hardly alone.¹⁵ A beef ban would lead to massive and understandable opposition from ranchers and their home states.¹⁶ Such opposition would likely topple radical regulatory approaches.¹⁷ **Second**, another recommendation is to reduce air travel significantly. What would happen to the economy in Central Florida if the United States curtailed flights tomorrow? Tourism is Florida’s leading economic driver.¹⁸ Given Florida’s importance in U.S. electoral politics, it is not likely that any administration would push too hard in that direction.¹⁹ **More generally**, as one U.S. government agency puts it, “[w]ithout a stable energy supply, health and welfare are threatened, and the U.S. economy cannot function.”²⁰ Therefore, dismantling existing energy infrastructure before replacing it is not a realistic option.

It turns out that there is, in fact, a tool available to buy more time—solar radiation management (SRM).²¹ The idea behind

13. Harvey, *supra* note 1.

14. *What Is the Contribution of Cattle to the Texas and U.S. Economy*, TEX. A&M AGRILIFE EXTENSION, <https://pathtotheplate.tamu.edu/topics/beef/what-is-the-contribution-of-cattle-to-the-texas-and-u-s-economy> [https://perma.cc/K4M3-MYNC].

15. See *Beef*, KAN. DEP’T OF AGRIC., https://agriculture.ks.gov/docs/default-source/ag-growth-summit/2021-growth-documents/beef.pdf?sfvrsn=15c296c1_8 [https://perma.cc/9VZZ-X2DZ]; *Nebraska: The Beef State*, NEB. BEEF COUNCIL, <https://www.nebeef.org/raising-beef/state-national-facts> [https://perma.cc/FY62-ACKA].

16. See Chuck Coffey, *Viewpoint: Fake Meat Is Not the Solution to Climate Change*, OKLAHOMAN (Aug. 29, 2021, 5:00 AM), <https://www.oklahoman.com/story/opinion/2021/08/29/fake-meat-is-not-the-solution-to-climate-change/5592966001> [https://perma.cc/NN7S-CJB8].

17. Sourgens, *supra* note 12, at 9.

18. Laura McCamy, *13 Mind-Blowing Facts About Florida’s Economy*, MKTS. INSIDER (May 20, 2019, 12:40 PM), <https://markets.businessinsider.com/news/stocks/florida-economy-facts-2019-5-1028214563?miRedirects=1> [https://perma.cc/6C9Q-WKM5].

19. Liz Mair, *Ron DeSantis Was a Slam Dunk. Until He Wasn’t.*, N.Y. TIMES (Sept. 24, 2021), <https://www.nytimes.com/2021/09/24/opinion/ron-desantis-florida.html> [https://perma.cc/C5YR-HZW4].

20. *Energy Sector*, CYBERSECURITY & INFRASTRUCTURE SEC. AGENCY, <https://www.cisa.gov/energy-sector> [https://perma.cc/6XN2-TR6J].

21. Jesse L. Reynolds, *Solar Geoengineering to Reduce Climate Change: A Review of Governance Proposals*, 475 PROC. ROYAL SOC. A1, 2 (2019); see also Alan Carlin, *Why a Different Approach Is Required if Global Climate Change Is to Be Controlled Efficiently or Even At All*, 32 WM. & MARY ENV’T L. & POL’Y REV. 685,

SRM is simple. Climate change is the result of heat getting trapped in greenhouse gases in the atmosphere.²² With SRM, we can reduce the amount of heat getting trapped by keeping solar energy out of the atmosphere in the first place.²³ We can think of reducing atmospheric greenhouse gas concentrations, and thereby reducing climate change, as adjusting the global climate thermostat internally; that is, within the atmosphere. Most SRM adjusts the global climate thermostat *externally*; that is, outside the atmosphere.²⁴ Importantly, SRM theoretically can adjust the thermostat externally just as effectively as we could adjust it internally.²⁵

There is an obvious catch—SRM is a uniquely dangerous tool, and all SRM approaches “have the potential for unintended negative consequences for both environmental and human systems.”²⁶ For example, one of the most popular SRM approaches releases sulfate aerosol particles into the stratosphere at ever-increasing concentrations to keep solar energy out.²⁷ These particles can cause anything from acid rain to a depletion of the ozone layer.²⁸ And, not only is SRM uniquely dangerous, but if deployed, it would have an immediate impact not just in the State deploying it but on all States around the world, leading to potential regional climate imbalances.²⁹

Dangerously, there currently is no global governance mechanism for SRM development or deployment.³⁰ A web of legislation, regulation, international treaties, and customary international law is likely to make at least some SRM approaches unlawful to use under normal circumstances.³¹ In

686 (2008) (“Solar radiation management requires some development to optimize operational details, comparatively modest funding, a reliable command and control system, and a legal change—all of which has not started.”).

22. NAT’L RSCH. COUNCIL, DIV. OF EARTH & LIFE STUD., *ADVANCING THE SCIENCE OF CLIMATE CHANGE: AMERICA’S CLIMATE CHOICES: PANEL ON ADVANCING THE SCIENCE OF CLIMATE CHANGE* 184 (2010).

23. *Id.*

24. *Id.* at 380–81.

25. *See id.* (discussing how SRM affects global average temperatures).

26. *Id.* at 382; *see also* Jonathan M. Gilligan & Michael P. Vandenbergh, *Beyond Wickedness: Managing Complex Systems and Climate Change*, 73 VAND. L. REV. 1777, 1798–99 (2020).

27. NAT’L RSCH. COUNCIL, DIV. OF EARTH & LIFE STUD., *supra* note 22, at 381.

28. *See* Reynolds, *supra* note 21, at 8.

29. NAT’L RSCH. COUNCIL, DIV. OF EARTH & LIFE STUD., *supra* note 22, at 383.

30. *See* Reynolds, *supra* note 21, at 6.

31. *See id.*; Craig Martin, *Atmospheric Intervention? The Climate Change Crisis and the Jus Ad Bellum Regime*, 45 COLUM. J. ENV’T L. 331, 372–73 (2020);

fact, there are even suggestions that the deployment of SRM “could provoke international conflict.”³² Still, as Karen Scott noted in 2013, current international environmental law does not “provide a suitable forum or framework within which key ethical, policy, and legal questions associated with geoengineering for climate change mitigation can be addressed.”³³

The lack of a global SRM governance framework is a pressing issue. Calls are growing louder that, under current circumstances, the traditional legal arguments against SRM no longer hold. Climate change creates a uniquely urgent and destructive emergency to which SRM (and likely only SRM) could respond with the necessary speed.³⁴ Traditional legal rules cited against SRM do not apply in such emergencies.³⁵ Even the authoritative *Oxford Handbook of International Environmental Law*, in its new 2021 edition, argues that “the scale of the challenge” and “the magnitude of the emissions gap is such that bridging it may well require use of . . . negative emissions technologies such as solar radiation management.”³⁶

Even so, emergency does not provide an automatic roadmap for how specific SRM should be assessed or deployed. Emergency, almost by definition, eschews governance paradigms.³⁷ The climate emergency does not itself provide us

Joshua Horton et al., *Liability for Solar Geoengineering: Historical Precedents, Contemporary Innovations, and Governance Possibilities*, 22 N.Y.U. ENV'T L.J. 225, 225–26 (2015); Benoit Mayer, *A Review of the International Law Commission's Guidelines on the Protection of the Atmosphere*, 20 MELB. J. INT'L L. 453, 485–86 (2019) (noting equivocation on this point by the International Law Commission).

32. Jody Freeman, *A Critical Look at “The Moral Case for Fossil Fuels”*, 36 ENERGY L.J. 327, 341 (2015).

33. Karen N. Scott, *International Law in the Anthropocene: Responding to the Geoengineering Challenge*, 34 MICH. J. INT'L L. 309, 354 (2013); see also David A. Wirth, *Engineering the Climate: Geoengineering as a Challenge to International Governance*, 40 B.C. ENV'T AFFS. L. REV. 413, 430–36 (2013).

34. See Charles R. Corbett, *The Climate Emergency and Solar Geo-Engineering*, 46 HARV. ENV'T L. REV. 197, 207 (2022); Daniel A. Farber, *Coping with Uncertainty: Cost-Benefit Analysis, the Precautionary Principle, and Climate Change*, 90 WASH. L. REV. 1659, 1677–78 (2015); Frédéric G. Sourgens, *Geo-Markets*, 38 VA. ENV'T L.J. 58, 112–33 (2020).

35. Sourgens, *supra* note 34, at 112–33.

36. Lavanya Rajamani & Jacob Werksman, *Climate Change*, in THE OXFORD HANDBOOK OF INTERNATIONAL ENVIRONMENTAL LAW 492, 510 (Lavanya Rajamani & Jacqueline Peel eds., 2021).

37. For discussion of key governance questions, see Albert Lin, *The Missing Pieces of Geoengineering Research Governance*, 100 MINN. L. REV. 2509, 2513 (2016). For a discussion of applicable legal principles, see Anthony Chavez, *Using Legal Principles to Guide Geoengineering Deployment*, 24 N.Y.U. ENV'T L.J. 59, 70–

with mechanisms for deciding whether SRM approaches should be developed or deployed and, if so, which ones.³⁸ These questions can only be answered if a governance paradigm that enables decisions to counter it, which account for a concrete appraisal of the climate emergency and SRM approaches, is in place.

The classic governance paradigm proposed for SRM in the literature is a top-down, multilateral paradigm.³⁹ Problematically, the very urgency of the climate emergency makes it on the whole unlikely that traditional top-down multilateral global governance approaches, such as multilateral framework conventions, will solve our problem. Such mechanisms take too long and have failed to develop under less urgent circumstances.⁴⁰ Traditional U.N. mechanisms, such as the U.N. Security Council, are also unlikely to help: the Council's democracy deficit is too profound considering the veto power of the United States, U.K., France, China, and Russia.⁴¹ We therefore need alternatives to such top-down approaches to SRM governance.

In light of our current top-down SRM governance deadlock, there is a commonplace fear of unilateralism.⁴² In particular,

109 (2016). Chavez does not himself propose a governance approach for the application of these principles. *Id.*

38. J. Samuel Barkin & Yuliya Rashchupkina, *Public Goods, Common Pool Resources, and International Law*, 111 AM. J. INT'L L. 376, 392 (2017).

39. For a discussion of such a top-down approach, see Adam D.K. Abelkop & Jonathan C. Carlson, *Reining in Phaëthon's Chariot: Principles for the Governance of Geoengineering*, 21 TRANSNAT'L L. & CONTEMP. PROBS. 763, 797 (2013). For a soft law approach, see Anna-Maria Hubert & David Reichwein, *An Exploration of a Code of Conduct for Responsible Scientific Research Involving Geoengineering, Introduction, Draft Articles and Commentaries* 62 (Inst. for Advanced Sustainable Stud., Working Paper, 2015) [hereinafter *Code of Conduct*]. I will explore the distinctions between the Code approach and mine in Section III.A.

40. See Wirth, *supra* note 33, at 430–36.

41. See LORAINIE SIEVERS & SAM DAWS, *THE PROCEDURE OF THE UN SECURITY COUNCIL* 296–312 (4th ed. 2012) (describing historical impact of veto threats on deliberations at the Council).

42. Oliver Geden & Susanne Dröge, *The Anticipatory Governance of Solar Radiation Management*, COUNCIL ON FOREIGN REL. (July 2, 2019), <https://www.cfr.org/report/anticipatory-governance-solar-radiation-management> [https://perma.cc/Z9XU-XNVM] (“As long as high uncertainty exists about the benefits of unilateral action, countries will have little interest in striving for global governance.”); Sikina Jinnah, *Why Govern Climate Engineering? A Preliminary Framework for Demand-Based Governance*, 20 INT'L STUDS. REV. 272, 275 (2018); see also Joshua B. Horton, *Geoengineering and the Myth of Unilateralism: Pressures and Prospects for International Cooperation*, in CLIMATE CHANGE GEOENGINEERING (William Burns & Andrew Strauss eds., 2013).

many fear U.S. or Chinese unilateral action.⁴³ Such unilateralism is seen as an outright cause for alarm and a potential threat to global peace and security.⁴⁴ I argue that this fear is not only misplaced, but it actively stands in the way of the best alternative to SRM governance we currently have available to us.

To solve this global problem, I propose a paradigm shift: instead of a top-down approach, we need to focus on a networked, bottom-up governance approach.⁴⁵ Contrary to fears of unilateralism, I argue that U.S. unilateralism is, in fact, our best hope of launching a bottom-up governance network. I develop how such a bottom-up governance approach would look and assert that it is wholly achievable within existing law. Existing policy literature already submits that “national-level policies are often the driver of international policy development as countries are more likely to agree and adhere to international policies that reflect pre-existing domestic policies.”⁴⁶ I now provide a legal theory of *how* such governance approaches can be made to converge in the SRM context.⁴⁷

My global networked governance approach begins from the premise that national governments, and particularly agencies

43. See Peter Irvine & David Keith, *The US Can't Go It Alone on Solar Geoengineering*, ENV'T AFFS., Spring 2021, at 44 (“If China and the US, for example, develop clearly aligned interests they could, no doubt, impose their decision.”).

44. See Craig Martin, *Geoengineering and the Use of Force*, OPINIOJURIS.ORG (Jan. 20, 2021), <http://opiniojuris.org/2021/01/20/geoengineering-and-the-use-of-force> [<https://perma.cc/7SHT-DSB3>].

45. See Cinnamon P. Carlarne, *Arctic Dreams and Geoengineering Wishes: The Collateral Damage of Climate Change*, 49 COLUM. J. TRANSNAT'L L. 602, 666 (2011) (discussing the role of bottom-up governance in geoengineering); Geden & Dröge, *supra* note 42 (calling for the development of a bottom-up governance approach). Geden & Dröge call for “setting up enforceable codes of conduct for responsible SRM research, adopted by project funders and national research organizations” and thus differ from the international approach followed by the Code of Conduct to which Geden & Dröge also link. *Id.*; *Code of Conduct*, *supra* note 39. My key contribution is to develop how such codes of conduct can in fact be made to converge *without* ex ante agreement.

46. See F. FOR CLIMATE ENG'G ASSESSMENT, ACAD. WORKING GRP. ON CLIMATE ENG'G, GOVERNING SOLAR RADIATION MANAGEMENT 23 (2018). Despite this observation, the report does not propose a bottom-up governance approach but rather proposes an international, organization-led approach. *Id.* at 30.

47. This is where I differ from soft law approaches like that of Hubert & Reichwein. I do not assume that regulators will share common normative starting points concerning geoengineering but rather that they share an understanding that they wish to solve a common problem only. See sources cited *supra* note 39. The point of networked governance is that it will arrive at normative convergence even in the absence of ex ante shared normative principles.

such as the Environmental Protection Agency (EPA) and their global counterparts, have the expertise to understand the chemical and physical processes involved in SRM and their environmental impacts. These agencies, therefore, have the tools to understand the relevant risks and benefits of specific SRM strategies.⁴⁸ These agencies also typically have the statutory authority to regulate airborne emissions, meaning that they would have natural regulatory authority over many SRM activities in their respective domestic jurisdictions.⁴⁹ The best course of action is for these agencies to begin engaging in proposals to deploy SRM as soon as possible and thus gather risk data about specific strategies.⁵⁰

A networked approach adds a global layer to such regulatory activities. I argue that global regulators must interact with each other and with the data they each generate as part of their respective domestic analyses of SRM strategies and proposals. Because SRM has a global impact, any approval by a domestic regulatory agency has the potential to cause transboundary harm.⁵¹ As I will argue, the chief means to respond to such a potential for transboundary harm is meaningful consultation before the potentially harmful activity is licensed or undertaken. This is true both from an international law and from a U.S. environmental law perspective.⁵² Such meaningful consultation requires an exchange of data and risk projections.⁵³ It further requires each regulatory agency to take into account the global impact of a proposed SRM approach rather than exclusively the domestic impact.⁵⁴

This bottom-up, networked governance approach allows us a path out of the SRM governance impasse. The literature on global governance networks strongly suggests that creating

48. See Albert C. Lin, *Myths of Environmental Law*, 2015 UTAH L. REV. 45, 55–57 (2015).

49. See, e.g., *id.* at 55–57 (noting that “[r]isk assessment is at the heart of many environmental statutes and regulatory actions” and noting further that “[w]hile almost all environmental statutes are in some way concerned with risk, the standards in some statutes purport to focus solely on risk regardless of economic costs”).

50. See Geden & Dröge, *supra* note 42.

51. Reynolds, *supra* note 21.

52. See Sourgens, *supra* note 12, at 458.

53. *Id.*

54. *Id.* at 451 (energy companies and policymakers “will need to account for the potential transboundary harm such projects and policies might produce in their own right”).

conduits for global governance by providing opportunities for regulators to interact with each other causes each decision-maker to internalize the concerns raised by their peers.⁵⁵ That is, while it is not possible to achieve a negotiated SRM agreement *ex ante*, networked governance approaches allow for regulatory convergence *ex post*.⁵⁶ Further, to the extent that disagreement persists, such disagreement can be articulated in concrete ways based on specific data. Such disagreement can then be resolved in tangible ways based on specific data points. The question would no longer be whether the deployment of SRM by a particular actor is lawful or unlawful *in the abstract*. Rather, the question would be whether the *specific diligence* conducted by a particular actor was sufficient and whether the *concrete choices* made as a result of that diligence were appropriate. When time is of the essence, such concrete questions are easier to answer on the whole. And they can be answered within these very networked regulatory dialogues.

This change in perspective offers four surprising insights. *First*, bottom-up, networked global governance approaches are far more *flexible* than top-down approaches. Consequently, bottom-up governance approaches can build buy-in for global SRM governance while accounting for the urgent need for action. Bottom-up governance can therefore speed up global and domestic SRM development and deployment efforts rather than slow them down.

Second, U.S. leadership is instrumental to achieving the benefits of such networked governance. U.S. leadership will take the form of *unilateral (i.e., domestic) action*. But due to the framework of U.S. environmental legislation, such domestic action can serve as a needed push to commence a thick global regulatory dialogue around SRM.⁵⁷

55. See generally ANNE-MARIE SLAUGHTER, A NEW WORLD ORDER (2004) (providing the classical explanation for how networked governance works effectively to solve global policy problems).

56. See *id.* at 61 (discussing the logic of convergence in environmental regulation).

57. A key condition for my approach is that the United States adopts a civilian rather than a military approach. On the civilian path, see Charles R. Corbett, “Extraordinary” and “Highly Controversial”: Federal Research of Solar Geoengineering Under NEPA, 115 NW. U. L. REV. ONLINE 240, 243 (2021). On the potential military path, see Meredith Doswell, *The Department of Defense Is Poised to Update Its Climate Change Adaptation Roadmap to Consider “Mitigation Measures”*: Now Is the Time to Nationally Regulate Solar Radiation Management, 22 N.C. J.L. & TECH. 487, 487–88 (2021).

Third, existing global governance mechanisms are sufficiently capacious to address the apparently unilateral deployment of SRM proposed here. Such unilateral deployment proposals will cause domestic regulators to engage with a broader global impact of proposed SRM strategies. This dialogue, in its own right, will provide an **inclusive** foundation for better, global SRM decision-making.

Fourth, such engagement with global impacts by U.S. regulators is a matter of **law** (both U.S. and, though more tenuously, international environmental law) and **not** just a matter of **prudential choice**. Law tells us how to build these dialogues between regulators. It tells us where regulators need to look for domestic and foreign civil society groups for input. And law tells us how regulators can internalize these inputs by working together in governance networks rather than as regulatory islands working at cross-purposes.

This Article has four parts. Part I introduces SRM and its environmental impact. Part II outlines the goals for successful SRM governance. Part III introduces bottom-up, networked governance as a means to achieve these goals. Part IV then explains how U.S. SRM governance leadership, far from being a threat to inclusive global SRM governance, can jump-start such inclusive global SRM governance within the confines of existing domestic U.S. environmental law.

I. SOLAR SHIELDS AND THEIR COLLATERAL COSTS

SRM has a sad provenance. At the height of the Cold War, scientists at the vaunted Lawrence Livermore National Laboratory, a chief site of U.S. nuclear weapons research, studied two related, grizzly scenarios: nuclear winter brought on by the use of the weaponry its scientists perfected and the weaponization of the weather through climate control.⁵⁸ The problems of modelling shock waves of nuclear explosions and climate events share many mathematical similarities, and understanding one helped model the other.⁵⁹ From the mid-1950s onwards, the U.S. military injected vast amounts of

58. Paul N. Edwards, *Entangled Histories: Climate Science and Nuclear Weapons Research*, 68 BULL. ATOMIC SCI. 28, 37 (2012).

59. *Id.* at 32–33.

money into obtaining a military advantage out of either (nuclear weapons and climate control).⁶⁰

The link between nuclear weapons, nuclear winter, and the climate makes intuitive sense. Nuclear explosions are powerful enough to inject smoke plumes of soot and ash not just into the lower atmosphere but also into the upper troposphere and stratosphere some thirty miles off the ground.⁶¹ If soot reaches this height, “enough light is blocked to cause global surface cooling.”⁶² As this research developed, Lawrence-Livermore scientists suggested that “smoke from 100 simultaneous firestorms would block sunlight for about four years . . .”⁶³ Even at a comparatively early stage of the research, the basic idea took hold: human action can change the climate in either direction.⁶⁴ If we want to fight global warming, all we have to do is block out the sun.⁶⁵ Consequently, and somewhat unsurprisingly, three of the pioneers of developing today’s ideas for a solar shield were senior members of the Lawrence-Livermore team—Edward Teller (the father of the hydrogen bomb), Lowell Wood, and Ken Caldeira.⁶⁶

Despite sizeable military interest in the technology, both in the U.S.S.R. and the United States, solar shields and geoengineering were long considered fringe or “post-normal”

60. *Id.* at 31.

61. Stephen Wampler, *Examining Climate Effects of Regional Nuclear Exchange*, LAWRENCE LIVERMORE NAT’L LAB’Y (Nov. 30, 2020), <https://www.llnl.gov/news/examining-climate-effects-regional-nuclear-exchange> [https://perma.cc/MVX5-M22E].

62. *Id.*

63. *Id.*

64. See Ken Caldeira & Govindasamy Bala, *Reflecting on 50 Years of Geoengineering Research*, 5 EARTH’S FUTURE 10 (2017).

65. Wampler, *supra* note 61; Stephen Wampler, *Examining Climate Effects of Regional Nuclear Exchange*, LAWRENCE LIVERMORE NAT’L LAB’Y (Nov. 30, 2020), <https://www.llnl.gov/news/examining-climate-effects-regional-nuclear-exchange> [https://perma.cc/YG7T-8MSE].

66. Caldeira & Bala, *supra* note 64, at 11; Joel N. Shurkin, *Edward Teller, ‘Father of the Hydrogen Bomb,’ Is Dead at 95*, STAN. REP. (Sept. 24, 2003), <https://news.stanford.edu/news/2003/september24/tellerobit-924.html> [https://perma.cc/Y7QD-ENPY].

science.⁶⁷ The idea was simply taboo.⁶⁸ This changed when Paul Crutzen, a Nobel Prize winning atmospheric chemist with a decidedly nonmilitary background, reluctantly suggested the use of SRM as a means to combat climate change in 2006.⁶⁹ Since Crutzen broke the taboo in the scientific community by discussing SRM as a policy option, SRM has become increasingly mainstream in global policy circles.⁷⁰

Obviously, SRM would have to be controlled—it could not rely on the detonation of hundreds of nuclear warheads.⁷¹ But scientists used to designing nuclear weapons are no strangers to precisely calibrating devastatingly powerful physical processes. In this case, their inspiration for a less disastrous solar shield came from nature—massive volcanic eruptions.⁷² Past eruptions had in fact led to measurable global cooling.⁷³ This provided a blueprint for engineering solutions.⁷⁴ And, as it stands, these blueprints look like they will work—both SRM experts and leading climate scientists project “with a [degree of] high agreement” that SRM in fact can stabilize global temperatures in the Paris Agreement zone of well below 2 degrees Celsius (or even 1.5 degrees Celsius) above preindustrial levels.⁷⁵

A. SRM Basics

So how does it work? The perhaps best known (and least expensive) SRM approach is the one reluctantly endorsed by Crutzen in 2006.⁷⁶ As Crutzen wrote, SRM “can be achieved by burning S₂ [disulfur] or H₂S [hydrogen sulfide] carried into the

67. See Alexander C. Kaufman, *Geoengineering the Climate Just Became More of a Real Possibility in the U.S.*, HUFFPOST (Mar. 25, 2021, 11:56 AM), https://www.huffpost.com/entry/solar-geoengineering-climate-change_n_605c765dc5b67593e055ff9d [<https://perma.cc/6B2X-TEZK>]; *Once a Fringe Idea, Geoengineering Moves to Center Stage in Policy Arena*, ENV'T F., May/June 2020, at 52.

68. CLIVE HAMILTON, *EARTHMASTERS, THE DAWN OF THE AGE OF CLIMATE ENGINEERING* 15 (2013).

69. *Id.*; Paul J. Crutzen, *Albedo Enhancement by Stratospheric Sulfur Injections: A Contribution to Resolve a Policy Dilemma?*, 77 CLIMATIC CHANGE 211, 212 (2006).

70. Caldeira & Bala, *supra* note 64, at 12.

71. Reynolds, *supra* note 21, at 17.

72. See Caldeira & Bala, *supra* note 64.

73. See DAVID KEITH, *A CASE FOR CLIMATE ENGINEERING* 26 (2013).

74. See *id.*

75. Reynolds, *supra* note 21, at 3.

76. Crutzen, *supra* note 69, at 212.

stratosphere on balloons and by artillery guns to produce SO₂ [sulfur dioxide].”⁷⁷ He went on to say that, “[t]o enhance the residence time of the material in the stratosphere and minimize the required mass, the reactants might be released, distributed over time, near the tropical upward branch of the stratospheric circulation system.”⁷⁸ Once in “the stratosphere, chemical and microphysical processes convert SO₂ into sub-micrometer sulfate particles.”⁷⁹ Crutzen argued that “to derive the radiative forcing,” that is the change to the equilibrium of solar energy entering and exiting the atmosphere “caused by the presence of 1 Tg S in the stratosphere, we adopt a simple approach based on the experience gained from the Mount Pinatubo volcanic eruption.”⁸⁰ Crutzen calculated that “a stratospheric sulfate loading of 1.9 Tg S [teragram of sulfur] would be required,” which “can be achieved by a continuous deployment of about 1–2 Tg S per year for a total price of U.S. \$25–50 billion”⁸¹ This form of SRM is also known as stratospheric aerosol injection (SAI).⁸²

SAI is far from the only SRM approach. One alternative is to introduce engineered reflective nanoparticles into the stratosphere instead of sulfur compounds.⁸³ Further, it may be possible “to increase the albedo [whiteness/reflectivity] of relatively dark stratocumulus clouds” by spraying seawater “upwards as a fine mist” in a process known as “marine cloud brightening” (MCB).⁸⁴ Alternatively, it may be possible to thin high altitude cirrus clouds in a process called “cirrus cloud thinning” (CCT) by “injecting ice nuclei, such as bismuth triiodide, into the areas where cirrus clouds are likely to form.”⁸⁵ Another alternative is to “consider a system of mirrors in space engineered so that each could be rotated on command”⁸⁶ Other approaches are indeed feasible, and practical research is in a comparatively early stage as most research at this point

77. *Id.*

78. *Id.*

79. *Id.*

80. *Id.* One teragram is 1,000,000 metric tons.

81. *Id.* at 213.

82. Reynolds, *supra* note 21, at 3.

83. KEITH, *supra* note 73, at 72.

84. Reynolds, *supra* note 21, at 3.

85. *Id.*

86. KEITH, *supra* note 73, at 112.

relies principally upon modelling and analogy to natural events.⁸⁷

B. Local Effects of SRM Approaches

Crucially, many SRM approaches can be developed *locally*. Obviously, a global deployment of any number of methods would achieve better results.⁸⁸ But, in Crutzen's case, artillery guns shooting sulfur compounds into the stratosphere are located *somewhere*.⁸⁹ Similarly, balloons releasing sulfur compounds would do so in specific airspace (as would airplanes injecting aerosols).⁹⁰ The same is true for cloud-based SRM approaches like MCB and CCT—they spray salt water or inject ice into clouds *from somewhere*.⁹¹ It is thus entirely conceivable that a State would use its sovereign territory, sovereign airspace, or maritime areas under its jurisdiction for SRM operations.⁹²

While the *deployment* of SRM can be *local*, the *effects* of SRM are likely to be *global*. Air and water pollution frequently do not stay in one place but follow air and water currents.⁹³ To use an admittedly imperfect analogy, think of the nuclear power plant accidents at Fukushima or Chernobyl.⁹⁴ Radiation from

87. See Caldeira & Bala, *supra* note 66, at 14–15; Reynolds, *supra* note 21.

88. See Wilfried Rickels et al., *Who Turns the Global Thermostat and by How Much?*, 91 ENERGY ECON., Aug. 2020, at 1.

89. Crutzen, *supra* note 69, at 212.

90. *Id.*

91. Reynolds, *supra* note 21, at 3.

92. See JAMES CRAWFORD, BROWNLIE'S PRINCIPLES OF PUBLIC INTERNATIONAL LAW 204 (9th ed. 2019) (discussing the international legal concept of territory and the right of States to make use of their own territory); Terry Gill & Dieter Fleck, *Air Law and Military Operations*, in THE HANDBOOK OF INTERNATIONAL LAW OF MILITARY OPERATIONS 354, 354 (Terry Gill & Dieter Fleck eds., 2d ed. 2015); Umberto Leanza & Maria Cristina Caracciolo, *The Exclusive Economic Zone*, in 1 THE IMLI MANUAL ON INTERNATIONAL MARITIME LAW: THE LAW OF THE SEA 177, 184 (David J. Attard et al. eds., 2014) (discussing the “exercise of the coastal State jurisdiction for the purposes of . . . installations, and structures, in order to monitor scientific research at sea and to protect the marine environment against pollution” in the exclusive economic zone).

93. See Dennis Normile, *Watch Air Pollution Flow Across the Planet in Real Time*, SCIENCE (Nov. 28, 2016), <https://www.science.org/news/2016/11/watch-air-pollution-flow-across-planet-real-time> [<https://perma.cc/8HKS-LY3Q>]; Catherine Zandonella, *Ocean Currents Push Phytoplankton, and Pollution, Around the Globe Faster than Thought*, SCIENCEDAILY (Apr. 19, 2016), www.sciencedaily.com/releases/2016/04/160419130133.htm [<https://perma.cc/9ZZV-JVS7>].

94. *Fukushima Daiichi Accident*, WORLD NUCLEAR ASS'N (May 2022), <https://world-nuclear.org/information-library/safety-and-security/safety-of->

those accidents did not stay in Japan and Ukraine; they travelled via air and sea currents around the world.⁹⁵ Depending exactly upon where SRM is deployed, it is thus possible (and in fact highly likely) that the particles used in SRM will also travel beyond the original injection site. In fact, airborne global travel of small soot particles from mainland China already provides a real-life, small-scale example of such global aerosol movements.⁹⁶

And it is not just the chemicals introduced to bring about SRM that are potentially problematic. A change in temperatures over, say, the United States is bound to have climate consequences further afield given the interconnectivity of global climate systems, such as the Jetstream over the North Pole or the Gulfstream in the Atlantic.⁹⁷ Large-scale **local deployment of SRM** therefore will have **varied global climate impacts** no matter what method is used.⁹⁸

C. *The Environmental Consequences of SRM Approaches*

The environmental consequences of any SRM approach are likely going to be significant. The first of these potential consequences, again, is reasonably intuitive. We—and certainly our parents and grandparents—know that introducing sulfur compounds into the stratosphere is environmentally harmful given our experiences with acid rain in the 1980s.⁹⁹ And Crutzen

plants/fukushima-daiichi-accident.aspx [https://perma.cc/V4Z3-8TUD]; *Chernobyl Accident 1986*, WORLD NUCLEAR ASS'N (Apr. 2022), <https://www.world-nuclear.org/information-library/safety-and-security/safety-of-plants/chernobyl-accident.aspx> [https://perma.cc/ZU94-FDS8].

95. Michael Simmons, *Radiation High over Europe After Chernobyl Disaster—Archive, 1986*, GUARDIAN (May 3, 2021, 12:30 AM), <https://www.theguardian.com/environment/2021/may/03/radiation-high-over-europe-after-chernobyl-disaster-1986> [https://perma.cc/V2ML-2QRS]; Amanda Grennell, *California Wines Contain Fukushima Radiation, and It's Not a Bad Thing*, PBS (July 24, 2018, 4:32 PM) <https://www.pbs.org/newshour/science/california-wines-contain-fukushima-radiation-and-its-not-a-bad-thing> [https://perma.cc/W5S4-WEVC].

96. Normile, *supra* note 93.

97. Xiaojun Yuan et al., *The Interconnected Global Climate System—A Review of Tropical-Polar Teleconnections*, 31 J. CLIMATE 5765, 5765 (2018).

98. Wilfried Rickels et al., *supra* note 88, at 7 (noting “[t]he heterogeneous economic interests involved in SRM deployment under future climate conditions are more nuanced than . . . climate-change losers and winners.”).

99. *The Legacy of EPA's Acid Rain Research*, EPA (Aug. 18, 2020), <https://www.epa.gov/sciencematters/legacy-epas-acid-rain-research> [https://perma.cc/VV7V-2P5A].

doesn't mince words—"According to the World Health Organization, the pollution particles affect health and lead to more than 500,000 premature deaths per year worldwide."¹⁰⁰ Further, "[t]hrough acid precipitation and deposition, SO₂ and sulfates also cause various kinds of ecological damage."¹⁰¹ Just as dangerously, the use of sulfur compounds has been linked to ozone depletion and thus would return a significant environmental threat to the ozone layer.¹⁰² These effects may well be reduced depending upon *how* sulfur is delivered into the stratosphere.¹⁰³ But significant negative impacts are likely to remain—the question is whether these effects are sufficiently small to warrant deployment to counter the threat of climate change.

Pollution may be diminished by finding aerosols or particles other than sulfur-based compounds.¹⁰⁴ It is also possible that SRM approaches other than SAI could be less environmentally harmful in their own right.¹⁰⁵ These questions will have to be studied, and environmental impacts remain to be fully assessed.¹⁰⁶ As a general rule, however, the introduction of large quantities of foreign substances into the air is likely to have some polluting effect—and the larger the quantity, the greater the problem.¹⁰⁷

Second, even if pollution from SRM delivery approaches *themselves* was kept at a minimum, SRM has negative environmental consequences because of what it intends to do (block sunlight). One of these consequences is that SRM weakens the hydrological cycle—in other words, weather patterns responsible for precipitation around the world.¹⁰⁸ Importantly, SRM will not impact the hydrological cycle

100. Crutzen, *supra* note 69, at 211.

101. *Id.*

102. *Id.* at 214–15.

103. *Id.* at 215.

104. KEITH, *supra* note 73, at 72.

105. Reynolds, *supra* note 21.

106. Caldeira & Bala, *supra* note 64.

107. See *Ambient (Outdoor) Air Pollution*, WHO (Sept. 22, 2021), [https://www.who.int/news-room/fact-sheets/detail/ambient-\(outdoor\)-air-quality-and-health](https://www.who.int/news-room/fact-sheets/detail/ambient-(outdoor)-air-quality-and-health) [<https://perma.cc/R8GC-63F3>] (“By reducing air pollution **levels**, countries can reduce the burden of disease from stroke, heart disease, lung cancer, and both chronic and acute respiratory diseases, including asthma.”) (emphasis added).

108. Katherine Dagon & Daniel P. Schrag, *Exploring the Effects of Solar Radiation Management on Water Cycling in a Coupled Land–Atmosphere Model* 29 J. CLIMATE 2635, 2636 (2016).

uniformly around the world—local soil and vegetation patterns matter, meaning that the SRM impacts on the hydrological cycle will be regionally diverse.¹⁰⁹ There has also been some discussion in the literature that SRM (no matter what kind) could negatively affect the monsoon.¹¹⁰ As such, it could have a negative impact on large ecosystems.¹¹¹ These ecosystems support farming for large populations around the world.¹¹² The problem is made more complex in that climate change itself affects the hydrological cycle.¹¹³ As it stands, climate change has weakened the monsoon in Burma/Myanmar.¹¹⁴ Instead of accounting only for SRM effects, climate change modelling must also account for the effects of climate change on climate systems. Consequently, modelling must account for SRM effects, climate change effects, and any interactions between SRM and climate change events.¹¹⁵

Finally, SRM does not address the concentration of CO₂ in the atmosphere. This means that the negative consequences of growing CO₂ concentrations remain untouched.¹¹⁶ This includes increased ocean acidification—something that SRM does not reduce.¹¹⁷ Just as importantly, if one terminates SRM processes, atmospheric greenhouse gases will rapidly increase global temperatures.¹¹⁸ Global ecosystems could not keep up with such rapid change.¹¹⁹ This means that SRM does not itself solve the

109. *Id.* at 2646.

110. Compare Simone Tilmes et al., *The Hydrological Impact of Geoengineering in the Geoengineering Model Intercomparison Project (GeoMIP)*, 118 J. GEOPHYSICAL RSCH.: ATMOSPHERES 11036, 11054 (2013) (“Considering the multimodal median and the interannual variability of G1, we find a robust and significant decrease of monsoonal precipitation over land for East Asia (6%), North America (7%), South America (6%), and South Africa (5%), and a robust but not significant decrease of 2% over India.”), with Jesse L. Reynolds et al., *Five Solar Geoengineering Tropes that Have Outstayed Their Welcome*, 4 EARTH’S FUTURE 562, 565 (2016) (submitting that “the degree of cooling from SRM and the magnitude of the associated reduction in monsoon precipitation would be a choice”).

111. Tilmes et al., *supra* note 110, at 11054.

112. HAMILTON, *supra* note 68, at 64.

113. See Zbigniew W. Kundzewicz, *Climate Change Impacts on the Hydrological Cycle*, 8 ECOHYDROLOGY & HYDROBIOLOGY 195 *passim* (2008).

114. THANT MYINT-U, *THE HIDDEN HISTORY OF BURMA, RACE, CAPITALISM, AND THE CRISIS OF DEMOCRACY IN THE 21ST CENTURY* 203 (2020).

115. See Tilmes, *supra* note 110, at 11053.

116. Ronald Sandler, *Solar Radiation Management and Nonhuman Species*, in *ENGINEERING THE CLIMATE, THE ETHICS OF SOLAR RADIATION MANAGEMENT* 95, 107 (Christopher Preston ed., 2012).

117. *Id.*

118. Sourgens, *supra* note 34, at 116–17.

119. *Id.* at 113–17.

underlying problem from increased greenhouse gas emissions while presenting significant environmental risks.¹²⁰

D. The Legal Consequences of SRM Approaches

Given these potential consequences, it should not be surprising that the deployment of SRM is legally problematic. For instance, customary international law prohibits one State from engaging in, or permitting others to engage in, conduct within its jurisdiction that causes serious transboundary harm.¹²¹ As Philippe Sands and Jacqueline Peel put in their authoritative *Principles of International Environmental Law*, this principle “remains the cornerstone of international environmental law.”¹²² Several international treaties have since codified that rule in different contexts.¹²³ As we have outlined above, SRM in fact does risk causing significant transboundary harm in the form of pollution as well as in the form of climate impacts brought on by SRM itself.¹²⁴ But SRM also reduces another kind of global harm—the harm from climate change. A simple prohibition of SRM (unrealistic as it is in current circumstances) therefore would do little to help us weigh these concerns against each other. Just as importantly, given the significant consequences of SRM on the ecosystem, it would be unlawful to simply implement SRM on a whim and without regulatory scrutiny as a matter of U.S. law.¹²⁵ Any injection of aerosols into the stratosphere would need to meet at least Clean Air Act, Endangered Species Act, and National Environmental Policy Act scrutiny.¹²⁶

There’s the rub: SRM will become inevitable. Leading climate experts confirm as much.¹²⁷ But given the dangers of SRM itself and the current state of the law, how are we to govern its use? A tempting escape valve is to look to emergency as an

120. *Id.* at 116–17.

121. PHILIPPE SANDS & JACQUELINE PEEL, *PRINCIPLES OF INTERNATIONAL ENVIRONMENTAL LAW* 201 (4th ed. 2018).

122. *Id.*

123. *Id.* at 199–210.

124. *See supra* Section I.C.

125. *See* Albert Lin, *US Law, in CLIMATE ENGINEERING AND THE LAW, REGULATION AND LIABILITY FOR SOLAR RADIATION MANAGEMENT AND CARBON OXIDE REMOVAL* 154, 154–201 (Michael Gerrard & Tracy Hester eds., 2018).

126. *See id.*

127. Rajamani, *supra* note 36, at 510.

authorizing principle.¹²⁸ But emergency is not a governance framework. Emergency suggests the very opposite—it suggests an irrepressible need for action that is so overwhelming, it thwarts deliberation.¹²⁹ If this is how we take emergency, it is fairly certain that the cure of SRM may well exacerbate rather than resolve the climate change threat—the climate wars of Cold War nightmares in which multiple powers try to force the climate in opposite directions to meet strategic objectives would leave the test tube and become a reality.¹³⁰ We need a governance framework capable of banishing such a specter back to the shelf housing other classics of dystopian science fiction where it safely belongs. And such a framework must allow deployment of SRM to avoid the dystopian future of a planet ravaged by climate change.¹³¹ Yet, this framework also must be sensitive to the significant risks SRM poses on a global scale and must coordinate risk mitigation strategies. So far, we have not yet created such a “suitable forum or framework within which key ethical, policy, and legal questions associated with geoengineering for climate change mitigation can be addressed.”¹³²

II. WHAT WE NEED FROM SRM GOVERNANCE

We have now seen the problem: it is becoming increasingly likely that SRM will become a necessary tool to combat climate change.¹³³ Climate change threatens millions of lives in the Global South—a threat that becomes more acute with each passing day.¹³⁴ Further, existing solutions are not reactive enough. Decarbonization, for example, is too slow to protect low-

128. See sources cited *supra* note 34.

129. See CARL SCHMITT, *POLITISCHE THEOLOGIE* 42–46, 80–84 (2d ed. 1934); Adrian Vermeule, *Our Schmittian Administrative Law*, 122 HARV. L. REV. 1095, 1142–43 (2009). Carl Schmitt used “emergency” to justify and defend National Socialist dictatorship in Germany. See Frédéric G. Sourgens, *Curious Unilateralism*, 13 FED. CTS. L. REV. 113, 132–35 (2021).

130. See Edwards, *supra* note 58, at 35.

131. DAVID WALLACE-WELLS, *THE UNINHABITABLE EARTH: LIFE AFTER WARMING* (2019).

132. Scott, *supra* note 33, at 354; see also Wirth, *supra* note 33, at 430–36.

133. See *What Next? 22 Emerging Technologies to Watch in 2022*, ECONOMIST (Nov. 8, 2021), <https://www.economist.com/the-world-ahead/2021/11/08/what-next-22-emerging-technologies-to-watch-in-2022> [<https://perma.cc/Q5RP-5P5>].

134. Jocelyn Timerley, *The World’s Fight for ‘Climate Justice’*, BBC (Nov. 8, 2021), <https://www.bbc.com/future/article/20211103-the-countries-calling-for-climate-justice> [<https://perma.cc/2NWT-EWXX>].

lying island States from sea level rise and risks catalyzing climate tipping points.¹³⁵ It is tempting to analyze SRM through the lens of emergency or necessity.¹³⁶ This legal lens permits countries and, in the case of the United States, the president to take actions needed to respond to a threat even if the actions themselves may otherwise be unlawful.¹³⁷ But such an approach precisely undercuts any governance attempt, setting up our current problem.¹³⁸

We can see how SRM can create such governance problems. SRM governance must meet two core, conflicting goals at the same time: (1) it must be *flexible* to respond to the climate threat, but (2) it must also be *inclusive* to make sure that harms and benefits are appropriately distributed. These goals are obviously *in tension* with each other. But as we will see, these twin goals *do not contradict* each other. It is therefore entirely possible to balance them against each other so that they in turn strengthen outcomes—but only if done correctly. The goal of any SRM governance paradigm must be to strike the right balance.

A. Flexibility

Time is of the essence for the deployment of SRM. It is prudent, at this point, to assume that climate tipping points cannot be avoided with climate mitigation measures alone.¹³⁹ The pace of energy transition is heartening.¹⁴⁰ But as it stands,

135. Rhoda Kwan, *Island Nation at Risk of Extinction from Rising Seas Laments Watered-Down Climate Pact*, NBC (Nov. 15, 2021), <https://www.nbcnews.com/news/world/tuvalu-laments-watered-cop26-climate-pact-rcna5575> [<https://perma.cc/B9SP-ARUT>]; see also Mélissa Godin, *I Get Scared: The Young Activists Sounding the Alarm from Climate Tipping Points*, GUARDIAN (Nov. 7, 2021), <https://www.theguardian.com/environment/2021/nov/07/young-activists-climate-tipping-points-coral-reefs-ice-sheets> [<https://perma.cc/AYE4-2VR4>].

136. See STEPHEN M. GARDINER, A PERFECT MORAL STORM: THE ETHICAL TRAGEDY OF CLIMATE CHANGE 403 (2011); Rep. of the Int'l Law Comm'n on the Work of Its Fifty-Third Session, U.N. Doc. A/56/10, at 80–84 (2001); Lin, *supra* note 125.

137. See sources cited *supra* note 129.

138. See DIANE A. DESIERTO, NECESSITY AND NATIONAL EMERGENCY CLAUSES: SOVEREIGN IN MODERN TREATY INTERPRETATION 137–38 (2012) (discussing the dangers of such attempts).

139. Godin, *supra* note 135.

140. Fatih Birol, *COP26 Climate Pledges Could Help Limit Global Warming to 1.8 °C, but Implementing Them Will Be the Key*, INT'L ENERGY AGENCY (Nov. 4, 2021), <https://www.iea.org/commentaries/cop26-climate-pledges-could-help-limit->

greenhouse gas emissions continue to increase rather than decrease.¹⁴¹ Commentators agree that the current pace of emissions reductions may well be too slow to stave off disaster.¹⁴² The construction of a global renewable energy or nuclear energy infrastructure sufficient to displace existing fossil-fueled systems may not be achieved in time.¹⁴³ Carbon capture technology similarly is promising but unlikely to be available at a sufficient scale quickly enough.¹⁴⁴

This assessment does not intend to be defeatist. The point is not that current efforts to decarbonize the world economy are doomed to fail. The point is that they may need more time to be successful. This assessment highlights the uncertainty surrounding how long these efforts require before they are successful. Consequently, it will be necessary to have tools available for deployment the moment it becomes clear that action beyond mitigation is needed.

There are two complementary needs for flexibility. The *first* is that there needs to be an approach—today—that allows for the *development* of SRM technologies so that they can be ready for deployment in 2030 (the time when climate tipping points are currently projected to be reached on existing emission trajectories).¹⁴⁵ This flexibility concerns not the actual deployment of SRM but the *study of different methods*, their cost of deployment, and the readying of all necessary

global-warming-to-1-8-c-but-implementing-them-will-be-the-key
[<https://perma.cc/ZG7M-J2PL>].

141. *Global Carbon Dioxide Emissions Are Set for Their Second-Biggest Increase in History*, INT'L ENERGY AGENCY (Apr. 20, 2021), <https://www.iea.org/news/global-carbon-dioxide-emissions-are-set-for-their-second-biggest-increase-in-history> [<https://perma.cc/J2FQ-5K7L>].

142. Nina Chestney & Andrea Januta, *U.N. Climate Change Report Sounds 'Code Red for Humanity'*, REUTERS (Aug. 9, 2021, 4:52 PM), <https://www.reuters.com/business/environment/un-sounds-clarion-call-over-irreversible-climate-impacts-by-humans-2021-08-09> [<https://perma.cc/4256-D2GF>] (“The pledges to cut emissions made so far are nowhere near enough to start reducing level of greenhouse gases - mostly carbon dioxide (CO₂) from burning fossil fuels - accumulated in the atmosphere.” (emphasis omitted)).

143. For a discussion of supply chain problems, see Sourgens, *supra* note 12.

144. For a discussion of carbon capture, see Sempertegui & Sourgens, *supra* note 10.

145. See Damian Carrington, *Climate Tipping Points Could Topple Like Dominoes, Warn Scientists*, GUARDIAN (June 3, 2021, 12:34 PM), <https://www.theguardian.com/environment/2021/jun/03/climate-tipping-points-could-topple-like-dominoes-warn-scientists> [<https://perma.cc/97RW-3EWQ>].

components for deployment such that deployment can occur if it is indeed needed.¹⁴⁶

The **second** need for flexibility concerns the actual **deployment** of SRM. Climate science continues to play catch up to real life events.¹⁴⁷ As it stands, the science consistently has underestimated the pace of climate change.¹⁴⁸ Consequently, it is entirely possible that societies around the world will learn of impending climate disasters with only very short notice.¹⁴⁹ Design and deployment of SRM technologies may need to be scrambled with less notice than we would have thought to avoid these tipping points.¹⁵⁰ The governance framework must account for this potential need or else risk being undone by an emergency precisely when it is needed most.

The point of flexibility must be understood for what it is. If past is prologue, States **will deploy** SRM as a last-ditch effort to prevent a climate catastrophe.¹⁵¹ At that time, imploring States that such an act would be illegal would be of no practical consequence.¹⁵² Governance must therefore build toward an acceptable process of SRM development and toward early deployment to be successful. The goal of networked governance I outline here is to provide a flexible guide to SRM decision-making leading toward its eventual deployment. Any further attempt to prohibit its deployment is simply not attuned to human nature and what humans will do in circumstances where

146. Sikina Jinnah et al., *Governing Climate Engineering: A Proposal for Immediate Governance of Solar Radiation Management*, 11 SUSTAINABILITY 3954, 3956–57 (2019).

147. For a discussion of risk-mitigation management in light of this problem, see Frédéric G. Sourgens, *The Precaution Presumption*, 31 EUR. J. INT'L L. 1277 (2020).

148. Naomi Oreskes et al., *Scientists Have Been Underestimating the Pace of Climate Change*, SCI. AM. (Aug. 19, 2019), <https://blogs.scientificamerican.com/observations/scientists-have-been-underestimating-the-pace-of-climate-change> [<https://perma.cc/KGB2-Y4C6>].

149. Timothy M. Lenton et al., *Climate Tipping Points—Too Risky to Bet Against*, 575 NATURE 592, 592 (2019) (“[S]everal cryosphere tipping points are dangerously close . . .”).

150. *See id.*

151. *See* Daniel Grossman, *Geoengineering: A Worst-Case Plan B? Or a Fuse Not to Be Lit?*, YALECLIMATECONNECTIONS (June 8, 2021), <https://yaleclimateconnections.org/2021/06/geoengineering-a-worst-case-plan-b-or-a-fuse-not-to-be-lit> [<https://perma.cc/GV6W-SWJK>] (noting predictions of inevitable deployment of SRM from 1974 onwards).

152. *See* Sourgens, *supra* note 34, at Part III.

their bare survival is at stake. Nor is it attuned to the legal claims of necessity and emergency.¹⁵³

B. Inclusion

Flexibility is clearly not enough. The asserted need for flexibility to respond to an alleged climate emergency with SRM deployment leads to a breakdown in governance when it matters most—such an emergency would cut States potentially harmed by SRM deployment out of decision-making processes in the State deploying SRM.¹⁵⁴ The potentially harmed third State(s) outside of the deploying State would likely claim that the impending SRM action itself presents an emergency and would do all in its power to interdict it.¹⁵⁵ This sets up a vicious governance circle that has no easy way out. Holding off on SRM only makes the climate emergency more pressing; deploying more radical SRM approaches is only likely to set up stronger claims of emergency and more vigorous attempts at SRM interdiction. To avoid this scenario, we must take into account reasoned objections to specific SRM proposals as early as possible during the development of SRM protocols. Waiting until the eventual deployment of SRM is clearly too late.¹⁵⁶

1. Thin Conceptions of Consent

To avoid this problem, there is an additional need for governance beyond flexibility: SRM governance must be highly ***inclusive***. In the first place, it needs to be domestically inclusive. But just as importantly, it needs to include foreign parties. This idea of inclusivity goes back to an idea of ***consent***—for SRM governance to be legitimate, it needs to have the consent of those upon whom SRM could be unleashed.

True inclusivity demands that any regulatory SRM dialogue requires ***more than a thin conception of consent***.¹⁵⁷ A thin conception of consent would be satisfied if everyone affected by

153. See sources cited *supra* note 34.

154. See Sourgens, *supra* note 34, at 112–24.

155. See Craig Martin, *Geoengineering and the Use of Force*, OPINIO JURIS (Jan. 20, 2021), <https://craigmartin.com/2021/01/geoengineering-and-the-use-of-force> [https://perma.cc/62FQ-D245].

156. See *id.*

157. ADOM GETACHEW, *WORLDMAKING AFTER EMPIRE, THE RISE AND FALL OF SELF-DETERMINATION* 50 (2019).

an SRM rule had an opportunity to provide comments in a (foreign-led) administrative proceeding.¹⁵⁸ In a thin conception of consent scenario, the domestic regulator would continue to have wide discretion in shaping policy so long as it took into account the comments it received.¹⁵⁹

A thin conception of consent is intuitively problematic. **First**, take, for instance, subsistence farmers in India affected by SRM decisions in the United States; it is unlikely these farmers would in fact participate in U.S. notice-and-comment proceedings.¹⁶⁰ Granting them an opportunity to speak would do reasonably little to make sure that their concerns are in fact incorporated in policymaking given that they are *unlikely to learn of the opportunity* in the first place.¹⁶¹ To call such an approach “inclusive” would therefore not take seriously the concerns of such subsistence farmers.

Second, a thin conception of consent does not provide affected persons with the *information needed to comment* in a timely manner. Rather, policymaking can move forward behind closed doors. Comment is sought when reasonable alternatives to the one proposed by the regulator are few.¹⁶² And even then, important information is not always exchanged in a transparent manner.¹⁶³ Thin conceptions of consent are likely to lead to similar problems in the SRM context, given the stakes.

Third, and relatedly, a thin conception of consent does not allow affected persons to have *authorship and agency* with regard to the formulation of the rules that will end up governing

158. *See id.*

159. *See id.* For an account of participation in agency rulemaking as against settlement efforts, see Seema Kakade, *Remedial Payments in Agency Enforcement*, 44 HARV. ENV'T L. REV. 117, 119 (2020).

160. *See* Ayelet Berman, *Taking Foreign Interests into Account: Rulemaking in the US and EU*, 15 INT'L J. CONST. L. 235, 241 (2017) (“[O]ther kinds of impacts on foreigners (e.g., health, environmental, social) are not flagged and can go unnoticed.”). For a recent scientific discussion of the potential relationship between SRM and Indian monsoons, see Mansi Bhowmick et al., *Response of the Indian Summer Monsoon to Global Warming, Solar Geoengineering and its Termination*, 11 SCI. REPS., no. 9791, 2021, at 1.

161. *See* Berman, *supra* note 160, at 241.

162. *See* Quechan Tribe of Fort Yuma Indian Reservation v. U.S. Dep't of Interior, 755 F. Supp. 2d 1104 (S.D. Cal. 2010).

163. *See id.*; Elizabeth Kronk Warner et al., *Changing Consultation*, 54 UC DAVIS L. REV. 1127, 1152–54 (2020) (discussing caselaw involving claims as to alleged violations of statutory consultation requirements).

them.¹⁶⁴ Rather, authorship would remain in the hands of a (foreign) regulator.¹⁶⁵

Fourth, and finally, this thin conception of consent as a matter of logic does little for **coordinating responses** between different States. Even if each regulator applied a thin conception of consent globally, each regulator would simply continue to make its own domestic policy. It would not strive to make policy as part of a broader global plan of action.

Given these problems, it should be unsurprising that this thin conception of consent is subject to a strong critique from anti-colonialist authors such as Professor Adom Getachew.¹⁶⁶ Thin conceptions of consent, argues Professor Getachew, are tools of oppression.¹⁶⁷ They do not give equal moral agency to those immediately affected by a particular decision.¹⁶⁸ And the decision is made in faraway power centers that have little to no regard for the welfare of those whom it affects.¹⁶⁹

2. Strong Conceptions of Consent

It is therefore equally intuitive that any desirable SRM governance paradigm must rely upon a stronger conception of inclusion and consent. Persons affected by SRM must not be subject to the arbitrary power of those developing or deploying SRM. What makes such power arbitrary is a structural question: those affected by a decision are excluded from actual decision-making because they are excluded from decision-making processes and decision-making structures.¹⁷⁰ In a thin conception of consent, they at most enjoy a limited right of submitting comments to decision-makers. But they are not active participants in designing decisions or deliberating choices. In other words, thin consent precisely disguises arbitrary exercises of power because it does not include the voices of affected persons on an equal footing.

164. For a discussion of similar concerns in the context of the Dakota Access Pipeline, see Warner et al., *supra* note 163 at 1166–68.

165. *See id.*

166. GETACHEW, *supra* note 157, at 50–71.

167. *See id.*

168. *Id.*

169. *Id.*

170. *See* PHILIP PETTIT, REPUBLICANISM: A THEORY OF FREEDOM AND GOVERNMENT 90–92 (1999).

A strong conception of consent and inclusion reverses these attributes of a thin conception of consent. **First**, a strong conception of consent solicits input from affected persons. It is not enough that these persons have standing to make comments in a proceeding of which they know little. This reversal of consent requirement is nothing novel. Rather, it is a typical requirement of community consent in infrastructure and tribal consent in energy projects.

Second, a strong conception of consent requires a significant exchange of information at the earliest feasible time.¹⁷¹ This exchange of information is necessary precisely because available information conditions comments.¹⁷² And the sooner information is exchanged, the more effectively comments can guide decision-making because the information can intervene before significant expenditures have been made in a problematic direction.¹⁷³

Third, a strong conception of consent requires that affected communities have an ability to take a hand at regulatory drafting.¹⁷⁴ They must have proposal rights rather than just rights to comment on the proposals of others.¹⁷⁵ They must have active rights to participate in decision-making.¹⁷⁶ Affected communities cannot be relegated to the status of passive participants.¹⁷⁷

A strong conception of consent also reverses the fourth problem I identified in the context of thin consent above. Rather than leading to arbitrary regulatory approaches, a strong conception of consent can lead to paralysis.¹⁷⁸ Requiring a strong conception of consent can tie a regulator's hands.¹⁷⁹ Requiring strong conceptions of consent, even in emergency situations, therefore risks succumbing to the emergency.¹⁸⁰

Intuitively, flexibility and inclusion appear to be in tension with each other. Now we have a better understanding why that

171. Warner et al., *supra* note 163, at 1161.

172. Quechan Tribe of Fort Yuma Indian Rsrv. v. U.S. Dep't of Interior, 755 F. Supp. 2d 1104, 1104 (S.D. Cal. 2010).

173. *See id.*

174. *See* GETACHEW, *supra* note 157, at 50–71.

175. *Id.*

176. *Id.*

177. *Id.*

178. *See* David Takacs, *Environmental Democracy and Forest Carbon (REDD+)*, 44 ENV'T L. 71, 118 (2014).

179. *See id.*

180. *See id.*

is. SRM has potentially far-reaching implications for those affected by it, which increases the need for a strong conception of consent. But at the same time, the need for flexibility makes it difficult to give full voice to those affected by decisions. There is thus a pull toward thinner conceptions of consent. Both flexibility and inclusion thus are poised to fight each other to a stalemate unless governance processes provide a means to reconcile and leverage this tension.

Identifying this problem is crucial for devising a governance solution. The goal must be to build a model that is capable of generating meaningful global consultation. Such consultation must be able to yield flexible results, rather than lead to a one-size-fits-all approach. And as I will submit, the best way to secure these two goals is to follow a bottom-up governance approach. The reason for this choice is simple: bottom-up governance has a track record for successfully navigating the flexibility-inclusion dilemma identified so far in this Article.

III. THE DARK SUN NETWORK

In the remainder of this Article, I develop how a networked, bottom-up governance approach can solve the SRM governance challenge outlined above. Networked governance provides a means for flexible problem solutions. It also provides a means for implementing a meaningful strong conception of consent. Networked, bottom-up governance is frequently associated with cyberspace.¹⁸¹ In fact, this decentralized approach to governance from the grassroots up is part of cyberspace's founding mythology.¹⁸² Cyberspace, of course, did not invent bottom-up, networked governance.¹⁸³ Rather, it adopted as its own the

181. David R. Johnson & David Post, *Law and Borders—The Rise of Law in Cyberspace*, 48 STAN. L. REV. 1367, 1387–91 (1996); Paul Schiff Berman, *The Globalization of Jurisdiction*, 151 U. PA. L. REV. 311, 534 (2002); Milton Mueller, *Communications and the Internet*, in THE OXFORD HANDBOOK OF INTERNATIONAL ORGANIZATIONS 535, 541 (Jacob Katz Cogan et al. eds., 2016).

182. For a discussion of the literature arguing that such a bottom-up approach is inappropriate for cyberspace and therefore a myth, see Dan Hunter, *Cyberspace as Place and the Tragedy of the Digital Anticommons*, 91 CAL. L. REV. 439, 450 (2003). For a full discussion of the nature of cyberspace as a true commons, see Frédéric G. Sourgens, *Cyber-Nuisance*, 42 U. PA. J. INT'L L. 1005 (2021).

183. See Ralf Michaels & Nils Jansen, *Private Law Beyond the State? Europeanization, Globalization, Privatization*, 54 AM. J. COMP. L. 843, 883 (2006) (embedding cyber-governance in the broader private, international law governance discourse). For the purposes of this Article, bottom-up governance does not mean

existing governance approaches to global commerce (such as global finance, international sales transactions for raw materials, or finished goods).¹⁸⁴ To this day, bottom-up governance remains one of the key features of international private governance in both the brick-and-mortar world and in virtual reality.¹⁸⁵

As we will see in this Part, the story of bottom-up governance as a viable approach for global *public* governance problems is a story of three scholar-diplomats: Janet Koven Levit, Harold Hongju Koh, and Anne-Marie Slaughter.¹⁸⁶ Bottom-up governance is not focused in the first instance on a formal, substantive legal norm such as, say, an international treaty.¹⁸⁷ Instead, bottom-up governance connects administrative agencies across States to solve shared problems in a collaborative fashion through engagement and exchange. Their work has deeply influenced the existing structure of global climate regime.¹⁸⁸ A bottom-up approach to SRM governance is a natural continuation of their story. And for the reasons that drove Levit, Koh, and Slaughter to bottom-up governance—its flexibility, the inclusive manner in which it builds consensus,

soft law governance. Instead, it means networked governance as discussed in this Section.

184. See *id.* For a discussion of the development of these broader bottom-up governance processes in transnational law, see KLAUS PETER BERGER, *THE CREEPING CODIFICATION OF THE NEW LEX MERCATORIA* 1–13 (2d ed. 2010).

185. See GERALF-PETER CALLIESS & PEER ZUMBANSEN, *ROUGH CONSENSUS RUNNING CODE: A THEORY OF TRANSNATIONAL PRIVATE LAW* 134–52 (2d ed. 2010).

186. See Janet Koven Levit, *A Bottom-Up Approach to International Lawmaking: The Tale of Three Trade Finance Instruments*, 30 *YALE J. INT'L L.* 125 (2005); Harold Hongju Koh, *Triptych's End: A Better Framework to Evaluate 21st Century International Lawmaking*, 126 *YALE L.J. FORUM* 338 (2017) (hereinafter Koh 2017); HAROLD HONGJU KOH, *THE TRUMP ADMINISTRATION AND INTERNATIONAL LAW* (2018) [hereinafter Koh 2018]; SLAUGHTER, *supra* note 55.

187. Benedict Kingsbury et al., *Global Administrative Law and Deliberative Democracy*, in *THE OXFORD HANDBOOK OF THE THEORY OF INTERNATIONAL LAW* 526, 528–29 (Anne Orford & Florian Hoffmann eds., 2016).

188. For example, Harold Koh served as legal adviser to the State Department and Anne-Marie Slaughter as director of policy planning at the State Department as the new bottom-up approach to climate governance in U.S. foreign policy began to take shape. *Anne-Marie Slaughter*, *NEW AM.*, <https://www.newamerica.org/our-people/anne-marie-slaughter> [https://perma.cc/4W23-KPRW] (Slaughter was the director of policy planning for the U.S. State Department from 2009 to 2011); see *Harold Hongju Koh*, *YALE L. SCH.*, <https://law.yale.edu/harold-hongju-koh> [https://perma.cc/H34G-9LAC] (Koh was the legal adviser to U.S. State Department from 2009 to 2013). The switch to a bottom-up approach became apparent in the Copenhagen Conference of the Parties in 2009 and the period immediately thereafter. See Radoslav S. Dimitrov, *Inside Copenhagen: The State of Climate Governance*, 10 *GLOBAL ENV'T POL.* 18, 21–22 (2010).

and its ability to deliver coordinated results even before that consensus is firmly established—bottom-up governance is also a particularly good fit for solving our SRM governance impasse.

A. Bottom-Up Global Governance

Why bottom-up governance? Janet Levit classically answers this question by pointing out a bias in legal scholarship.¹⁸⁹ Legal scholars prefer a top-down governance lens (legislators legislate and diplomats conclude treaties and the like to solve governance problems). Yet, this top-down approach leaves much of actual global governing (that is, how decisions are actually made and implemented in the real world) by the wayside.¹⁹⁰ In fact, even accounts that suggest that global governance is far less monolithic than top-down approaches would “nonetheless relegate most of their analysis to a top-down approach, usually starting with a state-based treaty in the context of a banner headline national security or foreign relations question.”¹⁹¹ As former assistant general counsel to the U.S. Export-Import Bank and associate general counsel of TradeCard, Inc. (and thus an active participant in bottom-up governance processes in the government and private sector), Levit knew that there is a lot more to global governance than the traditional top-down approach would suggest.¹⁹² Not only that, the missing piece (bottom-up governance) may interact and “be mutually reinforcing and sustaining” with the traditional top-down perspective.¹⁹³ It is therefore necessary that bottom-up governance be brought to the fore.

The key difference between a top-down and a bottom-up governance approach is that a top-down approach looks to specific instruments that lay down new formal rules agreed upon ahead of time by legislators and diplomats in legislative deliberations and treaty negotiations.¹⁹⁴ Before the deliberations reach that crucial stage of passing the text of a

189. See Levit, *supra* note 186, at 129.

190. See *id.*

191. *Id.* at 181.

192. See *id.* at 126. TradeCard, Inc. “designs and develops supply chain management software.” *TradeCard Inc.*, BLOOMBERG, <https://www.bloomberg.com/profile/company/7623771Z:US> [<https://perma.cc/89XJ-WU6T>].

193. Levit, *supra* note 186, at 153.

194. *Id.* at 126–27.

statute into law or signing a treaty, legislating is pretty vacuous work—bills do not have any legal force of their own, after all. Once there is law or treaty, however, the rules the law or treaty embody have immediate, concrete, and full authority to constrain behavior.¹⁹⁵ One upshot is that law through a top-down lens is either there or it is not; it is never in between.¹⁹⁶

Bottom-up governance approaches place emphasis precisely on the in-between of actual governance practice. In a private law setting, we are used to merchants dealing with each other outside of the firm strictures of classic contract law—such dealings gave us Cardozo’s *Lady Duff Gordon* and Llewellyn’s article 2 of the UCC.¹⁹⁷ We are perhaps less used to this kind of interaction in a public law setting. But the same kind of exchange takes place here, too. And this type of exchange is the focus of bottom-up governance, which is not on agreement on a formal, substantive legal norm.¹⁹⁸ Rather, it considers how one can channel the power of domestic regulators and diplomats, private enterprise, and civil society toward a common goal.¹⁹⁹

Once one sees bottom-up governance in action, it is hard to unsee. Consider a domestic U.S. example: as of yet, there is no federal standard governing how much of the electricity generated and sold in the United States must come from renewable energy sources.²⁰⁰ Despite this lack of federal mandate, “states began enacting RPS [renewable portfolio standard] laws primarily in the 1990s, and they now exist in thirty states.”²⁰¹ RPS laws “require electric utilities in the state to obtain a certain percentage of the electricity they sell to customers from renewable energy resources by a set date, such as 20 percent by 2025 or 15 percent by 2030.”²⁰² There is a discernible move toward such laws—and (within reason) toward

195. See DAVID JENS OHLIN, *THE ASSAULT ON INTERNATIONAL LAW* 54 (2015).

196. See Anna di Robilant, *Genealogies of Soft Law*, 54 AM. J. COMP. L. 499, 505–06 (2006).

197. *Wood v. Lucy, Lady Duff Gordon*, 118 N.E. 214 (N.Y. 1917); Ingrid Michelsen Hillinger, *The Article 2 Merchant Rules: Karl Llewellyn’s Attempt to Achieve the Good, the True, the Beautiful in Commercial Law*, 73 GEO. L.J. 1141 *passim* (1985).

198. See Benedict Kingsbury et al., *supra* note 187, at 528–29.

199. *Id.*

200. Jesse M. Cross & Shelley Welton, *Making Federalism Work: Lessons from Health Care for the Green New Deal*, 55 U. RICH. L. REV. 765, 821 (2021).

201. Alexandra B. Klass & Shantal Pai, *The Law of Energy Exports*, 109 CAL. L. REV. 733, 793–94 (2021).

202. *Id.*

greater ambition within them all without a federal mandate.²⁰³ Critically, once States started moving in that direction, they apparently influenced others to follow suit.²⁰⁴ Renewable energy policy in the United States therefore is very much an example of bottom-up governance.²⁰⁵ This is not a lone example.²⁰⁶ Rather, governments frequently coalesce around common policy values on an apparently voluntary basis even when there is no realistic hope of achieving a top-down agreement on such common policies.²⁰⁷ And frequently, one can even discern a momentum or influence such policies have on policies used by other governments.²⁰⁸

B. Assessing a Bottom-Up Approach

There are two central and related benefits of such bottom-up governance. **First**, it can garner **truly broad participation**.²⁰⁹ It is not yet necessary to sign up for fully binding commitments ahead of time. One can do something less—such as agree in principle while waiting to see whether that agreement will in fact yield the desired results.²¹⁰ That is, bottom-up governance is (to a point) governance by test balloon.²¹¹ **Second**, and just as importantly, bottom-up governance therefore has a certain **legal economy**—it looks to mobilize agents with existing power to address a problem instead of insisting on reinventing the wheel from scratch.²¹²

These two benefits track and address our flexibility and inclusion dilemma. Bottom-up governance is **genuinely**

203. *Id.*

204. *See id.*

205. Hari M. Osofsky & Janet Koven Levit, *The Scale of Networks?: Local Climate Change Coalitions*, 8 CHI. J. INT'L L. 409, 416–17 (2008); Shelley Welton & Joel Eisen, *Clean Energy Justice: Charting an Emerging Agenda*, 43 HARV. ENV'T L. REV. 307, 325 (2019) (noting the bottom-up nature of current efforts as well as their limitations).

206. *See* Welton & Eisen, *supra* note 205, at 325.

207. *See* Levit, *supra* note 186, at 125–30.

208. *Id.*

209. Peter Lawrence, *International Relations Theory*, in THE OXFORD HANDBOOK OF INTERNATIONAL ENVIRONMENTAL LAW 153, 162–63 (Lavanya Rajamani & Jacqueline Peel eds., 2021).

210. Frédéric G. Sourgens, *The Paris Paradigm*, 2019 U. ILL. L. REV. 1637, 1690–98.

211. *Id.*

212. Lawrence, *supra* note 209, at 162–63.

inclusive.²¹³ Because it governs by test balloon, it allows all participants to make proposals.²¹⁴ It then subjects these proposals to debate between participants in the governance process.²¹⁵ This debate in turn allows for a more intelligent formulation of policies because there is now more data from test balloons to see what actually works.²¹⁶ Bottom-up governance empowers participants to try their hand, demonstrate proof of concept, and continue to work toward common goals over time.²¹⁷ And this approach encourages the timely exchange of information to improve one's own governance response and convince others that one, in fact, has provided proof of concept.

In short, bottom-up governance avoids the inclusion problems associated with top-down approaches. No one person holds the regulatory pen at any one time. There is no active norm author and passive norm audience—rather, there are only diverse and yet more or less equal norm authors. That means that the dynamics of weak consents cannot easily develop. Similarly, top-down approaches see comments as potential detractors from a desired outcome. Bottom-up approaches, on the other hand, look at comments as engagement toward joint action and therefore welcome them far more readily.

At the same time, bottom-up governance is also far **more flexible**. It does not insist on any one approach and leaves a broad field of possible action by governance participants. Short of action that is patently inconsistent with broadly defined shared goals, it allows participants to float test balloons. It thus encourages flexibility—and allows fast action—far more readily than a top-down approach could.

Climate negotiations are a good example of how bottom-up governance overcame a flexibility-inclusion dilemma that had bedeviled climate law since the Kyoto Protocol.²¹⁸ Harold Koh, then legal adviser to the U.S. State Department, was part of the team that deployed this bottom-up approach in the context of climate negotiations.²¹⁹ These efforts culminated in the conclusion of the Paris Agreement.²²⁰ This was a significant

213. See Sourgens, *supra* note 210, at 1690–98.

214. *Id.*

215. *See id.*

216. *See id.*

217. *See supra* Section III.A.

218. Koh 2017, *supra* note 186, at 435.

219. *Id.* at 435.

220. *Id.*

achievement; the “Paris Agreement is the first universal agreement on climate change that is legally binding.”²²¹ It leverages the expertise of existing regulatory processes in member States to achieve global climate outcomes.²²² And the Agreement would have utterly failed to come to fruition had it insisted on following a top-down model.²²³

This development was purposeful. Koh noted in his tenure as legal adviser that “international legal engagement has become about far more than just treaties and executive agreements.”²²⁴ Specifically, it deviated from the top-down approach to climate change prior to the Copenhagen climate conference in 2009 “to a much more informal, politically binding, bottom-up Copenhagen blueprint infused with stronger norms and with greater symmetry between the duties of developed and developing nations.”²²⁵ Rather than mandating emissions quotas, this bottom-up approach engaged State decision-makers through voluntary contributions toward greenhouse gas emissions reductions.²²⁶ It required that reductions become increasingly more ambitious over time.²²⁷ It thus did on a global scale what happened in the context of renewable portfolio standards on the domestic scale: it leveraged bottom-up governance.

But what makes the Paris Agreement such a success is not just any kind of bottom-up governance approach. Rather, just as Levit predicted, traditional top-down framework instruments and bottom-up governance approaches are mutually reinforcing.²²⁸ The mutual reinforcement between top-down and bottom-up approaches is clear—when comparing the Paris climate governance reports with renewable portfolio standards, the Paris Agreement accomplished goals that the portfolio standards have been unable to complete. It provided a clear mechanism for Paris Agreement members to work together

221. Rafael Leal-Arcas & Antonio Morelli, *The Resilience of the Paris Agreement: Negotiating and Implementing the Climate Regime*, 31 GEO. ENV'T L. REV. 1, 3 (2018).

222. See DANIEL BODANSKY ET AL., INTERNATIONAL CLIMATE CHANGE LAW 209 (2017).

223. See Koh 2017, *supra* note 186, at 435.

224. Koh 2018, *supra* note 186, at 338.

225. Koh 2017, *supra* note 186, at 435.

226. See Koh 2018, *supra* note 186, at 352.

227. See *id.* at 360.

228. Levit, *supra* note 186, at 153.

toward a shared goal.²²⁹ This mechanism used a traditional top-down governance instrument—a treaty—to create this additional momentum.²³⁰ This combination strengthened the ambition of domestic climate action by providing a forum for coordination of such action on a global scale.²³¹ But there is no constitutional magic at work in the combination of top-down instruments like the Paris Agreement with bottom-up governance approaches. States, such as California, or cities, such as New York, could enter into similar agreements with each other without running afoul of constitutional limitations (and they have in fact begun to do so).²³² One strength of bottom-up governance is that it is flexible all the way down.

C. Bottom-Up Governance and SRM

Bottom-up governance approaches are a helpful starting point for SRM governance. SRM governance requires a broad, global participation given the global impacts of SRM. Bottom-up governance permits us to get going on governance now, even before there is a formal, top-down multilateral instrument governing its use. The flexibility of bottom-up governance also makes it possible to build toward a consensus on SRM governance organically rather than requiring full buy-in on means and method before fully studying the various possible SRM approaches. As the example of renewable portfolio standards in the United States suggests, the process may well be messy and lead to inconsistent results at first.²³³ But these results are likely to converge and bring new regulators in from the sidelines at a time when broadening participation is critical.²³⁴

Before moving to how to launch bottom-up SRM governance, a point of distinction is in order. The bottom-up governance approach discussed in this Section has important similarities, but also significant differences, to another style of governance

229. See BODANSKY ET AL., *supra* note 222.

230. U.N. Framework Convention on Climate Change Conference of the Parties, Twenty-First Session, *Adoption of the Paris Agreement*, U.N. Doc. FCCC/CP/2015/L.9/Rev.1 (Dec. 12, 2015) [hereinafter *Paris Agreement*].

231. *Id.*

232. Frédéric G. Sourgens, *States of Resistance*, 14 DUKE J. CONST. L. & PUB. POL'Y 91, 133–34 (2019).

233. See sources cited *supra* notes 200–201.

234. *Id.*

that also has been labelled “bottom-up governance”—soft law governance. Soft law governance proposes a set of standards, typically developed by experts.²³⁵ Examples include model contracts that, if adopted, set trade usage for their terms or model rules that can be consulted by relevant decision-makers in the exercise of their sound discretion even in the absence of ex ante agreement.²³⁶ These standards on their face are nonbinding.²³⁷ Yet, through their increased use by core stakeholders, these standards become the de facto rules governing a particular enterprise.²³⁸

In the SRM context, the 2015 *Draft Code of Conduct for Responsible Scientific Research involving Geoengineering* is one such example.²³⁹ In nineteen draft articles, this Code seeks to sketch not just how parties ought to communicate with each other.²⁴⁰ It also sets substantive boundaries of precaution and use and sketches general principles to be followed.²⁴¹ Many of the procedural prescriptions on the importance of environmental assessments, public participation, and transparency are indeed central to any bottom-up governance approach.²⁴²

This is not what I mean by bottom-up governance. My bottom-up governance approach is far less substantively prescriptive. An example can help illustrate the distinction. The Code includes a strong precautionary principle; it requires the adoption of precautionary measures against harm from geoengineering.²⁴³ The Code’s use of precaution proposes a value preference.²⁴⁴ Our approach, on the other hand, leaves this value question of precaution open. Problematically for us, the

235. Kenneth W. Abbott & Duncan Snidal, *Hard and Soft Law in International Governance*, 54 INT’L ORG. 421, 441–43 (2000).

236. E.g., *Forms*, AAPL (2019), <https://www.landman.org/resources/contract-center-and-forms> [<https://perma.cc/2WJP-ZZHW>]; INT’L BAR ASS’N, IBA RULES ON THE TAKING OF EVIDENCE IN INTERNATIONAL ARBITRATION 5 (2020) (“The Rules provide mechanisms for the presentation of documents, witnesses of fact and expert witnesses, inspections, as well as the conduct of evidentiary hearings. The Rules are designed to be used in conjunction with, and adopted together with, institutional, ad hoc or other rules or procedures governing international arbitrations.”).

237. Abbott & Snidal, *supra* note 235, at 439.

238. See di Robilant, *supra* note 196, at 510.

239. *Code of Conduct*, *supra* note 39, at 9–10.

240. *Id. passim*.

241. *Id.* at arts. 5, 8, 9.

242. *Id.* at arts. 13–15, 18.

243. *Id.* at 43.

244. See *id.* at 43.

Code precisely prejudices a key question that requires deliberation: how does one resolve a clash between climate precaution counselling and SRM precaution?²⁴⁵ Climate precaution would favor the rapid deployment of uncertain SRM technologies to forestall hitting uncertain but potentially catastrophic climate tipping points. SRM precaution would counsel against such deployment because the SRM technology itself might (but is not certain to) do significant harm in its own right. The Code has an *ex ante* answer: SRM precaution trumps climate precaution.²⁴⁶ That is precisely the kind of debate that this bottom-up approach hopes to keep open for concrete, factual contestation, as opposed to *ex ante* predetermination.²⁴⁷ This approach is bottom-up “all the way down.” The Code’s soft law approach is not.

This distinction is purposeful: I hope to provide a governance framework that imposes as few external substantive constraints on global SRM decision-making as possible. My point is that the way out of SRM governance deadlock is procedural rather than substantive. The process just needs to be prudently flexible and robustly inclusive. Approaches like the Code demand something else.

This is not to say that soft law approaches like the Code’s and the bottom-up governance approach could not work together. The research done by the Code’s working group is likely to prove instrumental within a bottom-up governance network once it has been formed, given the expertise of the Code’s expert group.²⁴⁸

But even then, use of the Code requires caution. The difference between thin and strong conceptions of consent and inclusivity turn exactly on the difference between passive assent and active deliberation.²⁴⁹ Lobbying for the early acceptance of a soft law document like the Code runs a risk: it could hollow out consent. This risk is particularly acute in the SRM context because Global South States face an information deficit even though they are likely to be heavily impacted by SRM and climate change. The Code could cajole them into a passive

245. *Id.*

246. *Id.*

247. See Sourgens, *supra* note 147.

248. *Code of Conduct*, *supra* note 39, at 2.

249. GETACHEW, *supra* note 157, at 50–71; see also PETTIT, *supra* note 170, at 90–92.

exercise of acceptance of the work of experts.²⁵⁰ Nothing could be more dangerous for inclusivity.²⁵¹ The Code therefore cannot jump-start bottom-up governance. Jump-starting bottom-up governance requires a particular kind of State action. This leaves the questions of what kind of State action and how that State action can improve the quality of engagement and bottom-up governance—questions that I will address in the next Section.

D. The Network Effect

Bottom-up governance sounds like a great slogan—but how does it actually work? And how does we ensure that bottom-up governance is, in fact, a deliberative form of governance? Both of these questions are critical in assessing whether this governance approach is capable of overcoming the current problems faced by SRM governance. Can we get broad participation around meaningful standards that have been appropriately vetted and give a sufficient voice to those most directly affected by an SRM approach prior to them being subjected to its consequences?

Anne-Marie Slaughter is perhaps the leading voice on these fundamental questions.²⁵² Slaughter is also one of the most respected international legal academics in the United States, having served as president of the American Society of International Law and director of policy planning for the U.S. State Department.²⁵³ Slaughter—like Koh and Levit—approaches questions of global governance as both an academic and an active participant in global governance processes.

250. The expertise of the group skews heavily in favor of technical and international legal expertise and may be less well attuned to the perspective of developing States. See *Code of Conduct*, *supra* note 39, at 2.

251. GETACHEW, *supra* note 157, at 50–71; see also PETTIT, *supra* note 170, at 90–92.

252. See Itamar Mann, *Dialectic of Transnationalism: Unauthorized Migration and Human Rights, 1993-2013*, 54 HARV. INT'L L.J. 315, 323 (2013).

253. *Governance*, AM. SOC'Y INT'L L., <https://www.asil.org/about/governance> [<https://perma.cc/8JYP-QWYN>]; Anne-Marie Slaughter, NEW AM., <https://www.newamerica.org/our-people/anne-marie-slaughter/> [<https://perma.cc/22GV-TQ82>]. The position of director of policy planning has a rank comparable to an assistant secretary of state, and the director is tasked with providing independent policy analysis to the secretary of state. See *Director of Policy Planning*, U.S. DEPT OF STATE, <https://history.state.gov/departmenthistory/people/principalofficers/director-policy-planning> [<https://perma.cc/WQ8Q-HD2C>].

Slaughter's principal point is that bottom-up governance occurs in transnational networks.²⁵⁴ Regulators meet up to exchange and discuss common problems they face.²⁵⁵ At the most informal level, regulators compare notes and take what they have learned into account when exercising their respective domestic authority.²⁵⁶ Something as informal as participation on a conference panel can have this effect: a regulator could hear their counterpart present how they were able to solve a particularly thorny issue and think, "I could try that!"²⁵⁷

Frequently, what happens in networks is more than an exchange of information. Regulators have an honest desire to exchange knowledge regarding common problems and find a way to coordinate their responses.²⁵⁸ Here, the exchanges are no longer left to chance depending on what conference panel a regulator attends. There is a targeted attempt to compare regulatory approaches.²⁵⁹ The idea is to find means to, where possible, make such approaches compatible so as to improve regulatory outcomes and to ease the regulatory burden on those affected by regulation.

Finally, regulators can back up multilateral diplomatic exchanges.²⁶⁰ They can provide the necessary input for meaningful diplomatic advances on technical regulatory issues.²⁶¹ Here, regulators take a role that is almost that of a diplomat and work with their counterparts to find solutions to global problems consistent with their respective expertise.²⁶²

In all three modes of networked governance discussed above, the exchange between regulators is deliberative.²⁶³ It is the exchange between different regulators that makes it possible

254. SLAUGHTER, *supra* note 55. The approach has been developed further by Kal Raustiala. Kal Raustiala, *The Architecture of International Cooperation: Transgovernmental Networks and the Future of International Law*, 43 VA. J. INT'L L. 1, 17–26 (2002).

255. SLAUGHTER, *supra* note 55.

256. *Id.*

257. *See id.*

258. *Id.*

259. *See id.* at 173 (discussing examples of such exchanges between the U.S. SEC and U.S. EPA and international interlocutors).

260. *Id.* at 63–64.

261. *Id.*

262. *Id.*

263. For a discussion on the question of how deliberative such engagement is and whether such deliberation suffices to address a democracy deficit in global administrative exchanges, see Benedict Kingsbury et al., *The Emergence of Global Administrative Law*, 68 L. & CONTEMP. PROBS. 15, 50 (2005).

to find effective solutions to common problems. Bottom-up governance approaches in these networks live from the exchange of ideas between different States, regulators, and civil society representatives. Each of these actors contribute to deliberation by making concrete regulatory proposals. Each actor exposes these proposals to scrutiny from other actors. And not only do they provide a forum in which such proposals could be scrutinized in concrete detail, they also provide experiments or models against which proposals can be appraised.

1. Transnational Networks

Transnational networks work differently from international treaties and top-down governance approaches. Regulators in transnational networks think of themselves as having shared problems, and they discuss and coordinate solutions.²⁶⁴ Network participants take in peer regulatory experiences and have critical conversations with each other about the ins and outs of different policy alternatives to solve their shared problem.²⁶⁵ As they have those discussions, they internalize the approaches of their peers as their own and use their domestic discretion in a manner consistent with those approaches.²⁶⁶ Networks work because regulators recognize, internalize, and implement joint solutions to shared problems in what becomes a form of dynamic regulatory coordination between network participants after the fact.²⁶⁷

The Paris Agreement again can help to shine a light on this process. In the last Section, I highlighted that the Paris Agreement is one of the success stories for bottom-up governance.²⁶⁸ How did we get there? Prior to the negotiation round that led to the Paris Agreement, leading emitters coordinated their proposed emissions reductions in Intended Nationally Determined Contributions (INDCs).²⁶⁹ For example, the U.S. commitment, consisting of the promise to pass and

264. See SLAUGHTER, *supra* note 55, at 49.

265. See *id.* at 250.

266. Harold Koh, *Transnational Legal Process*, 75 NEB. L. REV. 181, 186 (1996).

267. See *id.*

268. See Lavanya Rajamni & Emmanuel Guérin, *Central Concepts in the Paris Agreement and How They Evolved*, in THE PARIS AGREEMENT ON CLIMATE CHANGE: ANALYSIS AND COMMENTARY 74, 77–78 (Daniel Klein et al. eds., 2017).

269. *Id.*

maintain domestic regulation including the Clean Power Plan, was made strategically so as to invite reliance and coordination.²⁷⁰ U.S. action demonstrably did induce States, such as the China, to respond in kind.²⁷¹ The participation of China and the United States was instrumental to the success of the Paris Agreement overall.²⁷² What made the Paris Agreement work, then, was an exchange between regulators that gave meaning to diplomatic pledges to reduce greenhouse gas emissions. And this exchange occurred in a networked environment, as Anne-Marie Slaughter has succinctly demonstrated.²⁷³

Regulators who participate in transnational networks are trusted and effective go-betweens because they both have important subject matter expertise and appropriate investigatory resources. Take, for example, the EPA.²⁷⁴ The EPA has significant regulatory expertise with regard to air and water pollution.²⁷⁵ Foreign regulators seeking to solve air pollution problems can look to the EPA as a helpful conversation partner because the EPA has subject matter expertise.²⁷⁶ Just as importantly, the EPA also has access to data and an ability to investigate environmental problems.²⁷⁷ It can commission scientific research.²⁷⁸ It can do field work with other agencies to establish the health and safety impact of, say, water

270. Koh 2017, *supra* note 186, at 359.

271. Joint Statement-U.S.-China Announcement on Climate Change, 2014 Daily Comp. Pres. Doc. 852 (Nov. 12, 2014).

272. See SOPHIA KALANTZAKOS, THE EU, US AND CHINA TACKLING CLIMATE CHANGE, POLICIES AND ALLIANCES FOR THE ANTHROPOCENE 109 (2017) (discussing the global importance of U.S.-China climate collaboration).

273. Anne-Marie Slaughter, *How to Succeed in the Networked World*, FOREIGN AFF. (Nov./Dec. 2016), <https://www.foreignaffairs.com/articles/world/2016-10-04/how-succeed-networked-world> [<https://perma.cc/F6LE-X7ZQ>].

274. See Daniel A. Farber, *Triangulating the Future of Reinvention: Three Emerging Models of Environmental Protection*, 2000 U. ILL. L. REV. 61, 62–68 (discussing the EPA's historical model of environmental regulation).

275. *Id.*

276. *About the Office of Policy*, EPA (Oct. 5, 2022), <https://www.epa.gov/aboutepa/about-office-policy-op> [<https://perma.cc/ZS4P-PU6T>].

277. *Research Centers, Programs, and Scientific Advisory Organizations*, EPA (July 27, 2022), <https://www.epa.gov/aboutepa/research-centers-programs-and-science-advisory-organizations> [<https://perma.cc/S6LQ-6WX6>].

278. *Id.*

contamination from lead pipes.²⁷⁹ In the context of the Paris Agreement, it was rulemaking and proposed rulemaking by the EPA, like the Clean Power Plan, that paved the way for the U.S. INDCs (and thus the process of coordination with China and others).²⁸⁰

2. Regulator Responsibilities

Just as importantly, regulators themselves are under constraints to act diligently as a matter of domestic law.²⁸¹ For example, the EPA must follow rigorous notice-and-comment procedures when it wishes to make a new environmental

279. *Basic Information about Lead in Drinking Water*, EPA (May 25, 2022), <https://www.epa.gov/ground-water-and-drinking-water/basic-information-about-lead-drinking-water#regs> [<https://perma.cc/N8SV-DZYX>].

280. The United States of America, Nationally Determined Contribution: Reducing Greenhouse Gases in the United States; A 2030 Emissions Target, <https://unfccc.int/sites/default/files/NDC/2022-06/United%20States%20NDC%20April%2021%202021%20Final.pdf> [<https://perma.cc/H9WM-U8R6>] [hereinafter First US NDC]. For a discussion of the role of the Clean Power Plan, see Jonathan B. Wiener, *Precaution and Climate Change*, in THE OXFORD HANDBOOK OF INTERNATIONAL CLIMATE CHANGE LAW 163, 172–75 (Cinnamon Carlarne et al. eds., 2016). This regulatory authority has been hamstrung by the *West Virginia v. EPA* decision. *West Virginia v. EPA*, 142 S. Ct. 2587 (2022). The decision ruled that “[c]apping carbon dioxide emissions at a level that will force a nationwide transition away from the use of coal to generate electricity may be a sensible ‘solution to the crisis of the day.’ But it is not plausible that Congress gave EPA the authority to adopt on its own such a regulatory scheme in Section 111(d). A decision of such magnitude and consequence rests with Congress itself.”

Id. at 2616 (internal citation omitted). The decision applied the “major questions doctrine” to reach this result. *Id.* at 2610–14. The decision did not overrule *Massachusetts v. EPA* giving the EPA authority to regulate CO₂ emissions in the first place—reading between the lines of the decision, CO₂ emissions are within the scope of EPA authority so long as it regulates emissions in a manner that requires existing sources to operate more cleanly. “Prior to 2015, EPA had always set emissions limits under Section 111 based on the application of measures that would reduce pollution by causing the regulated source to operate more cleanly.” *Id.* at 2610. This would suggest that geoengineering approaches such as carbon capture utilization and storage may still present a viable option under existing statutory law. I will develop this point in later Article. For a discussion of what authority otherwise remains, see Amber X. Chen, ‘A Serious Setback:’ *Supreme Court Sides with West Virginia in West Virginia v. EPA*, DAILY CALIFORNIAN (July 4, 2022), <https://www.dailycal.org/2022/07/04/a-serious-setback-supreme-court-sides-with-west-virginia-in-west-virginia-v-epa> [<https://perma.cc/KC9S-5XFH>].

281. David S. Rubenstein, *Administrative Federalism as Separation of Powers*, 72 WASH. & LEE L. REV. 171, 231–35 (2015).

administrative rule or determination.²⁸² Administrative processes, in fact, frequently require regulators to engage actively with local stakeholders affected by an administrative decision.²⁸³ In the energy context, this typically requires that regulators solicit input from affected communities and affirmatively share data with those communities at the earliest possible point in time.²⁸⁴ The Clean Power Plan at the heart of the U.S. INDCs went through such a rigorous notice-and-comment process.²⁸⁵

The discourse between different global regulators, therefore, provides a source for subject matter expertise about, say, greenhouse gas emissions reductions. It also provides a means to hold decision-making accountable to those affected by regulation, either within the regulatory process itself or thereafter when regulation is challenged in the courts. Administrative agencies must follow administrative process and consult with affected communities.²⁸⁶ And agencies are accountable because other political actors (legislatures, the executive more broadly, and the courts) will hold administrative agencies to account if they fail to do so.²⁸⁷ The Clean Power Plan is one example of such accountability—its repeal was a campaign promise of then-candidate Trump, and its implementation was halted by the courts prior to a hearing of a full substantive challenge to the regulation.²⁸⁸ Given these control models, and the incentives they set, administrative agencies have expertise in governance design as much as they have expertise in technical subject matters.²⁸⁹ For example, the

282. See Daniel A. Farber, *Regulatory Review in Anti-Regulatory Times*, 94 CHI.-KENT L. REV. 383, 419–22 (2019) (discussing the Clean Power Plan and its later rollback).

283. See, e.g., *Quechan Tribe of the Fort Yuma Indian Rsrv. v. U.S. Dep't of the Interior*, 755 F.Supp.2d 1104 (discussing approval of a new solar energy project).

284. *Id.*

285. See BLAKE EMERSON, *THE PUBLIC'S LAW: ORIGINS AND ARCHITECTURE OF PROGRESSIVE DEMOCRACY* 201–03 (2019).

286. Rubenstein, *supra* note 281, at 231–35.

287. David S. Rubenstein, "Relative Checks Towards": *Optimal Control of Administrative Power*, 51 WM. & MARY L. REV. 2169, 2223–40 (2010).

288. For a discussion of litigation surrounding the Clean Power Plan, see Sourgens, *supra* note 129, at 190–91.

289. See Jean Chemnick, *Biden Won't Revive Obama's Clean Power Plan. So Now What?*, CLIMATEWIRE (Feb. 9, 2021, 7:00 AM), <https://subscriber.politicopro.com/article/eenews/1063724547> [<https://perma.cc/W9XZ-D2BT>].

Biden Administration's pick to lead the EPA stated that he would not revive the Clean Power Plan as such and would look for other means to implement its goals indicating an adjustment to governance design.²⁹⁰ The decision by the U.S. Supreme Court in *West Virginia v. EPA*, therefore, is not the body blow to climate regulation as it might at first appear.²⁹¹

In fact, when different regulators interact with each other, they cannot simply adopt the approach of a foreign counterpart.²⁹² Rather, regulators will need to follow their respective domestic public law processes in place for the making of regulation.²⁹³ Doing so ties coordinated global responses and shared problems firmly into existing public law accountability mechanisms and therefore lends legitimacy to coordinated global administrative decision-making.

Centrally, this form of global coordination provides greater accountability than ordinary treaty making. Administrative rulemaking, it is true, suffers its own accountability deficit.²⁹⁴ But this accountability deficit is even greater in the context of traditional, top-down rulemaking by means of international treaties.²⁹⁵ Treaties are traditionally negotiated by diplomats.²⁹⁶ They are then approved wholesale, for example, by means of domestic ratification procedures.²⁹⁷ In practice, this means that there is reasonably limited civil society input into the rules included in international treaties, with only informal avenues available in most instances.²⁹⁸

3. Law in Action

Networked, bottom-up governance has the benefit of enlisting domestic public law processes directly in global administrative action. This means that civil society actors have

290. *Id.*

291. *Id.*

292. See Rubenstein, *supra* note 281, at 231–35.

293. See *id.*

294. David S. Rubenstein, *Delegating Supremacy?*, 65 VAND. L. REV. 1125, 1184–85 (2012).

295. Vasan Kesavan, *The Three Tiers of Federal Law*, 100 NW. U. L. REV. 1479, 1613–14 (2006).

296. See Timothy Meyer, *From Contract to Legislation: The Logic of Modern Lawmaking*, 14 CHI. J. INT'L L. 559, 569 (2014) (contrasting the traditional role of a diplomatic conference to bilateral prescriptive approaches).

297. See Kesavan, *supra* note 295, at 1613–14.

298. See *id.* at 1613.

a greater ability to interrogate decision-making earlier than in the traditional treaty context.²⁹⁹ And they have an ability to steer conversations on specific points of contention rather than having to adopt or reject a finished treaty wholesale; they can, for instance, provide record evidence and legal and policy arguments in notice-and-comment procedures in a targeted manner.³⁰⁰ The evidentiary record civil society actors created would then form the basis for administrative decision-making in a concrete manner that more directly impacts the process of global coordination.³⁰¹

This leaves the question of how networked governance can lead to successful and effective global cooperation even in the absence of a top-down, treaty-based approach (or indeed any substantive *ex ante* agreement). Here, networks help explain how bottom-up governance works in much the same way as what we know from our private law experience. The exchange of apparently naked promises between merchants (and that such arrangements typically are met by performance) is not infrequent.³⁰² Justice Cardozo famously gave legal force to such arrangements in *Lady Duff-Gordon*, noting that “the law has outgrown its primitive stage of formalism when the precise word was the sovereign talisman, and every slip was fatal.”³⁰³ The reason that such arrangements tend to be performed—and are

299. For a discussion of potential for exclusion of civil society in the traditional treaty making paradigm, see Nahuel Maisley, *The International Right of Rights? Article 25(a) of the ICCPR as a Human Right to Take Part in International Law-Making*, 28 EUR. J. INT’L L. 89, 91–95 (2017). Maisley argues that article 25(a) of the International Covenant on Civil and Political Rights granting individuals a right to participate in public affairs also includes a right to participation in international lawmaking. *Id.* at 95–113. Maisley makes this argument in the traditional context of treaty making. *Id.* at 107–13. Networked governance would provide an intriguing alternative for the implementation of a right and would provide a more or less direct implementation of such a view as it treats international lawmaking as analogous to administrative rulemaking.

300. Thomas Lorenzen, *Undoing the Clean Power Plan: What Awaits President Obama’s Signature Environmental Regulation?*, 2017 NO. 1 RMMLF-INST 11, 11–9 (discussing notice-and-comment requirements in the context of the rollback of the Clean Power Plan); EMERSON, *supra* note 285, at 201–03 (discussing the notice-and-comment process by the Obama EPA in promulgating the Clean Power Plan).

301. Michael Barsa & David Dana, *Regulating During Emergencies*, 116 NW. U. L. REV. ONLINE 223, 227–29 (2021).

302. John E. Murray, *The Revision of Article 2: Romancing the Prism*, 35 WM. & MARY L. REV. 1447, 1456–57 (1994).

303. *Wood v. Lucy, Lady Duff-Gordon*, 118 N.E. 214, 214 (N.Y. 1917).

enforced by the courts when they are not—comes back to the good faith protection of reasonable reliance interests.³⁰⁴

Global networks function in much the same way. Regulators participate in networks and coordinate with their peers because they rely on the continued coordination and collaboration by others in return.³⁰⁵ As they do so, they must filter this coordination and collaboration through their own respective domestic administrative law processes to secure buy-in for the policy and see to its domestic enforceability.³⁰⁶ This, in turn, strengthens the buy-in of regulators because they can see that others are, in fact, moving to implement the result of networked governance decisions.

We can see this dynamic at work in the context of the Paris Agreement: once there was enough momentum behind INDCs, it became possible for other States to rely on the Paris process.³⁰⁷ Those States found ways to make their own INDCs in reliance on the action of first movers.³⁰⁸ This, in turn, paved the way for the Paris Agreement itself (including its temperature goal compromise).³⁰⁹ Yet, the Paris Agreement relied crucially on the networks of environmental regulators leading the way in INDCs to set the stage on which the formulation of a meaningful international treaty was in fact possible.³¹⁰ Climate dialogue after the Paris Agreement now takes place in a truly networked regulatory dialogue.³¹¹ The centralized exchange of INDCs provides a platform for the dynamic coordination of climate change efforts.³¹² INDCs create

304. See, e.g., Brian Bix, *Bargaining in the Shadow of Love: The Enforcement of Premarital Agreements and How We Think About Marriage*, 40 WM. & MARY L. REV. 145, 189 (1998) (discussing good faith and reasonable reliance jurisprudence in the context of premarital agreements).

305. SLAUGHTER, *supra* note 55, at 49.

306. Rubenstein, *supra* note 281, at 231–35.

307. Frédéric G. Sourgens, *Climate Commons Law: The Transformative Force of the Paris Agreement*, 50 N.Y.U. J. INT'L L. & POL. 885, 928–44 (2018).

308. *Id.*

309. See Fiona Harvey, *Paris Climate Change Agreement: The World's Greatest Diplomatic Success*, GUARDIAN (Dec. 14, 2015, 2:51 PM), <https://www.theguardian.com/environment/2015/dec/13/paris-climate-deal-cop-diplomacy-developing-united-nations> [<https://perma.cc/26JJ-RMBD>].

310. *Id.*

311. Sourgens, *supra* note 210, at 1690–98.

312. See Implementing the Paris Agreement—Issues at Stake in View of the COP 22 Climate Change Conference in Marrakesh, PARL. EUR. DOC. (PE 537.319) 18 (2016) [hereinafter European Parliament Report] (“These Parties played an important role in the preparation of the Paris Agreement, China and the United States *inter alia* through coordinated statements on their mitigation plans and the

reliance interests and incentives for more ambitious INDCs and create conduits for technology and knowledge transfer to implement these new approaches.³¹³

This *resilience* (significantly) holds even in the face of a withdrawal of the United States from the Paris Agreement under the Trump Administration.³¹⁴ The withdrawal did provide a jolt to global climate negotiations.³¹⁵ But crucially, U.S. cities and states jumped into the breach to make their own pledges to keep the United States on track with its original climate commitments.³¹⁶ Although COVID-19 complicates any meaningful systemic assessment, U.S. emissions in 2020 were down 21 percent against 2005 levels, thus exceeding the 17 percent reduction target agreed on during the 2009 Copenhagen negotiations and keeping the 26–28 percent reductions of the first U.S. INDC within sight.³¹⁷ This suggests that action by these stakeholders had a measurable impact on U.S. greenhouse gas emissions even at the height of Trump Administration rollbacks of Obama-era climate policies.

The U.S. withdrawal from the Paris Agreement also shows another surprising feature of networked governance. Networked governance—and its reliance on domestic administrative processes—improves governance *quality*. Current EPA data suggests that U.S. CO₂ emissions from electricity generation in 2019 were approximately 30 percent below 2005 levels.³¹⁸ The

European Union e.g. by establishing a coalition of countries supporting a strong mechanism to increase ambition under the Paris Agreement.”).

313. *See id.*

314. *See* Sourgens, *supra* note 210 (discussing the United States’s withdrawal from the Paris Agreement).

315. Emily Holden, *Trump Begins Year-Long Process to Formally Exit Paris Climate Agreement*, GUARDIAN (Nov. 4, 2019, 10:21 PM), <https://www.theguardian.com/us-news/2019/nov/04/donald-trump-climate-crisis-exit-paris-agreement> [<https://perma.cc/CV8F-G4AB>].

316. *See* Sourgens, *supra* note 232, at 114–17; KENT E. CALDER, GLOBAL POLITICAL CITIES: ACTORS AND ARENAS OF INFLUENCE IN INTERNATIONAL AFFAIRS 176 (2021).

317. Kate Larsen et al., *Preliminary US Greenhouse Gas Emissions Estimates for 2020*, RHODIUM GRP. (Jan. 12, 2021), <https://rhg.com/research/preliminary-us-emissions-2020> [<https://perma.cc/TL7F-Z2P5>]; *see also* Trevor Houser & Hannah Pitt, *Preliminary US Emissions Estimate for 2019*, RHODIUM GRP. (Jan. 7, 2020), <https://rhg.com/research/preliminary-us-emissions-2019> [<https://perma.cc/NH3E-FMN4>] (noting that 2019 figures put U.S. emissions “[a]t roughly 12% below 2005 levels”). Notably, in 2019, “[c]oal-fired power generation fell by a record 18% year-on-year to its lowest level since 1975.” *Id.*

318. *Greenhouse Gas Inventory Data Explorer*, EPA (Mar. 15, 2022), <https://cfpub.epa.gov/ghgdata/inventoryexplorer/#electricitygeneration/entiresecto>

Clean Power Plan sought to reduce CO₂ emissions by “32 percent below 2005 levels” once the regulation “is fully in place in 2030.”³¹⁹ It therefore appears that mechanisms replacing the Clean Power Plan achieved some top line of the goals of the plan earlier than expected and with greater social acceptability, even at a time of a reasonably skeptical administration.

In sum, by filtering coordinated action immediately through the administrative process, it is possible to get an early check on whether coordinated action is in fact possible because of the domestic regulatory processes that must be followed in each coordinating State. Once a statement of intent by a regulator (or diplomat) crosses that threshold to firm regulatory action, it is far more likely to “stick”—and continued coordination and collaboration is far more likely to have lasting results.³²⁰ We have seen that this is the case even if the specific regulatory approach implementing these goals changes because political accountability mechanisms (the election of President Donald Trump and the earlier injunction enjoining the implementation of the Clean Power Plan) work to rollback a specific approach to implement globally shared goals (greenhouse gas emissions reductions).³²¹ Global institutions, such as the International Energy Agency (IEA), confirmed these conclusions; it measures carbon emission pathways in emission reduction pledges in much the same way.³²² That is, once a regulation is in place, this pledged reduction counts toward IEA energy transition pathways and trajectories.³²³

In short, networked governance shows how bottom-up international lawmaking functions and how it improves both the resilience and quality of international efforts to solve shared global problems. We have seen that this is the case even in the

r/allgas/category/all [https://perma.cc/SSR2-32JW] (listing emissions in 2005 as 2400.06 million metric tons of CO₂ and in 2019 as 1606.02 million metric tons of CO₂).

319. *Fact Sheet: Overview of the Clean Power Plan; Cutting Carbon Pollution from Power Plants*, EPA (Jan. 19, 2017), <https://archive.epa.gov/epa/cleanpowerplan/fact-sheet-overview-clean-power-plan.html> [https://perma.cc/JVT6-YPZ5].

320. See Koh 2018, *supra* note 186, at 415 (“These internalized rules create default patterns of international law-observant behavior for all participants in the process. Those default patterns become routinized [and] ‘sticky’ . . .”).

321. See Sourgens, *supra* note 129, at 190–91.

322. See, e.g., INT’L ENERGY AGENCY, WORLD ENERGY OUTLOOK 2021, at 117–18 (Edmund Hosker ed., 2021) (discussing China’s net-zero pledge).

323. *Id.*

context of highly charged problems such as climate change and energy transition.³²⁴ We have also seen that this is the case even to the extent that there is a political check on the means of implementation of a particular approach to global coordination—global networks manage to incorporate the input from that check in future decision-making.³²⁵ And we have seen that this check serves to improve the governance design and record basis for shared regulatory goals.³²⁶ That is, we can conclude that networked, bottom-up governance is qualitatively up to the task of addressing complex problems requiring technical and governance expertise.

Further, it is able to address these problems in a manner that provides a more granular solution to the flexibility-inclusivity dilemma. What networked, bottom-up governance provides is *inclusivity as flexibility*. An ongoing regulatory dialogue makes inclusivity and flexibility possible *at the same time*.³²⁷ This regulatory dialogue means that information exchanges are in fact meaningful—they are communicated to the right people and in reasonably prompt intervals.³²⁸ And they are communicated to solve a shared problem—that is, inclusivity and flexibility become part of the same toolkit.³²⁹ The reason that a regulator networks a solution to a shared problem is that no one regulator believes that it is up to the task of resolving the problem on its own—something that is also the case in the SRM arena.³³⁰ That means that regulatory flexibility is built in to a networked governance approach as a starting point for governance to proceed.

We now also know how networked, bottom-up governance can resolve an important blind spot in the weak consent paradigms we encountered in Part II.³³¹ The problem of thin conception of consent paradigms was that regulators did not sufficiently involve affected persons in their own domestic regulatory processes.³³² That is, they allowed comments from affected persons without truly providing a means for these

324. See *supra* Section II.A.

325. See *supra* Subsection III.D.iii.

326. See *supra* Subsection III.D.ii.

327. See SLAUGHTER, *supra* note 55, at 49.

328. *Id.*

329. See *id.*

330. See Horton, *supra* note 42, at 175–80.

331. See *supra* Section II.B.

332. See *supra* Section II.B.

affected persons to enter into a regulatory dialogue.³³³ Networked, bottom-up governance provides an answer for how to overcome this problem: put regulators in touch with each other to solve regulatory problems together. In other words, the solution to the domestic administrative blind spot is to link domestic processes together on a global scale.

4. Preliminary Conclusions on Network Effects

We can also now see that what many fear as the worst-case scenario for SRM governance³³⁴—unilateral action by the United States and China—can, in fact, be exactly what is needed. Bottom-up, networked governance needs to get started by a regulator. In the context of the Paris Agreement, we have seen the extraordinary power of U.S. regulators as first movers.³³⁵ It is precisely that engagement between U.S. regulators and their Chinese counterparts that was able to build momentum and bring other network players to the table.³³⁶ This apparently unilateral conduct by the United States and China in the context of the Paris Agreement did not override, overpower, or oppress the voices of less powerful States.³³⁷ To the contrary, it empowered them to speak due to the genuine momentum toward solving a shared problem.³³⁸ Emulating the success of bottom-up, inclusive, networked governance leading to the Paris Agreement therefore means leaning on U.S. unilateral leadership to jump start the SRM governance network. Part IV will discuss how the United States could do so.

E. Remaining Problems

Of course, networking domestic regulators is not a cure all. It, too, has a critical blind spot. It makes a silent assumption: each domestic regulator is, in fact, appropriately responsive to

333. See *supra* Section II.B.

334. See Irvine & Keith, *supra* note 43.

335. See Sourgens, *supra* note 210, at 1646–56 (discussing U.S. commitments regarding the Paris Agreement).

336. Press Release, White House Off. of the Press Sec’y, U.S.-China Joint Announcement on Climate Change (Nov. 11, 2014), <https://obamawhitehouse.archives.gov/the-press-office/2014/11/11/us-china-joint-announcement-climate-change> [<https://perma.cc/5WSB-QD52>].

337. See Sourgens, *supra* note 210, at 1646–56.

338. *Id.*

affected groups *within* its own jurisdiction. As the relationship between Indigenous Peoples and the U.S. government has shown, this assumption does not always hold true.³³⁹

Truly inclusive, bottom-up governance therefore must do more than network. It must also strengthen the inclusivity of decision-making in the domestic setting. Critically, this does not require each regulator to follow strong global consent principles for ordinary domestic regulatory purposes, even in the context of SRM, if that regulator also participates in global governance networks. As we have seen, much of the benefit of strong conceptions of consent comes as a matter of those global governance networks.³⁴⁰ But there is an important exception to this rule. Inclusive governance does require *each regulator* to solicit input from traditionally marginalized groups *wherever they might be located* to the extent that impact on these groups is readily foreseeable. This point is a matter of logic—a traditionally marginalized group is traditionally marginalized *because* domestic regulatory processes do not include and protect the group as a matter of course.³⁴¹ Consequently, it is logically insufficient for one regulator to rely on those peer processes affecting these groups—one simply cannot be sure that these processes protect the groups in question now when they did not do so before. Strong conception of consent requirements then demand that regulators address this known blind spot.³⁴² For example, Canadian regulators cannot take for granted that U.S. regulators will appropriately consult Indigenous Peoples and vice-versa.

This requirement is particularly important in the context of SRM. SRM has the potential to affect a host of natural phenomena.³⁴³ Not only that—it is likely the repercussions of SRM will vary within individual countries.³⁴⁴ This means that

339. See Warner et al., *supra* note 163, at 1152–54.

340. See *supra* Subsection II.D.ii, Section III.A.

341. See Benjamin G. Bishin et al., *Elite Mobilization: A Theory Explaining Opposition to Gay Rights*, 54 LAW & SOC'Y REV. 233, 233–34 (2020) (“While the barriers to political incorporation take many forms, laws preventing acceptance of and participation by traditionally marginalized groups like gays and lesbians gradually continue to fall The public plays a large role in advancing or impeding minority rights by supporting referenda and rewarding candidates who support their views. As a result, those defending the status quo often appeal to public opinion to prevent advances in minority rights.”).

342. See *supra* Part II.

343. See *supra* Part I.

344. See *id.*

marginalized groups may in fact have interests that do not always squarely align with the interests of those who have a government's ear. Strong conception of consent principles therefore will become a particularly important concern as SRM networks form.

A bottom-up, networked governance process that is attuned to such blind spots improves global governance across the board. If each invites the comments from affected native communities irrespective of territorial boundaries, it is more likely to provide a check for exclusive domestic governance. This check allows States to tailor their own responses to the comments from those communities. And it can bring these concerns into global networks and thereby suggest to other States to follow suit.

* * *

Bottom-up, networked governance is not a perfect solution. It still has inclusivity gaps. And its flexibility is not always harnessed in the service of solving a shared global problem. But bottom-up, networked governance can take these concerns seriously and incorporate them into decision-making processes. It avoids the many inclusivity problems of truly unilateral or top-down regulation. It thus presents a hopefully viable candidate for SRM governance if implemented correctly. Such correct implementation, as I will argue below, could benefit from current U.S. leadership.

IV. U.S. DARK SUN NETWORKING

Can the United States realistically take a leadership role in setting up a networked SRM governance paradigm? In Part III, we saw that a bottom-up governance approach is in principle capable of solving the global SRM governance problem.³⁴⁵ We also saw that not all bottom-up governance approaches are created equal. This Part IV takes stock of current U.S. SRM efforts and develops how the United States can take on a critical leadership role by thoughtfully deploying existing regulatory processes in furtherance of U.S. SRM policy.

345. *See supra* Part III.

A. Ongoing U.S. SRM Efforts

U.S. SRM regulatory efforts are at a comparatively early stage. As *Nature* reported in April 2021, “So far, the US Congress’s most significant investments in federal geoengineering research are at [the National Oceanic and Atmospheric Administration], which has received some \$13 million over the past two years to advance basic-science studies of the stratosphere.”³⁴⁶ Congress began funding initial research in 2019.³⁴⁷ With this funding, Congress instructed the National Oceanic and Atmospheric Administration (NOAA) to begin “modeling, assessments, and, as possible, initial observations and monitoring of stratospheric conditions and the Earth’s radiation budget”³⁴⁸

These efforts are likely to increase radically. The National Academies of Sciences, Engineering, and Medicine called upon the U.S. government to further study and to invest more in the research of SRM as a response to worsening climate change in March 2021.³⁴⁹ These recommendations outline an integrated research agenda and governance approach.³⁵⁰ They focus further on developing the context and goals for SRM research in close engagement with the impacts and technical dimensions of SRM approaches (“atmospheric processes, climate response, other impacts”) and the social dimensions of SRM approaches (“public perception, political and economic dynamics, governance and ethics”).³⁵¹ This call by the National Academies is likely to resonate with U.S. government stakeholders—

346. Jeff Tollefson, *US Urged to Invest in Sun-Dimming Studies as Climate Warms*, NATURE (Mar. 29, 2021), <https://www.nature.com/articles/d41586-021-00822-5> [<https://perma.cc/3KRP-V7T3>].

347. Charles R. Corbett, “*Extraordinary*” and “*Highly Controversial*”: *Federal Research of Solar Geoengineering Under NEPA*, 115 NW. U. L. REV. ONLINE 240, 243 (2021).

348. *Id.* (quoting H. COMM. ON RULES, 116TH CONG., JOINT EXPLANATORY STATEMENT SUBMITTED BY MRS. LOWEY, CHAIRWOMAN OF THE HOUSE COMMITTEE ON APPROPRIATIONS REGARDING H.R. 1158: CONSOLIDATED APPROPRIATIONS ACT, 2020, DIVISION B - COMMERCE, JUSTICE, SCIENCE, AND RELATED AGENCIES APPROPRIATIONS ACT, 2020 17-18 (Dec. 17, 2019), <https://docs.house.gov/billsthisweek/20191216/BILLS-116HR1158SA-JES-DIVISION-B.pdf> [<https://perma.cc/3PKU-JVE7>].

349. NAT’L ACAD. OF SCIS., ENG’G & MED., REFLECTING SUNLIGHT: RECOMMENDATIONS FOR SOLAR GEOENGINEERING RESEARCH AND RESEARCH GOVERNANCE (2021).

350. *Id.* at 193.

351. *Id.*

particularly as climate events will increasingly threaten the economic, environmental, and physical security in large parts of the United States.³⁵²

To the extent that SRM research and development moves ahead in the United States, it will be subject to multiple regulatory regimes. Most immediately, any U.S. governmental SRM action is subject to the National Environmental Policy Act (NEPA).³⁵³ Just as importantly, SRM would also fall under the EPA's traditional regulatory purview under the Clean Air Act.³⁵⁴ It would do so because SRM would likely emit pollutants into the air that are themselves environmentally harmful (think sulfite spraying). Not only that, but these substances also affect climate change.³⁵⁵ And (on the dominant reading of *Massachusetts v. EPA* at least), any emissions into the air that impact the climate are subject to EPA regulation.³⁵⁶ In addition to being subject to the Clean Air Act, SRM is also subject to the same statutory regimes that govern large (energy) project developments including the Endangered Species Act, the National Historic Preservation Act, and others.³⁵⁷

A substantive review of each of these regimes is beyond our current scope. What matters for this inquiry is the way in which such regulation could and should be networked and how such networking supports strong conceptions of global consent and a development-driven approach to energy transition. As we will

352. See Alexander C. Kaufman, *Geoengineering the Climate Just Became More of a Real Possibility in the U.S.*, HUFFPOST (Mar. 25, 2021, 11:56 AM), https://www.huffpost.com/entry/solar-geoengineering-climate-change_n_605c765dc5b67593e055ff9d [https://perma.cc/6B2X-TEZK] (addressing foundations like the McArthur Foundation). Other stakeholders are similarly likely to be moved by such a call by virtue of the influence of the National Academies in their own right. For one example of the influence of the Academies, see Barbara Natterson-Horowitz & Amelia Reynolds, *Beyond the Laboratory: Emerging Landscape of Animal Studies – the Influence of the National Academies of Sciences Activities and Publications*, 62 ILAR J. 310 (2022).

353. See Corbett, *supra* note 347, at 244–45.

354. For a discussion of the ways in which the Clean Air Act and other U.S. environmental legislation can apply to SRM projects, see Tracy Hester, *Remaking the World to Save It: Applying U.S. Environmental Laws to Climate Engineering Projects*, in CLIMATE CHANGE GEOENGINEERING: PHILOSOPHICAL PERSPECTIVES, LEGAL ISSUES AND GOVERNANCE FRAMEWORKS 263 (Will Burns & Andrew Strauss eds., 2013).

355. See *supra* Part I.

356. *Massachusetts v. EPA*, 549 U.S. 497 (2007).

357. Albert Lin, *U.S. Law*, in CLIMATE ENGINEERING AND THE LAW REGULATION AND LIABILITY FOR SOLAR RADIATION MANAGEMENT AND CARBON DIOXIDE REMOVAL 154 (Michael B. Gerrard & Tracy Hester eds., 2018).

see, U.S. SRM policy and regulation can and should be networked. And such networking can in fact achieve the goal of a flexible and inclusive approach to SRM governance as one tool to secure a just energy transition.

B. NEPA Plus: Global SRM Diligence

The first step to building a robust governance network is diligence. Diligence provides the information needed for decision-making.³⁵⁸ Civilian U.S. SRM programs are subject to significant *environmental diligence obligations*. This diligence is principally *governed by NEPA*.³⁵⁹

Pursuant to NEPA, federal agencies must establish the environmental consequences—and related social and economic consequences—of new programs.³⁶⁰ NEPA diligence follows a three-step process. *First*, the agency proposing a particular action must conduct an *environmental assessment*.³⁶¹ This initial assessment outlines the proposed action, alternatives, and anticipated environmental consequences.³⁶² On the basis of this environmental assessment, the agency determines whether a particular action is likely to lead to significant environmental impacts.³⁶³ *Second*, if it makes such a determination, the agency must then proceed to an *environmental impact statement* (EIS).³⁶⁴ For significant policies, NEPA review can take the form of a *programmatic EA (PEA) or programmatic EIS (PEIS)* that considers the big picture consequences of a policy across federal actions.³⁶⁵ An EIS begins with the publication of a notice in the Federal Register.³⁶⁶ After publication of the notice, the agency engages the public to

358. Sourgens, *supra* note 12, at 437–46.

359. NEPA is codified at 42 U.S.C. § 4331 (2020).

360. *Id.*

361. 40 C.F.R. §§ 1501.3, 1501.5 (2020).

362. *Id.* § 1501.5.

363. *Id.* § 1501.3.

364. See Lin, *supra* note 37, at 2556–57; see also Albert C. Lin, *Revamping Our Approach to Emerging Technologies*, 76 BROOK. L. REV. 1309, 1335 (2011).

365. See Corbett, *supra* note 347, at 253; Lin, *supra* note 37, at 2557; 40 C.F.R. § 1502.4 (2020); CEQ, EFFECTIVE USE OF PROGRAMMATIC NEPA REVIEWS (2014), https://ceq.doe.gov/docs/ceq-regulations-and-guidance/Effective_Use_of_Programmatic_NEPA_Reviews_Final_Dec2014_searchable.pdf [<https://perma.cc/Q4WX-WPKA>] [hereinafter CEQ-PEA].

366. *Environmental Impact Statement Filing Guidance*, EPA (Oct. 6, 2022), <https://www.epa.gov/nepa/environmental-impact-statement-filing-guidance> [<https://perma.cc/6F5F-MLUE>].

determine the appropriate scope of environmental review and proceeds to draft an environmental impact statement.³⁶⁷ This statement is then subject to review and comment.³⁶⁸ Only after the agency has addressed all relevant comments can it publish a final EIS.³⁶⁹ **Finally**, agencies have to **monitor** the actual environmental impacts of new programs or policies.³⁷⁰

SRM governance likely requires a broad interpretation of NEPA's main relevant tools—PEAs and PEIS—to be effective.³⁷¹ Governmental modelling efforts **themselves** do not yet pass the threshold of significant environmental impacts.³⁷² A narrow view of NEPA therefore would conclude that a PEA or a PEIS is not yet required.³⁷³

Charles Corbett has convincingly argued that such a narrow view misses the unique governance challenges posed by SRM.³⁷⁴ One purpose of NEPA is to assess environmental impacts before we choose a policy path precisely to avoid path dependence.³⁷⁵ NEPA requires that PEIS in particular **consider alternatives** to a proposed policy to force consideration of other options early.³⁷⁶ In the context of SRM, alternatives to potential approaches need to be discussed early at the modelling stage to meaningfully guide future development.³⁷⁷ Consequently,

367. *See id.*

368. *See id.*

369. 40 C.F.R. § 1503.1 (2020).

370. Final Guidance for Federal Departments and Agencies on the Appropriate Use of Mitigation and Monitoring and Clarifying the Appropriate Use of Mitigated Findings of No Significant Impact, 76 Fed. Reg. 3,843, 3,849–50 (Jan. 21, 2011) (to be codified at 40 C.F.R. §§ 1500, 1501, 1502, 1505, 1506, 1507, 1508); S. Miano, *Managing an Environmental, Health and Safety Crisis*, in DUE DILIGENCE HANDBOOK: CORPORATE GOVERNANCE, RISK MANAGEMENT AND BUSINESS PLANNING 188, 190 (Linda S. Spedding ed., 2009).

371. *See* Corbett, *supra* note 347, at 255–58.

372. *Id.*

373. *Id.*; *see also* Lin, *supra* note 364, at 1336–38 (discussing the evolution of a narrow view of NEPA by federal agencies and courts).

374. *See* Corbett, *supra* note 347, at 258; *see generally* Kenta Tsuda, *Administrative Bulkheads*, 51 ENV'T L. 1, 34 (2021) (“[N]on-localized impacts to natural systems would be per se in the scope of NEPA review and would be subject to a rebuttable presumption of significance—in other words, they would be due full administrative scrutiny, with attendant public notice and comment.”).

375. *See* 40 C.F.R. § 1501.2 (2020) (“Agencies should integrate the NEPA process with other planning and authorization processes at the earliest reasonable time to ensure that agencies consider environmental impacts in their planning and decisions, to avoid delays later in the process, and to head off potential conflicts.”).

376. 40 C.F.R. §§ 1502.14, 1502.17 (2020); CEQ-PEA, *supra* note 365, at 17.

377. *See, e.g.*, S. Kalidindi et al., *Modeling of Solar Radiation Management: A Comparison of Simulations Using Reduced Solar Constant and Stratospheric*

progressing to an EIS only after modelling is completed is likely too late to meet NEPA's statutory purpose.³⁷⁸ As federally funded and licensed research into SRM will likely commence in earnest soon, an EIS process at this early stage would therefore be desirable.³⁷⁹ This EIS process would particularly need to lay out the baselines for modelling and the direction of SRM research in order to solicit early buy in for the future trajectory for SRM research within the United States.³⁸⁰

C. *The Global Networked SRM Response*

A robust engagement through the EIS process is not just critical for U.S. policymaking; it is also ***critical for networked SRM governance***. An EIS provides a baseline to engage fellow global regulators.³⁸¹ An EIS creates a meaningful early record of the specific environmental, social, and cultural problems to be resolved by way of SRM governance through an interdisciplinary perspective.³⁸² Without such a record, it would be comparatively difficult to engage in a regulatory dialogue about how to balance competing values in the context of SRM development. Insisting on an EIS therefore fulfills more than a domestic function.³⁸³ It

Sulphate Aerosols, 44 CLIMATE DYNAMICS 2909, 2909 (2014). Here, a PEA/PEIS approach arguably is needed because of the effect of modelling on future action, meaning that current NOAA research is the first step in the “approving multiple actions” category of PEA/PEIS review. CEQ-PEA, *supra* note 365, at 14. For discussion of which alternatives need to be considered in a PEA/PEIS, see *id.* at 21–22.

378. See 40 C.F.R. § 1501.2 (2020).

379. See Corbett, *supra* note 347, at 259.

380. See *id.*; CEQ-PEA, *supra* note 365, at 10 (discussing the value of PEAs/PEISs).

381. See Mayer, *supra* note 31, at 479–80. For a discussion of how environmental impact assessments serve this purpose in environmental governance of the Arctic in a cross-governmental dialogue, see FINNISH MINISTRY OF THE ENV'T, GUIDELINES FOR ENVIRONMENTAL IMPACT ASSESSMENT (EIA) IN THE ARCTIC 9 (Terry Forster ed., 1997).

382. 40 C.F.R. § 1502.6 (2020).

383. See Convention on Environmental Impact Assessment in a Transboundary Context art. 4, Feb. 25, 1991, 1989 U.N.T.S. 309 [hereinafter Espoo Convention] (providing for international environmental collaboration using environmental impact assessments); Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters art. 6(2), June 25, 1998, 2161 U.N.T.S. 447 [hereinafter Aarhus Convention]. For a discussion of these conventions, see Maria L. Banda, *Regime Congruence: Rethinking the Scope of State Responsibility for Transboundary Environmental Harm*, 103 MINN. L. REV. 1879, 1905 n.90 (2019).

fulfills a global function by booting up a regulatory network in which bottom-up governance processes can begin to take hold.³⁸⁴

But booting up a global network also requires that U.S. regulators actually involve foreign regulators in SRM NEPA efforts. As we have seen in Part III, networks form through communication.³⁸⁵ A domestic approach to SRM diligence by definition does not communicate with foreign regulators. Consequently, calls for a traditional ***domestic NEPA assessment are not enough*** (nor is it what scholars should be understood to advocate).³⁸⁶ Rather, any diligence effort capable of fostering a global networked response must be global in scope.

Since the promulgation of Executive Order 12,114 in 1979 by President Carter, U.S. law has suggested taking such a broader, global approach in developing EIS and, thus, SRM EIS.³⁸⁷ The order applies to major federal policies and programs “having significant effects on the environment outside the geographical borders of the United States.”³⁸⁸ SRM activities would certainly have such effects.³⁸⁹ Executive Order 12,114 instructs federal agencies conducting NEPA diligence to prepare an ***independent EIS*** for action “significantly affecting the

384. See John H. Knox, *Assessing the Candidates for a Global Treaty on Transboundary Environmental Impact Assessment*, 12 N.Y.U. ENV'T. L.J. 153, 163 (2003) (“[T]he Espoo Convention takes a bottom-up approach to prevention of transboundary harm.”).

385. See *supra* Part III.

386. See Corbett, *supra* note 347, at 259.

387. See Exec. Order No. 12,114, 44 Fed. Reg. 1,957 (Jan. 4, 1979) [hereinafter EO 12,114]. For a discussion of the political difficulty leading to the compromises made in the order, see Tara Leigh Grove, *Presidential Laws and the Missing Interpretive Theory*, 168 U. PA. L. REV. 877, 905 (2020). For a more detailed discussion of the Executive Order in practice, see Browne C. Lewis, *It's A Small World After All: Making the Case for the Extraterritorial Application of the National Environmental Policy Act*, 25 CARDOZO L. REV. 2143, 2150 (2004); Kevin A. Ewing & Erik E. Petersen, *Significant Environmental Challenges to the Development of LNG Terminals in the United States*, 2 TEX. J. OIL GAS & ENERGY L. 5, 19 (2007). For a negative view that the order is little more than window dressing, see David Young, *The Application of Environmental Impact Statements to United States Participation in Multinational Development Projects*, 8 AM. U. J. INT'L L. & POL'Y 309, 320–22 (1992). NEPA itself further requires taking into account extraterritorial effects of U.S. policies and programs to the extent that those policies and programs are otherwise subject to NEPA review. See CEQ, GUIDANCE ON NEPA ANALYSES FOR TRANSBOUNDARY IMPACT (1997) [hereinafter CEQ-TRANSBOUNDARY IMPACT] (“CEQ has determined that agencies must include analysis of reasonably foreseeable transboundary effects of proposed actions in their analysis . . .”).

388. EO 12,114, *supra* note 387, § 2-1.

389. See *supra* Part I.

environment of the **global commons** outside the jurisdiction of any nation (e.g., the oceans or Antarctica).³⁹⁰ The Order further instructs federal agencies conducting diligence to conduct “**bilateral or multilateral environmental studies**, relevant or related to the proposed action, by the United States and one [or] more foreign nations”³⁹¹ to the extent the action significantly affects “the environment of a foreign nation not participating with the United States and not otherwise involved in the action.”³⁹² Communication is initially liaised through the State Department.³⁹³ Yet, to draft bilateral or multilateral environmental studies, relevant agencies will need to work together, out of necessity, on a networked interagency basis given that the State Department lacks subject matter expertise with regard to the specific federal action. At this point, the State Department becomes a partner merely to set up and administer “a program for exchange on a continuing basis of information concerning the environment.”³⁹⁴

Beginning a NEPA process to conduct SRM diligence therefore likely will be the **first step** in setting up a **global networked response**.³⁹⁵ It will require agencies to work with the State Department to identify foreign governmental and international organization counterparties to participate in such a study of extraterritorial SRM effects.³⁹⁶ This, in turn, will allow the very networked governance approach we developed so far to coalesce.³⁹⁷ The facially small, domestic step to commence a NEPA analysis within NOAA (and the EPA) therefore will have significant, positive global governance consequences by nurturing a needed bottom-up, SRM governance network.

Importantly, the United States is in a better legal position to commence building such a network than many other States (as a matter of applicable law, at least). Similar international cooperation is, in principle, mandated by an international

390. EO 12,114, *supra* note 387, §§ 2-3(a), 2-4(a)(i), 2-4(b)(i) (emphasis added). Relevantly, this provision also applies to space-based programs. S. M. Mousavi Sameh, *Suborbital Flights: Environmental Concerns and Regulatory Initiatives*, 81 J. AIR L. & COM. 65, 86 (2016).

391. EO 12,114, *supra* note 387, § 2-4(a)(ii) (emphasis added).

392. *Id.* § 2-3(b).

393. *Id.* § 3-2.

394. *Id.* § 2-2.

395. See CEQ-TRANSBOUNDARY IMPACT, *supra* note 387.

396. EO 12,114, *supra* note 387, §§ 2-2, 2-3(b), 2-4(a)(ii), 2-4(b)(ii).

397. See *supra* Section III.C.

treaty, the 1991 Espoo Convention.³⁹⁸ Article 3 of the Espoo Convention requires notification of foreign States affected by likely transboundary environmental harm as early as possible and provides a means for the affected foreign States to participate in the environmental impact assessment process.³⁹⁹ Following notification, the Espoo Convention sets the requirements for multilateral cooperation on the drafting and approval of environmental impact assessments.⁴⁰⁰

Problematically, it is far less clear that the Espoo Convention would apply to all types of SRM activities.⁴⁰¹ The Espoo process starts with the notification requirement set out in article 3.⁴⁰² But this requirement is facially limited to specific activities included in Appendix I.⁴⁰³ SRM is not specifically listed in Appendix I.⁴⁰⁴ Further, depending upon the SRM approach, SRM may not easily fall within the type of activities listed in Appendix I.⁴⁰⁵ Consequently, the Espoo Convention may be *too rigid to start* a regulatory SRM networking process.⁴⁰⁶ That being said, the Espoo Convention provides important international standards for *how to proceed* once a State kick-starts the Espoo process for an SRM activity.⁴⁰⁷

398. See Espoo Convention, *supra* note 383. The U.S. has signed but not ratified the Espoo Convention. For the status of Espoo Convention ratification, acceptance, approval, or accession, see UNTC, https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-4&chapter=27&clang=_en [<https://perma.cc/Y33G-K4C9>]. For a discussion on the “fit” between the Espoo Convention and EO 12,144, see Tseming Yang, *The Emergence of the Environmental Impact Assessment Duty as a Global Legal Norm and General Principle of Law*, 70 HASTINGS L.J. 525, 566 (2019).

399. See Espoo Convention, *supra* note 383, at arts. 3(1)–3(3).

400. See *id.* at art. 4–6.

401. For an argument that the Espoo Convention does apply to SRM, see Jesse L. Reynolds, *International Law*, in CLIMATE ENGINEERING AND THE LAW: REGULATION AND LIABILITY FOR SOLAR RADIATION MANAGEMENT AND CARBON DIOXIDE REMOVAL 57, 93–94 (Michael B. Gerrard & Tracy Hester eds., 2018). Arguably, this gap has been filled by the Kyiv Protocol to the Espoo Convention. Protocol on Strategic Environmental Assessment to the Convention on Environmental Impact Assessment in a Transboundary Context, May 21, 2003, 2685 U.N.T.S. 140. Even there, Annex I does not obviously cover SRM. *Id.* at Annex I. It is therefore in the catch-all provisions in articles 4(2) and 5(1) of the Protocol. *Id.* at arts. 4(2), 5(1). For a discussion of the applicability of the Kyiv Protocol to geoengineering, see Lin, *supra* note 37, at 2564.

402. See Espoo Convention, *supra* note 383, at arts. 3(1)–3(3).

403. See *id.* at art. 3(1), app. 1.

404. See *id.* at app. 1.

405. See *id.*

406. See *id.*

407. See *id.* at arts. 4–6.

Consequently, the more flexible U.S. legal framework may well be a better starting point for such a process. U.S. leadership and U.S. action ahead of any global solution to SRM governance, therefore, is a critical feature to get started the governance mechanism discussed throughout this Article.

Even so, both the U.S. framework under Executive Order 12,114 and the Espoo Convention continue to have an inclusivity blind spot that remains to be remedied.⁴⁰⁸ Executive Order 12,114 sets up an intergovernmental process or a process involving an international organization.⁴⁰⁹ Similarly, the Espoo Convention sets up a process between State parties to the Espoo Convention.⁴¹⁰ Consequently, neither framework involves nongovernmental civil society actors in the environmental due diligence process.

As we have noted in Part III, the exclusion of civil society groups from networked governance creates significant issues for inclusivity.⁴¹¹ This inclusivity problem can only be solved to the extent that civil society groups are consulted as early as possible in the diligence process. We therefore need to supplement the process outlined in Executive Order 12,144 and the Espoo Convention to meet the inclusivity demands of networked SRM governance.

There are two paths to solve this problem—one premised in NEPA and the other premised in international legal instruments, like the Aarhus Convention regulating transparency of environmental information, discussed below. If we assume that the United States will, in fact, jump start a networked SRM governance approach through NEPA/Executive Order 12,114 diligence, it would need to involve domestic civil society actors as part of its NEPA review. Regulations implementing NEPA on their face identify the kind of groups whose input an agency conducting a NEPA review must solicit once it has completed a draft EIS: “[a]ppropriate . . . Tribal . . . agencies” and “[t]he public, affirmatively soliciting comments in a manner designed to inform those persons or organizations who may be interested in or affected by the proposed action.”⁴¹² To

408. See Espoo Convention, *supra* note 383, at arts. 3(1), 5; EO 12,114, *supra* note 387, §§ 2-3(b), 2-4(a)(ii), 2-4(b)(ii).

409. EO 12,114, *supra* note 387, §§ 2-3(b), 2-4(a)(ii), 2-4(b)(ii).

410. Espoo Convention, *supra* note 383, at arts. 3(1), 5.

411. See *supra* Part III.

412. 40 C.F.R. § 1503.1(2)(ii) (2020); see also CEQ-PEA, *supra* note 365, at 23–26.

be inclusive, a U.S. *NEPA review* should *solicit input* from relevant *global Indigenous Peoples' representatives* and should further seek to identify relevant *foreign civil society organizations* affected by the proposed SRM approach. This may include environmental nongovernmental organizations. But it may also involve groups representing particular interests (e.g., farmers who may be affected by changing rain patterns). An inclusive networked approach therefore should interpret NEPA guidance broadly to capture particularly marginalized foreign groups that are in a position like domestic groups whom an agency would have to consult.⁴¹³

On the international front, the Aarhus Convention provides further guidance, at least for large SRM field tests.⁴¹⁴ The Aarhus Convention requires that member States to the Convention make relevant information publicly available and permit public participation in decision-making.⁴¹⁵ Like in the NEPA context, this transparency obligation is an obligation vis-à-vis domestic civil society.⁴¹⁶ It is not an obligation with regard to global civil society as a whole.⁴¹⁷ The Aarhus Convention thus codifies an approach to civic participation that is broadly consistent with (if not entirely the same as) NEPA implementing

413. CEQ guidance on this point is ambiguous. On the one hand, “[a]gencies do have a responsibility to undertake a reasonable search for relevant, current information associated with an identified potential effect. However, the courts have adopted a ‘rule of reason’ to judge an agency’s actions in this respect.” CEQ-TRANSBOUNDARY IMPACT, *supra* note 387. Given the emphasis on agency responsibility, this part of the guidance would support a broad reading of NEPA for which I advocate here. But the same guidance document also states, “Additionally, in the context of international agreements, the parties may set forth a specific process for obtaining information from the affected country which could then be relied upon in most circumstances to satisfy agencies’ responsibility to undertake a reasonable search for information.” *Id.* Consultation with foreign governments therefore would be deemed sufficient to meet NEPA requirements. To apply, this sufficiency requires the presence of an international agreement between the U.S. and the foreign government in question governing the information exchange. Further, the guidance uses the permissive “may” and “could.” It thus, at the very least, does not preclude a broader scope of federal inquiry. This should be particularly true when the foreign governmental representations directly affect impacts on a marginalized group within its territory, and the U.S. State Department has noted foreign governmental oppressive conduct with regard to that marginalized group.

414. Jesse L. Reynolds, *Climate Engineering Field Research: The Favorable Setting of International Environmental Law*, 5 WASH. & LEE J. ENERGY, CLIMATE & ENV’T 417, 470 (2014).

415. Aarhus Convention, *supra* note 383, at arts. 1, 2(5).

416. *Id.*

417. *Id.*

regulations.⁴¹⁸ But what a truly inclusive networked approach to SRM needs is more than that—it needs to make each State stakeholder in global environmental impact assessment review a site for global contestation of environmental impacts. An inclusive networked approach to SRM needs to network Aarhus Convention transparency with Espoo Convention cooperation.

D. Practical Responses Within the United States

That being said, if the United States begins the process of a PEIS soon, much can be accomplished for ***inclusive networked governance*** at this current early stage. While it is likely not possible to force the Biden Administration to undertake such an EIS, the Biden Administration (NOAA and the EPA) could commence such a process on their own motion.⁴¹⁹ This would support inclusive decision-making at the domestic level as the relevant agencies would solicit broad-based civil society participation as part of the NEPA process. Such a step would therefore be domestically inclusive.⁴²⁰

If the Biden Administration combined such a NEPA review with diligence pursuant to Executive Order 12,114, it would take a meaningful step toward ***inclusivity*** on a ***global stage***.⁴²¹ Such a step would solicit input from affected foreign regulators (which in the case of SRM would draw in the entire world community). If the Biden Administration commences a NEPA PEIS process, it is on the whole implausible not to also start a global diligence process under Executive Order 12,114, as SRM is known to have global impacts.⁴²² Consequently, the first step of a NEPA PEIS would have significant positive global repercussions for inclusive governance: regulators would commence the information sharing that is so critical for bottom-up, networked governance to take off.

The final step the Biden Administration would need to take in order to meet the requirements of inclusivity set out in Part II and Section III.B is to engage broadly with foreign civil society actors and not just foreign regulators.⁴²³ Again, there is no way

418. See 40 C.F.R. § 1503.1 (2020).

419. See Corbett, *supra* note 347, at 258–60.

420. See 40 C.F.R. § 1503.1 (2020).

421. See EO 12,114, *supra* note 387, §§ 2-3(b), 2-4(a)(ii), 2-4(b)(ii).

422. See *supra* Part I.

423. See *supra* Sections II.A, II.C.

to force the Biden Administration to do so. Such a step would be beyond the purview of Executive Order 12,114, NEPA, or NEPA regulations.⁴²⁴ But it is again a step that the Biden Administration *can* take on its own. And if it took such a step, the information gathered through the U.S. process would again flow globally through the intergovernmental diligence exchange and thus be amplified with each foreign counterparty's further inquiry with regard to specific civil society input and as part of its own diligence process.⁴²⁵

In other words, it is entirely within our grasp to set the stage for truly inclusive SRM governance today—without need for additional legislation, rulemaking, treaty instruments, or diplomatic negotiations. All it takes is for one State like the United States to start the EIS process. And starting this process might appear to be unilateral conduct bringing SRM within the purview of purely domestic regulation. But it need not be. Rather, it can be the beginning of multilateral, networked, bottom-up decision-making.

Just as importantly, this approach does not take away any flexibility. All an EIS process would do is coordinate information and scope what future research should be conducted and what impacts to watch out for. Cooperating on diligence does not tie any hands of any participating regulator. That is, the United States still has every SRM path open to it even if it engages in the kind of diligence outlined in this Section. That flexibility is a strong reason to engage in such diligence globally and together. It increases the number of regulators considering potential impacts and thus is likely to result in better impact statements. And better understanding SRM impacts leads to better domestic decision-making, no matter what decision one ends up taking in the end.

1. Notice-and-Comment Plus: Global Regulatory Dialogue

Obviously, even programmatic NEPA review of current SRM modelling efforts and early tests in their own right are not enough to provide a robust governance framework for SRM

424. See 40 C.F.R. § 1503.1; EO 12,114, *supra* note 387, §§ 2-3(b), 2-4(a)(ii), 2-4(b)(ii).

425. See EO 12,114, *supra* note 387, §§ 2-3(b), 2-4(a)(ii), 2-4(b)(ii); Espoo Convention, *supra* note 383, at arts. 3(1), 5.

development and deployment. Such NEPA review does not itself license any SRM methods or providers, does not set parameters within which SRM could be developed or deployed, and generally does not itself curtail governmental or private SRM conduct.⁴²⁶ NEPA review does not determine which policy, program, or licensing decisions must be taken.⁴²⁷ A regulator conducting a NEPA review does not need to choose the least environmentally destructive path—it just needs to explain why it did not choose that path if it proceeds along a different route.⁴²⁸ It simply needs to take NEPA findings into account in its own program decisions.⁴²⁹ NEPA findings of a significant environmental impact do not themselves have to sound the starter gun for further regulatory action.⁴³⁰

As we consider the global regulation of SRM, this may sound like a discouraging conclusion. It need not be. Rather, given that each SRM approach will bring its own environmental impacts, it is on the whole likely that each of these impacts in turn will trigger other regulatory obligations outside of NEPA.

One statute that is likely to be implicated is the Clean Air Act.⁴³¹ Consider one of the simplest methods of SRM: sulfate spraying.⁴³² To spray sulfates is to emit a pollutant into the air.⁴³³ In the case of sulfates, the traditional consequences of increased acid rain mean that this type of emission would fall under traditional EPA regulatory authority under the Act for pollution.⁴³⁴ *West Virginia v. EPA* on its face does not displace

426. 42 U.S.C. § 4331 et seq. (2020).

427. See Steven Ferrey, *Null Climate Federalism: State Frustration of Federal Renewable Energy Entitlements*, 39 VA. ENV'T L.J. 1, 66 (2021) (noting the comparative lack of NEPA bite); but see Richard A. Epstein, *The Many Sins of NEPA*, 6 TEX. A&M L. REV. 1, 11–14 (2018) (arguing that NEPA review still too burdensome and slow).

428. CEQ-PEA, *supra* note 365, at 38–39.

429. See *id.*

430. See *id.*

431. See Hester, *supra* note 354, at 890 (current case law presents “climate engineering proponents with a Hobson’s choice: either risk public nuisance liability by arguing that the Clean Air Act does not apply to climate engineering projects, or accept the prospect of Clean Air Act permitting obligations”).

432. See NAT’L RSCH. COUNCIL, DIV. OF EARTH & LIFE STUD., *supra* note 22, at 381.

433. Zora F. Franicevic, *Engineering Our Climate: A Comprehensive Legal Framework that Captures the Harmful Effects of Geoengineering Approaches*, 30 CORNELL J.L. & PUB. POL’Y 587, 600–03 (2021).

434. *Id.* This would set up the regulatory fight whether the use of aircrafts to spray sulfates, rather than cannons, would move the same SRM method beyond the scope of Clean Air Act regulation as aircrafts may not be stationary sources. *Id.*

this authority but in fact uses the EPA's acid rain efforts as an example of the EPA acting in its traditional authority.⁴³⁵

But just as importantly, the fact that an emission has climate consequences makes that emission "pollution" under the Clean Air Act by virtue of the logic of *Massachusetts v. EPA*.⁴³⁶ The key move by the *Massachusetts v. EPA* majority was to ask first if CO₂ was in fact emitted and, if yes, if once emitted CO₂ had negative climate consequences.⁴³⁷ It answered "yes" to both questions.⁴³⁸ The emission of sulfates (or in fact any other substance) would face a similar fate—sulfates are "emissions" in that they are particles released into the air.⁴³⁹ And the emissions of these substances affect the climate—that is the purpose for releasing the particles in the first place.⁴⁴⁰ Consequently, the EPA should have regulatory authority (and regulatory duties) under the Clean Air Act for all substances emitted into the air in order to change the climate.⁴⁴¹

This leaves the question whether the "major questions doctrine" might block regulation of SRM under the Clean Air Act. If triggered, the major questions doctrine, in a nutshell, allows the courts to strike down administrative rules even if an agency, on a literal reading of a statute, would be permitted to promulgate that regulation.⁴⁴² The major questions doctrine has been described as "a potential nuclear bomb that can be aimed not merely at a particular rule, but at crippling an agency's ability to regulate at all."⁴⁴³ The central U.S. Supreme Court

This regulatory evasion maneuver can likely be addressed through acid rain related regulations under the Clean Air Act. *Id.*

435. 142 S. Ct. 2587, 2615 (2022).

436. 549 U.S. 497, 506 (2007).

437. *Id.* at 528–32.

438. *Id.* at 530. Importantly, *West Virginia v. EPA* did not overrule or distinguish *Massachusetts v. EPA* for stationary sources. *West Virginia*, 142 S. Ct. at 2587.

439. *Massachusetts*, 549 U.S. at 529 ("[T]he definition embraces all airborne compounds of whatever stripe, and underscores that intent through the repeated use of the word 'any.'").

440. *See id.* at 528 ("Because EPA believes that Congress did not intend it to regulate substances that contribute to climate change, the agency maintains that carbon dioxide is not an 'air pollutant' within the meaning of the provision. The statutory text forecloses EPA's reading.").

441. *See id.* at 534–35.

442. Jonas J. Monast, *Major Questions About the Major Questions Doctrine*, 68 ADMIN. L. REV. 445, 447 (2016).

443. Harvey Reiter, *Expanding 'Major Questions Doctrine' Risks Regulatory Stability*, BLOOMBERG L. (July 12, 2022, 2:00 AM),

decision eliciting the comparison to a nuclear bomb was *West Virginia v. EPA*.⁴⁴⁴

The Court applied the major questions doctrine to determine that the EPA lacked authority to promulgate the Clean Power Plan under section 111(d) of the Clean Air Act.⁴⁴⁵ The major questions doctrine may appear murky. Still, on closer analysis of *West Virginia*, it can be stated with reasonable clarity. Thus, one can break down the major questions doctrine in *West Virginia* into three elements. **First**, the major questions doctrine applies to types of *measures* as opposed to the question of whether an agency is authorized to deal with a particular subject matter at all (referred to below as **element 1**). **Second**, the measure in question must *depart from past regulatory practice* under the same statutory basis (referred to below as **element 2**). **Third**, if allowed to stand, the measure would have *far-reaching, structural consequences* for American society (referred to below as **element 3**). These three elements are present in *West Virginia* as well as the three core decisions on which it relies in its explanation of the doctrine: *Utility Air v. EPA*, *Gonzalez v. Oregon*, and *National Federation of Independent Business v. OSHA*.⁴⁴⁶ Viewing these cases together, the major questions doctrine seeks to ensure that regulatory measures that affect a large number of people in an unexpected and significant fashion allow for an additional layer of legislative participation.⁴⁴⁷

In *West Virginia* and the Clean Power Plan, the question was not whether the EPA had any authority to regulate greenhouse gases under the Clean Air Act as such (i.e., the decision did not overrule *Massachusetts v. EPA*).⁴⁴⁸ *West Virginia* concerned the specific measure adopted under section 111 of the Clean Air Act, namely the Clean Power Plan (**element 1**).⁴⁴⁹ The Court's majority further reasoned that "[p]rior to 2015, EPA had always set emissions limits under

<https://news.bloomberglaw.com/environment-and-energy/expanding-major-questions-doctrine-risks-regulatory-stability> [<https://perma.cc/X5QS-D8QK>].

444. *Id.*; see also *West Virginia v. EPA*, 142 S. Ct. 2587, 2608–09 (2022) (holding that in extraordinary cases there may be reason to hesitate before accepting a reading of a statute that would assert substantial power over the national economy through a government agency).

445. *West Virginia*, 142 S. Ct. at 2613.

446. *Id.* at 2608–09.

447. *Id.* at 2610.

448. *Id.* at 2609; see also *Massachusetts v. EPA*, 549 U.S. 497, 530 (2007).

449. *West Virginia*, 142 S. Ct. at 2609–10.

Section 11 based on the application of measures that would reduce pollution by causing the regulated source to operate more cleanly” (**element two**).⁴⁵⁰ The Chief Justice finally notes the effect of the measure was to “substantially restructure the American energy market” (**element three**).⁴⁵¹

Similarly, with regard to **element 1**, the Chief Justice used *Utility Air* as precedent because *Utility Air* challenged specific permitting authority with regard to greenhouse gases (rather than authority over greenhouses gas emissions in general).⁴⁵² He used *Gonzales* because it challenged the attorney general’s “assertion that he could rescind the license of any physician who prescribed a controlled substance for assisted suicide, even in a state where such action was legal.”⁴⁵³ The Chief Justice relied on *National Federation of Independent Business* because it challenged a vaccine mandate (as opposed to any responses to a pandemic in the workplace).⁴⁵⁴ With regard to **element 2**, the Chief Justice cited to *Utility Air* because the relevant objects of regulation “had never before been subject to such [permitting] requirements.”⁴⁵⁵ He relied on *Gonzales* because the rescission of licenses on this basis was “unusual” in that it was not consistent with past practice.⁴⁵⁶ He finally pointed to *National Federation of Independent Business* because OSHA had not applied a similar vaccine mandate (or similarly sweeping public health regulation) “in its half century of existence.”⁴⁵⁷ The Chief Justice also highlighted, with regard to **element 3**, that *Utility Air* concerned a permitting requirement that would have affected “millions of small sources, such as hotels and office buildings.”⁴⁵⁸ In *Gonzalez*, similarly, the exercise of authority would affect federalism by crippling state efforts to exercise their

450. *Id.* at 2610.

451. *Id.*

452. *Id.* at 2608 (citing *Util. Air Regul. Grp. v. EPA*, 573 U.S. 302, 310 (2014)); see also Barry G. Rabe & Adrianna Pita, *What Does the Supreme Court’s EPA Ruling Mean for Climate Regulation?*, BROOKINGS (July 1, 2022), <https://www.brookings.edu/podcast-episode/what-does-the-supreme-courts-epa-ruling-mean-for-climate-regulation> [<https://perma.cc/9YPG-DQGP>] (discussing the implications of *West Virginia v. EPA* and potential next steps for legislatures).

453. *West Virginia*, 142 S. Ct. at 2608 (citing *Gonzalez v. Oregon*, 546 U.S. 243, 297 (2006)).

454. *Id.* at 2608–09 (citing *Nat’l Fed’n of Indep. Bus. v. OSHA*, 142 S. Ct. 661, 668 (2022)).

455. *Id.* at 2608 (citing *Util. Air Regul. Grp.*, 573 U.S. at 310).

456. *Id.* (citing *Gonzalez*, 546 U.S. at 297).

457. *Id.* at 2608–09 (quoting *Nat’l Fed’n of Indep. Bus.*, 142 S. Ct. at 666).

458. *Id.* at 2608 (quoting *Util. Air Regul. Grp.*, 573 U.S. at 310).

constitutional competences.⁴⁵⁹ Finally, *National Federation of Independent Business* concerned a measure that affected “84 million Americans” in their ability to make healthcare decisions or to face significant financial burdens due to weekly testing requirements.⁴⁶⁰

The regulation of SRM does not meet any of these requirements. It concerns a broad authority as opposed to a specific measure (**element 1**). Further, the EPA has imposed limitations on the manner of emission of similar air pollutants in the past (**element 2**). Finally, the measure itself is not directed at a large, existing, structural component of American society or the American economy but rather at new SRM operators (**element 3**). In fact, the regulation of SRM is precisely what permits a more gradual approach to climate mitigation and, as such, protects the kinds of interests that the Chief Justice was concerned should not be upset by regulatory fiat alone but only by a combination of legislative process and regulatory implementation of clearly delegated power.

Once we have determined that there is a duty to regulate both environmental and climate impacts of SRM under the Clean Air Act, any earlier NEPA findings of such impacts take on a different importance. Now, they become part of the record of what regulatory approach the EPA must take into account in responding to airborne pollutants.⁴⁶¹ The EPA now must make a decision that can be supported by a record which centrally includes this diligence.⁴⁶² NEPA diligence thus can guide the

459. See *id.* at 2608 (citing *Gonzalez*, 546 U.S. at 270).

460. *Id.* at 2608–09 (quoting *Nat’l Fed’n of Indep. Bus.*, 142 S. Ct. at 665).

461. 42 U.S.C. § 7607 (2020) (dictating the administrative proceedings and judicial review standard for the prevention and control of air pollution).

462. See *Guidance on the Consideration of Past Actions in Cumulative Effects Analysis*, CEQ (June 24, 2005), https://ceq.doe.gov/docs/ceq-regulations-and-guidance/regs/Guidance_on_CE.pdf [<https://perma.cc/8C5Z-3EYN>]. One (imperfect) example is the case of guidance issued (then withdrawn and now to be reissued) on greenhouse gas emissions. For the 2016 guidance, see *Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Review*, CEQ (Aug. 1, 2016), https://ceq.doe.gov/docs/ceq-regulations-and-guidance/nepa_final_ghg_guidance.pdf [<https://perma.cc/3PVD-V75N>]. For the draft guidance issued by the Trump Administration to replace the 2016 guidance, see *Draft National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions*, 84 Fed. Reg. 30,097 (June 26, 2019). The 2016 version is currently subject to updating. *Guidance on Consideration of Greenhouse Gases*, CEQ, https://ceq.doe.gov/guidance/ceq_guidance_nepa-ghg.html [<https://perma.cc/F87W-K788>]. On the impact of the social cost of carbon (and the

regulator's hands even and, in particular, in the context of other statutory schemes.⁴⁶³ The same logic would apply in the context of other statutes such as the Endangered Species Act.⁴⁶⁴

The key remaining question is whether, in a purely domestic regulatory process under the Clean Air Act, the EPA may—or even must—take into account known foreign impacts of different regulatory approaches. The answer is “yes” on both counts. In the first place, the EPA takes foreign impacts into account as a matter of course; the Clean Power Plan is only one such example.⁴⁶⁵ The EPA, therefore, certainly may take foreign impacts into account in promulgating a rule.⁴⁶⁶

Whether the EPA *must* do so is a more complicated question—but not by much. To understand why the EPA must act on such known foreign impacts, consider what would happen if the EPA did not do so. In that case, the EPA would knowingly not prevent harmful foreign environmental impacts (that is what our assumption means after all). The next question is whether the EPA could have prevented the negative environmental impact. If the EPA did not consider and act on known foreign environmental harm, it would be hard for the EPA to disprove such an allegation—logically, all a foreign State would have to show is one means of avoiding the foreign environmental harm. For instance, the EPA could simply have prohibited the particular type of SRM at issue. It is blackletter law that a State's authorization of conduct that causes transboundary environmental harm is internationally wrongful—it violates the no-harm principle of international environmental law.⁴⁶⁷

impact of guidance documents), see Zoe Palenik, *The Social Cost of Carbon in the Courts: 2013-2019*, 28 N.Y.U. ENV'T L.J. 393, 398–404 (2020).

463. This is the case particularly in the context of PEA/PEIS. CEQ-PEA, *supra* note 365, at 26 (“The purpose and need statement and the proposed action for the programmatic NEPA review are critical for determining the compliance requirements under other applicable laws and regulations, such as the Endangered Species Act (ESA), National Historic Preservation Act (NHPA), and Clean Water Act.”).

464. *Id.*; For the applicability of the Endangered Species Act to SRM, see generally Hester, *supra* note 354, at 294–96.

465. See Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units; Final Rule, 80 Fed. Reg. 64,661, 64,682, 64,688, 64,914 (Oct. 23, 2015).

466. See *id.*

467. See SANDS & PEEL, *supra* note 121, at 206–10. In many instances, issues of proof can bog down litigation pursuant to the no-harm principle. See Case Concerning Pulp Mills on the River Uruguay (Arg. v. Urug.), Judgment, 2010 I.C.J.

This leads to a statutory construction question. The EPA may only act within the bounds of its delegated authority under statutes such as the Clean Air Act.⁴⁶⁸ But what does the Clean Air Act require of the EPA? One fundamental rule of U.S. statutory construction is that a statute may not be interpreted in a manner that violates international law if an interpretation consistent with U.S. international legal obligations is possible absent clear congressional intent to violate the international law rule in question.⁴⁶⁹

The EPA, therefore, must interpret the Clean Air Act in a manner consistent with the U.S. obligations under international law.⁴⁷⁰ This relevantly includes the obligation not to cause transboundary harm.⁴⁷¹ In our hypothetical, the EPA is aware of the transboundary harm potential due to its diligence efforts. It cannot now turn a blind eye to this harm without running afoul of a recognized rule of international law (and thus the

14 (Apr. 20). For a discussion of this case, see Frédéric G. Sourgens, *Truths in Translation*, 44 FORDHAM INT'L L.J. 101, 108–09 (2020).

468. See EPA v. EME Homer City Generation, L.P., 572 U.S. 489, 513 (2014); Jonathan S. Masur & Eric A. Posner, *Toward A Pigouvian State*, 164 U. PA. L. REV. 93, 113 (2015); Rubenstein, *supra* note 281, at 219–20, 254–55.

469. Murray v. Schooner Charming Betsy, 6 U.S. (2 Cranch) 64, 118 (1804). The *Charming Betsy* canon provides that the laws of the United States will be read so as to comply with international law to the extent one such reading remains possible. See Curtis A. Bradley & Jack L. Goldsmith, *Presidential Control over International Law*, 131 HARV. L. REV. 1201, 1205 (2018) (“Courts apply international law directly as domestic law or indirectly when interpreting statutes or regulations in accordance with the Charming Betsy canon, and in both contexts often give presidential interpretations of international law substantial deference.”). The *Charming Betsy* canon forms part of the broader canon of constitutional avoidance. Richard H. Fallon, Jr., *Facial Challenges, Saving Constructions, and Statutory Severability*, 99 TEX. L. REV. 215, 221 n.37 (2020).

470. Warren v. EPA, 159 F.3d 616, 624 (D.C. Cir. 1998) (holding that the court’s consideration of a congressional statute must not violate international law); see also Roger P. Alford, *Federal Courts, International Tribunals, and the Continuum of Deference*, 43 VA. J. INT’L L. 675, 738–39 (2003) (discussing Warren).

471. The Council on Environmental Quality (the U.S. government instrumentality tasked with the implementation of NEPA) emphatically agrees with this assessment of the no-harm rule, stating that “[i]t has been customary law since the 1905 Trail Smelter Arbitration that no nation may undertake acts on its territory that will harm the territory of another state. This rule of customary law has been recognized as binding in Principle 21 of the Stockholm Declaration on the Human Environment and Principle 2 of the 1992 Rio Declaration on Environment and Development. This concept, along with the duty to give notice to others to avoid or avert such harm, is incorporated into numerous treaty obligations undertaken by the United States. Analysis of transboundary impacts of federal agency actions that occur in the United States is an appropriate step toward implementing those principles.”

CEQ-TRANSBOUNDARY IMPACT, *supra* note 387, at 3.

Charming Betsy canon).⁴⁷² Consequently, it must engage with foreign stakeholders and continue on the path already taken in the diligence context.⁴⁷³ This result brings forward the ***benefits of inclusivity from the EIS process to the regulatory process***. It forces involvement of foreign stakeholders and consideration of foreign impacts at the regulatory stage. This, in turn, further strengthens the network effect; each regulator will communicate with its peers about how best to avoid transboundary harm. Bottom-up, networked governance is thus given a boost.

This approach displaces adventurist unilateralism in favor of inclusivity. Regulatory action with regard to SRM requires meaningful engagement with foreign stakeholders. This meaningful engagement puts forward the kind of networked discussion we have seen in the diligence context.

2. Additional Inquiries

This leads to the question: Does this boost in inclusivity come at the cost of flexibility? The answer is “no.” To understand why, we must return to why the EPA would be at the root of an internationally wrongful act if it did not consider foreign impacts in its own domestic regulatory process. That reason was the no-harm principle.

The no-harm principle would only limit flexibility in any meaningful sense if it were a strict liability rule. That is, if a State, by virtue of being harmed, could always demand that harmful conduct cease. But the no-harm principle is not a strict liability rule.⁴⁷⁴ It is a principle that emerged first and foremost from the law of nuisance.⁴⁷⁵ The law of nuisance looks to the reasonableness of the offending use vis-à-vis the person suffering the infringement.⁴⁷⁶ A regulation would thus not

472. *Id.*; *Charming Betsy*, 6 U.S. (2 Cranch) at 64; *Warren*, 159 F.3d at 624. See also sources cited *supra* note 469.

473. See CEQ-TRANSBOUNDARY IMPACT, *supra* note 387, at 3.

474. For scholarship regarding how international law influences the no-harm principle, see SANDS & PEEL, *supra* note 121, at 206–10.

475. *Trail Smelter (U.S. v. Can.)*, 3 R.I.A.A. 1905 (1941). For the genealogy of the development of the principle from *Trail Smelter*, see EDITH BROWN WEISS, *ESTABLISHING NORMS IN A KALEIDOSCOPIC WORLD* 203 (2020).

476. See Jill M. Fraley, *Liability for Unintentional Nuisances: How the Restatement of Torts Almost Negligently Killed the Right to Exclude in Property*, 121 W. VA. L. REV. 419, 457–58 (2018) (discussing the potential for balancing within the elements of nuisance and how such actions move away from strict liability

violate the no-harm principle (even though it had transboundary effects) if the underlying regulatory response was reasonable.⁴⁷⁷

While reasonableness is a nearly impossible concept to pin down in the abstract, what is reasonable in the SRM context is more straightforward. Here, one would have to compare the price of inaction with the price of the particular SRM proposal. If the environmental harm from unabated climate change is equal to or greater than the harm from SRM, the SRM proposal would meet one straightforward reasonableness requirement. But that is not enough. After all, amputating a person's arm after the person was bitten by a venomous spider may not be reasonable even if the bite (left untreated) would have been lethal. It may be true that amputation was one way to prevent the venom from spreading. But the intuitive question would be: What other ways would have been available? If it would have been straightforward and inexpensive to administer an antivenom, it would be unreasonable to amputate the arm. The same is true in the SRM context: the question is whether there were other SRM methods available that, viewed globally, would be reasonably certain to do less harm, all things considered. That is likely not the case—all SRM methods will have negative impacts. Which negative impact to choose, therefore, will be a question as to which different regulators may come to different preliminary conclusions.

One might ask, "Is this flexibility a recipe for disaster?" Realistically, the answer, once more, is "no." Before deployment of any one application of SRM would be authorized, there would be a significant number of studies. These studies could go forward even if they have some harmful effects. But once these studies conclude, networked governance will again take over; regulators are in touch to solve common problems. This means that examples of successful approaches are likely to be shared, adopted, and coordinated. And it means that any one approach that is disproportionately harmful to any one constituency is likely to be excluded. Flexibility in the real world will move toward convergence. This is not a wild theorem. Rather, it is a

nuisance law); see generally Joseph A. Schremmer, *Getting Past Possession: Subsurface Property Disputes as Nuisance*, 95 WASH. L. REV. 315 (2020).

477. SANDS & PEEL, *supra* note 121, at 206–10; see also JUTTA BRUNNÉE, *PROCEDURE AS SUBSTANCE IN INTERNATIONAL ENVIRONMENTAL LAW* 64 (2020) ("More starkly put, it is lawful for a State to cause even significant transboundary harm to another State if it took reasonable steps, but nonetheless failed, to forestall the harm.").

matter of common experience. Tapes displaced 8-tracks. VHS displaced Betamax. Microsoft Word displaced any number of word processing programs. And they did so not because the government mandated the adoption of one over the other but because of the power of convergence once successful approaches have reached a viability point.

The critical question is whether regulatory processes to get to that point can be made inclusive and flexible—not whether that flexibility will remain in place forever. And in the case of SRM technology, we have seen how such inclusivity and flexibility could naturally coexist in a bottom-up, networked governance approach.

CONCLUSION

Much has been written about the threat of unilateral SRM action—particularly if the unilateral actor is the United States. We have seen that, under the right conditions, this concern is not only over-blown—it is entirely wrongfooted. Unilateral U.S. SRM action is a much-needed exercise of U.S. leadership with regard to a critical global governance challenge. U.S. SRM leadership is not a threat to be feared because such leadership can begin booting up a global SRM governance network by following existing statutory programmatic diligence regimes. These regimes will be better able to bring to bear global engagement on this issue than existing international environmental mechanisms. This diligence will, in turn, lead to networked regulatory governance that will take these benefits of networked diligence to a global, bottom-up governance approach to SRM.

This networked governance approach has several key benefits. The first of these advantages is the flexibility it offers. Given that we are still at an early stage in SRM governance, there is a need for significant regulatory learning. This learning can occur best when different regulators remain free to pursue their own pathways while communicating with their peers about potential impacts and actual results. A top-down governance approach would not provide the same advantage because it would grate against and seek to file down the natural, national differences in approaches to SRM governance. A bottom-up approach, on the other hand, can leverage that very same difference to build needed expertise quickly by sharing

information and allowing meaningful comment and engagement from the earliest possible time.

Second, as we have seen, networked SRM governance can also achieve strongly inclusive decision-making. This inclusivity is in part due to the flexibility of bottom-up SRM governance; every regulator is allowed to hold the regulatory pen and is therefore not reduced to a passive vote in favor of someone else's (hegemonic) approach. The flow of information from other regulators further helps regulators overcome learning curves quickly to catch up to current scientific and engineering knowledge. Networked governance further secures that each regulator is fully heard at an early stage in SRM development and program-building and is therefore able to influence the direction of SRM programs of its peers away from particularly dangerous pathways.

The main blind spot we have identified concerns the voice of marginalized groups in SRM decision-making. There, we found that U.S. leadership again can play a helpful part due to the significant experience of civil society engagement under NEPA. While such engagement needs to increase significantly to do justice to the governance challenge posed by SRM, NEPA provides a blueprint for how to do so. U.S. leadership, therefore, can be helpful in overcoming a State-based Achilles heel of international legal processes toward greater civic inclusion in global SRM decision-making.