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Building a fossil fuel non-proliferation treaty: Key elements

Peter Newell [a,*], Harro van Asselt [b,c,d], Freddie Daley [e]

[a] International Relations, University of Sussex, United Kingdom
[b] Centre for Climate Change, Energy and Environmental Law, University of Eastern Finland Law School, Finland
[c] Copernicus Institute of Sustainable Development, Utrecht University, the Netherlands
[d] Stockholm Environment Institute, Oxford, United Kingdom
[e] Centre for Global Political Economy (CGPE), University of Sussex, United Kingdom

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ABSTRACT

Amid growing recognition of the need for supply-side policies which set limits on the further expansion of fossil fuel extraction and use, in this article we consider possible elements of a Fossil Fuel Non-Proliferation Treaty (FF NPT), behind which there is growing momentum. We elaborate on the possible institutional mechanisms, principles, procedures, and other elements of an FF NPT, by drawing on relevant precedents and parallels with other treaties and bodies of international law on the environment and other policy arenas, and proposals circulating in academic and grey literatures. We address in turn: the scope, objectives, and principles of an FF NPT; the three pillars of commitments under the treaty of (i) ending expansion, (ii) phasing out fossil fuels, and (iii) a global just transition; and options for implementation, including the review of implementation, compliance and effectiveness, a financial mechanism, institutional arrangements, and the role of non-state actors.

1. Introduction

Amid growing recognition of the need for supply-side policies which set limits on the further expansion of fossil fuel extraction, we consider possible elements of a Fossil Fuel Non-Proliferation Treaty (FF NPT), behind which there is growing momentum. We elaborate on the possible objectives, principles, commitments, and institutional mechanisms and other elements of a fossil fuel treaty, modelled here on the idea of an FF NPT, by drawing on relevant precedents and parallels with other treaties and bodies of international law on the environment, human rights and other policy arenas, and proposals circulating in academic and grey literatures. The research is based on a review of existing academic and grey literature, active involvement in the work of the FF NPT campaign and its research group to solicit ideas and feedback and suggestions for resources, and correspondence with key individuals involved in the campaign.

The rationale and point of departure for the treaty is the 'production gap' that exists between the plans by fossil fuel-producing countries to produce 110% more fossil fuels by 2030 and their incompatibility with the goal of the Paris Agreement to keep warming below 1.5 °C compared to pre-industrial levels. The Production Gap Report for 2021 (SEI et al., 2021) confirms that we need to reduce production by 6% per year by 2030 and emphasises the need for international cooperation. The most recent Working Group III report by the Intergovernmental Panel on Climate Change (IPCC) spelled out clearly the need for an immediate shift away from fossil fuels (IPCC, 2022), a call given further credence by the UN Secretary-General Antonio Guterres's comment that '[t]he truly dangerous radicals are the countries that are increasing the production of fossil fuels. Investing in new fossil fuels infrastructure is moral and economic madness' (Guterres, 2022). The normally conservative International Energy Agency (IEA) has called for an end to new fossil fuel infrastructure and the need for international cooperation to meet net-zero targets (IEA, 2021a). Although the main treaties and key decisions in the international climate regime have by and large failed to engage with fossil fuels as the main contributor to climate change, the 2021 Glasgow Climate Pact marks a step forward by naming the need for a 'phasedown' of unabated coal power, and a phaseout of 'inefficient' fossil fuel subsidies (UNFCCC, 2022, para. 20). The weakness of the language also underscores, however, the ongoing power of the fossil fuel industry and fossil fuel dependent economies to resist calls to restrict and ultimately phase out production.

As policy debates, academic research (van Asselt, 2021; Piggot et al., 2018; Le Billon and Kristoffersen, 2020), and activist campaigns begin to centre on the question of what form supply-side measures might take,

* Corresponding author.
E-mail addresses: P.J.Newell@sussex.ac.uk (P. Newell), harro.vanasselt@uef.fi (H. van Asselt), f.daley@sussex.ac.uk (F. Daley).

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we argue that it is useful to look to historical and contemporary examples from international law and governance to identify potentially useful precedents and parallels that might inform the design of a multilateral treaty on fossil fuels. Our aim in doing so is not to merely note or uncritically import these examples, but to briefly explore their relevance to the case of a supply-side treaty. Our contribution adds to existing literature, including proposals for a Coal Elimination Treaty (Burke and Fishel, 2020) and a Fossil Fuel Non-Proliferation Treaty (Newell and Simms, 2020a), by advancing discussions about the possible form that a fossil treaty might take, not in an open-ended normative sense, but based on existing practice, precedents, and bodies of international law. It also builds on a growing wave of minilateral climate clubs that focus on supply-side policies, such as the Beyond Oil and Gas Alliance (BOGA) announced at the Glasgow Climate Conference in 2021 (van Asselt and Newell, 2022).

The remainder of the article is structured as follows. We address in turn: the scope, objectives, and principles of an FF NPT (Section 2); the three pillars of commitments under the treaty of (i) ending expansion, (ii) phasing out fossil fuels, and (iii) a global just transition (Section 3); and options for implementation, including the review of implementation, compliance, and effectiveness, a financial mechanism, institutional arrangements, and the role of non-state actors (Section 4).

2. Scope, objectives, and principles

2.1. Scope

One of the first things an FF NPT would need to do is define its scope: which activities and fossil fuels are to be included and excluded, and on what basis. The treaty could have a broad scope by covering: all fossil fuels, not just one; not only fossil fuel extraction but also fossil fuel infrastructure such as pipelines or coal-fired power plants; both future and existing production; and investments in fossil fuels. A treaty with a narrow scope, by contrast, would restrict itself to one source, and a more limited set of activities.

While Burke and Fishel (2020) propose a Coal Elimination Treaty focused only on coal, a key rationale for covering *all* fossil fuels is that for reasons of equity and the uneven distribution of fossil fuels among countries, there would have to be mutually acceptable and agreed reductions across the fuel sources, such that some countries leave more coal in the ground while those with greater reserves of oil and gas would make cuts to those resources (Newell and Simms, 2020a). This type of 'issue linkage' is common to regime design and is often thought to facilitate cooperation and buy-in by introducing flexibility in how and where cuts are made (cf. Haas, 1980). In this case, countries negotiating a treaty may more easily reach agreement if they have some leeway in deciding which fossil fuel their commitments are focused on.

One issue the treaty might have to confront is whether fossil fuel production which employs carbon capture and storage (CCS) would be considered compatible with carbon budgets in line with the Paris Agreement. Advocates of a 'carbon take back obligation' believe this is critical to engaging major fossil fuel producers through plans for 'geological net zero' (Jenkins et al., 2021). Many advocates of a fossil fuel treaty, however, would see the inclusion of CCS as offering a loophole that locks in dependence on fossil fuels and disincentivises the required production cuts. Moreover, concerns can be raised about the market readiness, scalability, and permanence of many proposed CCS solutions which thus far have been largely deployed to increase extraction.

In sum, the treaty would need to establish the parameters of fossil fuel production under its purview: whether it concerns resources not yet extracted, existing production, or also existing facilities and infrastructures that depend on fossil fuels, which is a more ambitious endeavour. As discussed below, pillar 1 commitments would focus on restricting the expansion and extension of new fossil fuel frontiers, whereas pillar 2 would support active divestment and withdrawal of support for existing fossil fuel infrastructures as part of a process of 'managed decline'.

2.2. Objectives

The overall goal of the treaty would be to align fossil fuel production with the temperature goal of the Paris Agreement. Though distinct in form and purpose, there is an overlap in overall objectives with the United Nations Framework Convention on Climate Change (UNFCCC) and subsequent agreements. The FF NPT could begin as a framework agreement much like the UNFCCC itself or the Vienna Convention for the Protection of the Ozone Layer, which establish principles, modalities, and overall aims that lay the groundwork for subsequent legally binding reduction targets enshrined in the Kyoto and Montreal Protocols respectively. This would involve limiting the further production of fossil fuels that are inconsistent with the long-term temperature goal of the Paris Agreement by agreeing and setting a 'burnable carbon' budget that would provide the baseline and parameters for production constraints. How that budget is set would be informed by a dedicated scientific body, as discussed in Section 4. Broad goals might be set for production limits for coal, oil, and gas respectively. These would need to be revised in light of ongoing scientific assessments regarding safe climate thresholds, models on the availability of and emissions from fossil fuels, as well as equity considerations (relating to responsibility and capacity to transition away from fossil fuels).

The overall objective of an FF NPT is tied to the achievement of another treaty, namely the Paris Agreement. Building on the discussion above, there might need to be some limits set on the ways in which this objective is met. Setting targets for production limits would need to avoid the scenario in which countries claim their plans to expand fossil fuel production are compatible with the temperature goal of the Paris Agreement because their emissions will be captured through CCS, offset through carbon trading, or offshored as the fossil fuels are exported (and burnt) in other countries. As noted, any targets would need to be revised and updated in light of new scientific evidence, as well as on the basis of reviews of progress towards achieving the goals of the FF NPT.

2.3. Principles

An FF NPT would need to be underpinned by a series of agreed principles. Van Asselt (2021) surveys many of the principles that might be necessary under an international legal agreement to leave fossil fuels in the ground. First, these would include the need to address different historical responsibility for emissions, including the principle of common but differentiated responsibilities and respective capabilities (CBDR-RC) written into the UNFCCC. This would recognise that while all countries party to the treaty have a responsibility to restrict production of fossil fuels, some have more of a responsibility than others – namely those that have benefited most from the extraction and combustion of fossil fuels in the past and still do so today. Assessments of responsibilities and capabilities would need to consider the wealth different parties have accumulated from fossil fuel extraction in the past. The concept of 'ecological debt' has been proffered to assign responsibility for accumulated past emissions in the context of supply-side restrictions (Martínez-Alier, 2002). The 'respective capabilities' component of the principle in this context would help to address the uneven capacity of countries to limit production and transition away from fossil fuels and would be the basis for recognising the support they will need to meet obligations under the treaty, as described further below. In addition to the principle of CBDR-RC, differential treatment is also a key feature of other international regimes, including international trade law, under which developing countries receive 'special and differential treatment'. For example, under the Trade Facilitation Agreement of the World Trade Organization, developing countries – and in particular Least Developed Countries (LDCs) – have the option to self-select their commitments. Moreover, the implementation of some of

these commitments is contingent on technical assistance and capacity-building.

Though establishing and agreeing historical responsibility is a fraught and complex task (Okereke, 2008), contemporary responsibility and control is more concentrated. For example, there are only 10 countries with more than 10 'carbon bombs' (projects up to 1 Gigaton of potential carbon dioxide emissions). Forty percent of these have not yet been extracted (Kühne et al., 2022). The 'Fossil Fuelled 5' (Australia, Canada, Norway, United Kingdom, and the United States) are key: five wealthy fossil fuel producer and exporter countries with high levels of historical responsibility for the climate crisis and varying levels of dependence on fossil fuels for economic development, government revenues, and job creation (Daley, 2021). The process of prioritising cuts as part of securing agreement around sequencing might also consider criteria such as carbon intensity, production costs, affordability, developmental efficiency (of fossil fuel rents), and support for climate action (Le Billon and Kristoffersen, 2020).

Second, the treaty could adopt the 'polluter pays' principle or, as others have proposed, the 'extractor pays principle'. Kartha et al. (2018, 122) suggest that in the context of a limited overall 'extraction budget' for keeping warming below an agreed temperature range (as with the Paris Agreement) '[a] greater obligation to curb extraction, and to provide support to others who must curb extraction, should be borne by those who have been responsible for the extraction of fossil fuels in the past'. More broadly, the principle of prevention – i.e., the duty to prevent environmental harm from occurring – has a solid basis in international environmental law (Sands and Peel, 2018), and would provide a key normative rationale for leaving reserves of fossil fuels in the ground (van Asselt, 2021).

Third, to address questions of equity and justice, the treaty could recognise the need for a 'just transition'. The notion of a 'just transition' is included in the preamble of the Paris Agreement with regard to the 'imperatives of a just transition of the workforce and the creation of decent work and quality jobs' (UNFCCC, 2015, preamble) and is widely recognised as an important normative guide to action (ILO, 2015). In relation to the Sustainable Development Goals, it is expressed as a concern with leaving no one behind, but more specifically it relates to adopting measures to ease the uneven and unequal social and economic impacts of transitions on poorer communities through measures such as job retraining, compensation, and regional development funds. While the nature and scope of measures would be at the discretion of national governments, as discussed below, the treaty could provide financial support to countries expected to forego fossil fuel production for the collective good (i.e., achieving the goals of the Paris Agreement) in the form of funding and support for low-carbon energy provision.

As discussed in Section 3, reference to 'just transition' might be made alongside other human rights principles that would cover procedural (rights to consultation and participation, as contained in the Aarhus and Escazú Conventions), distributional, and intergenerational justice. 'Recognition' justice would further require attention to the rights of indigenous peoples enshrined in International Labour Organization (ILO) Convention No. 169 and the United Nations Declaration on the Rights of Indigenous Peoples, including the requirement of securing prior and informed consent. The first Special Rapporteur on Human Rights of the Environment posited that the duty to protect should include the obligation to assess the impacts of fossil fuel projects (Knox, 2016), but the human rights obligations of richer states might extend to prohibiting 'further exploration for additional fossil fuels' (cited in van Asselt, 2021, 4). Drawing on longer-standing attempts to articulate the human rights responsibilities of corporations on climate change (Newell, 2009), pressures for due diligence have also been extended to corporate actors as part of their human rights responsibilities. For example, in a recent legal case before a Dutch court, the oil major Shell was ordered to reduce its greenhouse gas emissions 45% by 2030.

Fourth, a non-regression clause would seek to lock-in upwards progression in ambition and the ratcheting up of commitments over time. Non-regression clauses also feature in international human rights law, in particular in human rights treaties such as the International Covenant on Economic, Social and Cultural Rights (ICESCR), where the right to an adequate standard of living makes an explicit connection between 'minimum requirements' and 'continuous improvement' (Vordermayer-Riemer, 2020). The notion of non-regression and upwards progression in the ICESCR reflects the fact that many of the rights will not be realised in full immediately. With regard to the FF NPT, however, there are immediate commitments and cuts that would have to be made by wealthy fossil fuel-producing nations on the basis of equity. The principle of upwards progression is also enshrined in Article 3 of the Paris Agreement, which indicates that parties should 'undertake and communicate ambitious efforts' through their NDCs and that 'the efforts of all Parties will represent a progression over time' (UNFCCC, 2015, Article 3). Such a principle could be mirrored in an FF NPT.

In sum, as van Asselt suggests (2021, 7) 'the adaptation of existing legal principles – including prevention, equity, and human rights – offers a way forward for developing specific obligations for states and non-state actors to achieve a fair and orderly transition away from fossil fuel production'.

3. Commitments

An FF NPT would contain a series of substantive and procedural commitments. Substantive commitments would include required and agreed limits on fossil fuel production. The goals and timeframes of the agreement would need to be guided by an international scientific assessment of the percentages of each type of fossil fuel that need to remain in the ground in line with the goal to keep warming below 1.5 °C, as expressed in the Paris Agreement. Negotiations towards an FF NPT would undoubtedly link across different fossil fuels based on these respective reserves; some countries would leave more coal, oil, or gas in the ground depending on the location of reserves, their value, and in light of which targets other countries commit to. Commitments would embody differentiated targets and timetables for first halting, and then phasing out, fossil fuel production by countries.

Informed by the proposed objectives of the treaty, namely to align fossil fuel production with the temperature goal of the Paris Agreement, criteria for allocating and sequencing commitments would include that: (i) the costs of action should be borne disproportionately by those who have the greatest ability to pay defined by per capita income levels and that are best placed to redirect finance, production, and technology towards lower-carbon alternatives; (ii) the greatest producers of greenhouse gas emissions from the direct burning of their own fossil fuel reserves should act first; and (iii) cumulative emissions are assessed to take adequate account of historical responsibility and the use of fossil fuels to date. In this regard, substantive financing obligations would apply to richer countries and larger historical emitters, who would be expected to contribute to a Global Transition Fund (discussed in Section 4) aimed at supporting poorer countries adopt lower-carbon and non-fossil fuel energy pathways. This would reinforce obligations that many parties have already assumed under the Paris Agreement to 'promote universal access to sustainable energy in developing countries, in particular in Africa, through the enhanced deployment of renewable energy' (UNFCCC, 2015, preamble).

Financial obligations might also extend to commitments to phase out public financial support in the form of subsidies, tax breaks, aid, and export credit finance for fossil fuels both domestically and internationally. This is already happening in a more haphazard and uncoordinated fashion, but agreed targets and timetables for phasing them out would help minimise associated social and economic risks of stranded assets and deliver the broader goals of the treaty. This would reinforce the Paris Agreement's call of '[m]aking finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development' (UNFCCC, 2015, Article 2(1)(c)).

Procedural commitments might include reporting obligations,

subject to review and mutual monitoring of compliance (see Section 4), and the production of a national production phase-out plan (rather like a Nationally Determined Contribution (NDC) strategy).

Here we lay out the three main pillars of commitments under the treaty.

3.1. Ending expansion ('non-proliferation')

The first pillar would seek to restrict the expansion of new fossil fuel frontiers under the umbrella of 'non-proliferation'. Insofar as fossil fuels can increasingly be characterised as polluting and hazardous substances, precedents for controls on such substances include the World Health Organization (WHO) Framework Convention on Tobacco Control, the Montreal Protocol, the Minamata Convention on Mercury, the Ottawa Treaty on Anti-Personnel Landmines, and of course the Nuclear Non Proliferation Treaty. Commitments under pillar 1 could be related to no new production and/or they could relate to not exploring, and/or not building new infrastructure and/or not funding new production. A precedent in this regard is the inclusion of a 'standstill' clause in trade agreements, where countries commit not to introduce new trade barriers. Such a mechanism is also under consideration by Asia-Pacific Economic Cooperation (APEC) members with regard to the introduction of new fossil fuel subsidies (APEC Committee on Trade and Investment, 2021).

In practice, some combination of these commitments would be required. As noted above, they could also be quantifiable targets and commitments (percentages of fossil fuels to stay in ground by agreed dates) or calculations of the economic worth of fossil fuels that countries are asked to forgo in light of carbon budgets. In this vein, Pellegrini et al. (2021) identify the reverse auction model as a means of identifying reserves that must remain unextracted, where the rights holders of commercially viable reserves receive compensation for forgoing extraction. However, market-based commitments may not deliver optimal outcomes as extractive industries rarely function on the principle of perfect competition and price signals often omit externalised costs, such as biodiversity loss (Bromley, 2007; Orta-Martínez et al., 2018).

Commitments might also extend to the timetabled phase-out of financial support to fossil fuels domestically and internationally following unilateral moves by particular governments and regional and international development banks and commitments made by over 20 countries – including major fossil fuel producers such as Canada and the United States – at the Glasgow Conference of the Parties (COP) to end overseas financing of fossil fuels by the end of 2022.[1]

Regarding the sequencing of non-proliferation commitments, the proposal for the FF NPT advanced by Newell and Simms (2020a) suggests this could be organised by region and energy source. For reasons of equity and historical responsibility, richer, primarily OECD (Organisation for Economic Co-operation and Development) countries and the Russian Federation would need to move the furthest and the fastest. When factoring in equity and historical emissions, the speed and depth of fossil fuel production cuts are stark. The wealthiest group of producer nations must cut oil and gas output by 74% by 2030 with a complete phase out by 2034 (Calverley and Anderson, 2022). The poorest nations, however, need to cut oil and gas output by 14% by 2030 with all production ending by 2050 (Calverley and Anderson, 2022). Coal production in developed countries needs to be eliminated by 2030, while in developing countries coal production must end by 2040 (Calverley and Anderson, 2022). Significantly, many of the world's largest and most powerful private fossil fuel companies are based in OECD countries. Therefore, to avoid problems of carbon leakage and to improve ease of compliance, fossil fuel assets held overseas by a country's home companies would be subject to supply-side commitments under an FF NPT. A second tier of next-mover countries would be large non-OECD emitters such as China, India, Brazil, and Indonesia, all of whom feature in the top 10 global greenhouse gas emitters, accounting together for nearly three-quarters of global emissions. Support would then have to be provided to poorer developing countries with reserves of fossil fuels to instead meet their energy needs with renewable energy, the cost of which would be met through the redirection of the large amount of public and private finance in the form of aid, export credits, investments, and fossil fuel subsidies towards low-carbon energy pathways. Potential precedents from other treaties include the 'grace period' under the Montreal Protocol, and differentiated commitments under the UNFCCC, Kyoto Protocol, and Paris Agreement. The treaty could also enact ideas of 'graduation and deepening' (Michaelowa et al., 2005) whereby, in this context, commitments could be assumed once a certain level of production capacity or level of reserves is reached, to ensure treaty commitments are dynamic and evolve over time. The UNFCCC can also be a precedent for further differentiation, taking into account different respective capabilities, such as lower capacities for LDCs, as noted above in the discussion of principles underpinning the treaty.

Which countries belong to which of the categories described above will of course be a function of the principles used to determine commitments that were discussed in Section 2. To be effective, such a treaty would need to engage China in commitments to phase down coal in particular, and measures to reduce financing for fossil fuels would help to achieve that. But the need to recognise the historical beneficiaries of fossil fuel use to date, would still mean that fossil fuel producer and exporter countries with high levels of historical responsibility for the climate crisis would belong in the first tier of 'first mover' countries. This is critical to addressing the potential tension between the need for an accelerated phase out of fossil fuels as recognised by a growing number of global bodies and the need to address issues of equity. Those countries with greatest wealth and 'respective capabilities' to transition away from fossil fuels should be encouraged to do so, while supporting those with less capacity to do so and which have less historical responsibility for emissions from fossil fuels. Cooperation by the latter would be contingent on accelerated action by the former.

3.2. Phasing out fossil fuels ('disarmament')

Whereas pillar 1 addresses the question of non-proliferation and an agreement not to exploit further reserves of fossil fuels, pillar 2 addresses the need to manage the decline of existing projects, investments, and infrastructures. The pace of decline would be determined by a combination of levels of emissions, degrees of responsibility and capacity to meet energy, transport, housing, or other needs through alternative means. Differential timeframes could be set for the phase-out, as is common in many multilateral environmental agreements (such as the Montreal Protocol), as well as arms control treaties such as the Strategic Arms Reduction Treaty. The Ottawa Treaty on landmines also includes a sequenced phase-out mechanism that is twofold, mirroring pillar 1 and pillar 2 of the FF NPT. The first stage of phase-out begins with the immediate prohibition on new deployments, production, and transfers of mines, and the second phase provides for the destruction of existing stockpiles and the clearance and destruction of operational mines, with the gap between these two phases being as short as practically possible.

The 1972 London Convention on the dumping of waste in the marine environment follows a 'black- and grey-list' approach to phasing out harmful marine pollutants. The 'black list' contains items and chemicals where dumping is completely prohibited, while the 'grey list' contains waste products that require a special permit from a mandated authority that monitors whether the strict conditions are met. To ensure that aspects of equity are embedded within the FF NPT, a similar approach could be followed where wealthy, high-polluting nations with large historical emissions begin phasing out projects, investments, and

[1] https://ukcop26.org/statement-on-international-public-support-for-the-clean-energy-transition/.

infrastructures immediately, while developing nations have their infrastructures added to a 'grey list' where operations are permitted to continue under monitoring, but ultimately phased out. Moreover, a degree of flexibility for developing nations via a 'grey list' will be important to sequencing a just transition in a way that minimises disruption from assets becoming stranded.

3.3. A global just transition ('peaceful use')

With 770 million people still without access to electricity (IEA, 2021b), meeting the energy needs of the world's poorest people without using fossil fuels presents a huge challenge. Many studies have shown that without adequate attention to justice issues, transitions to a lower-carbon economy are unlikely to be forthcoming (Newell and Mulvaney, 2013; Swilling and Annecke, 2012; Healy et al., 2019). At the same time there would need to be a recognition of the dependence many countries have on fossil fuels for their development. The language of the UNFCCC in this recognises '[c]ountries whose economies are highly dependent on income generated from the production, processing and export, and/or on consumption of fossil fuels and associated energy-intensive products' (UNFCCC, 1992, Article 8(h)).

There are procedural, distributional, intergenerational, and recognition aspects to justice that the treaty would need to address, from who has a right to participate in the treaty's deliberations and on what basis, to managing distributional issues from a transition away from fossil fuels. Intergenerational justice might be invoked and articulated as one of the underlying rationales for the treaty in terms of safeguarding a habitable climate for future generations and procedurally noting the key role of youth groups as stakeholders. Recognition justice could be articulated through the special mention of groups that have played a key role to date in restricting the expansion of fossil fuels, including environmental defenders from indigenous groups (Temper et al., 2020). Principles of procedural justice would translate into specific commitments around prior and informed consent, access to information, and public participation, written into many multilateral environmental agreements and regional treaties such as the Aarhus and Escazú Conventions.

Some of the commitments regarding this pillar of the treaty could cross-reference agreed formulations such as the ILO Guidelines for a Just Transition (ILO, 2015). While not all of these issues can or should be addressed by a multilateral treaty, some key principles and modalities for addressing these issues would need to be established drawing on these precedents. The uneven 'respective capabilities' that countries have to transition away from fossil fuels would feature in discussions about sequencing of commitments (discussed above) and decisions (discussed below) about how to allocate and distribute financial support from a Global Transition Fund. Given the scale of the challenge, the urgency, and the fact that many countries face capacity constraints and cannot undertake the transition on their own, there is a need for international coordination. While there is no doubt that all fossil fuel-producing countries face major challenges, countries such as Canada, the United Kingdom, and the United States not only have much more diversified economies – meaning that they are less dependent on oil revenues for the provision of government services – but they also have higher income per capita, which indicates a greater capacity to transition away from fossil fuels. By contrast, countries like Azerbaijan, Iraq, Congo, and Timor Leste are far more dependent on fossil fuels for government revenue and have a lower capacity to transition. There is hence a need for support, and for international agreement around which countries will phase out their fossil fuels first.

4. Implementation mechanisms

Various mechanisms can be deployed to facilitate the implementation by states of their commitments and the achievement of treaty objectives. Here we discuss three types of review mechanisms (of implementation, compliance, and effectiveness) (Bodansky, 2010), a financial mechanism, the institutional arrangements, as well as mechanisms to facilitate the participation of non-state and subnational actors.

4.1. Implementation review

Regular national reporting, and the subsequent review of reported information, is a common feature of multilateral regimes in issue areas as diverse as trade, the environment, human rights, and nuclear weapons. Although initiatives that have emerged to disclose information related to fossil fuel production, such as the Extractive Industries Transparency Initiative (Bradley, 2020), the available information is still incomplete, inconsistent, and scattered across a range of transparency initiatives, and that much of this information is reported or collected largely on a voluntary basis (SEI et al., 2021), a reporting and review mechanism would be an essential element of the FF NPT. The types of information that could be reported include data on fossil fuels produced in a country in any given year, plans and policies for future production, oil and gas fields and coal mines that are under production or in development (including their historical production and projected future production levels), fossil fuel infrastructure, amounts of government support for the production of fossil fuels, and information related to governments' plans for a fair and equitable transition (SEI et al., 2021). National reporting can draw – and expand – on information collected through existing transparency arrangements. For instance, information on fossil fuel finance could build on information collected by the OECD and IEA on fossil fuel subsidies, whereas information on fossil fuel reserves and their climate impact could build on the Global Registry of Fossil Fuels developed by the Carbon Tracker Initiative and Global Energy Monitor.

In designing a mechanism to review how parties are implementing their commitments under the FF NPT, several questions arise (van Asselt and Harrould-Kolieb, 2022). First, to what extent and how should reporting and review obligations be differentiated between countries? If reporting is completely voluntary, countries could self-determine what and when to report. However, this would make reported information difficult to compare, and the submission of information would be unpredictable. Therefore, for many multilateral agreements, the main reporting requirements apply to all parties. Nevertheless, reporting requirements can be differentiated. The Paris Agreement for instance differentiates between parties through a system of 'built-in flexibility' for 'those developing country Parties that need it in the light of their capacities' (UNFCCC, 2015, Article 13(2)). Under this system, developing countries may report in lesser detail for several elements. However, even in these instances, the reporting requirements still require all parties to report basic information, allowing for at least a minimum level of comparability. Moreover, parties need to 'clearly indicate the provision to which flexibility is applied, concisely clarify capacity constraints, … and provide self-determined estimated time frames for improvements in relation to those capacity constraints' (UNFCCC, 2019, Annex, para. 6). Likewise, to gain insights into progress made by states in implementing their commitments under the FF NPT, and to foster an aggregate understanding of trends in fossil fuel production and their alignment with climate goals, minimum reporting and review requirements would be warranted.

Second, should national reports be reviewed by technical experts, by other parties (in a peer review process), or both? Verification by technical experts is commonly used in international regimes. This may involve international organisations (e.g., the International Atomic Energy Agency (IAEA) in case of the Nuclear NPT), treaty secretariats (e.g., the secretariat of the Convention on International Trade in Endangered Species (CITES) reviewing national reports), or government-appointed experts acting in their personal capacity (e.g., the roster of experts carrying out technical reviews under the UNFCCC). A review by technical experts, which may include on-site inspections (a practice common for arms control treaties), can enhance trust by ensuring that the

reported information meets certain objective criteria. By contrast, a peer review by other parties is a decidedly more political process, offering space for questions and answers between states in a public forum. This type of review has been used in the areas of human rights (the United Nations Human Rights Council's Universal Periodic Review), trade (the World Trade Organization's (WTO) Trade Policy Review Mechanism), climate change (the Paris Agreement's upcoming 'facilitative, multilateral consideration of progress'), and fossil fuel subsidies (voluntary peer reviews under the G20). Through peer reviews, states can – in theory, though not always in practice (Gupta et al., 2021) – hold each other to account for their (lack of) implementation of commitments, but also learn from each other's practices.

4.2. Compliance review

The review of implementation can be closely related to a second type of review, that of compliance with commitments. Although in some areas of international governance non-compliance can give rise to an adversarial dispute settlement process (the WTO's dispute settlement mechanism being a prime example), multilateral environmental agreements have commonly relied on less confrontational mechanisms to promote compliance (Doelle, 2021).

A distinction can be made between 'facilitative' compliance mechanisms that find their origin in the 'managerial' approach to compliance (Chayes and Chayes, 1995) on the one hand, and enforcement-oriented mechanisms (Downs et al., 1996) on the other. Under a facilitative approach, non-compliance by a country is generally assumed to be related to a lack of capacity and ambiguous norms. Accordingly, to promote compliance, 'soft' measures such as developing compliance action plans, the provision of financial support, or capacity-building are suggested as key measures that could be adopted as a result of a non-compliance procedure. Examples of such an approach abound in international environmental governance, including for instance the Montreal Protocol's implementation review, as well as the Paris Agreement's Implementation and Compliance Committee. This approach to compliance requires the existence of effective mechanisms to provide financial and other support to countries facing challenges in complying. To strengthen the level of accountability under the non-compliance procedure, the process could be expanded to include civil society organisations (Burke and Fishel, 2020) drawing on the earlier experience of, for example, the North American Free Trade Agreement, which had a Joint Public Advisory Committee to the NACEC (North American Commission for Environmental Cooperation), designed to provide input from civil society and the business sector to the NACEC's governing council (Newell, 2007). Similarly, the Universal Periodic Review of the Human Rights Council offers opportunities for civil society to provide input into the review, which can be emulated in an FF NPT (van Asselt and Harrould-Kolieb, 2022).

By contrast, the enforcement school suggests that states will comply only if the costs of non-compliance exceed the benefits (Downs et al., 1996). The response to non-compliance in this view requires sanctions or other incentives increasing the costs of non-compliance (Hoffman et al., 2022). One possible response is the withdrawal of benefits. For example, under the Kyoto Protocol, one of the consequences of non-compliance included the exclusion from the Protocol's market-based mechanisms, effectively removing the opportunity to achieve cost-effective emission reductions. Restricting trade in fossil fuels has precedents in the Montreal Protocol, which provided for trade restrictions against non-parties, and in the Basel Convention, whose hazardous substances list system indicates which types of trade are permissible or banned. The costs of non-compliance could also be non-economic, for instance by 'naming and shaming' the countries that are not complying, resulting in reputational costs. In some treaties, measures to address non-compliance can also lead to trade sanctions, such as trade suspensions under CITES and the Montreal Protocol.

Various measures to promote compliance can co-exist. For instance, for less developed countries, facilitative measures such as capacity-building and financial support can help overcome concerns that participation in the FF NPT would be too costly. Such facilitative measures could be combined with 'harder' trade measures to reduce the incentive for countries to shirk key obligations (e.g., an obligation to phase out production by a given date). Trade measures could be in the form of suspending trade in any fossil fuels or fossil-fuel-derived product (e.g., LNG) from the non-complying country. Though not a sanction as such, other drivers of compliance beyond the regime might include the withdrawal of finance and loans for fossil fuels. MDBs such as the World Bank and regional banks such as the European Investment Bank already restrict finance for fossil fuels, and over 20 governments at Glasgow agreed to phase out overseas fossil fuel finance by the end of 2022. Hence some of the means of enforcing the treaty's aims would lie outside the purview of the treaty.

4.3. Effectiveness review

In addition to mechanisms to track the performance of individual countries, and hold them to account, a global mechanism would help to ensure that parties to the FF NPT, in aggregate, are on track towards achieving the treaty objective, and could maintain political momentum to accelerate the phase-out of fossil fuel production. A few existing multilateral agreements have such an effectiveness review mechanism. These include the Nuclear NPT, which includes a five-yearly review of the operation of the treaty, as well as the Paris Agreement, which provides for a five-yearly 'global stocktake' to assess progress towards the treaty's long-term goals. Somewhat less well-known is the effectiveness evaluation of the Stockholm Convention on Persistent Organic Pollutants, which combines a global monitoring plan with an assessment of national-level progress.

A global assessment could include a global mapping and assessment of fossil fuel production plans and their consistency with the 1.5 °C goal. Such an assessment could involve organisations with sectoral expertise such as the IEA, or a UN body such as UNEP, which has supported the annual Production Gap reports. Like the global stocktake under the Paris Agreement, a global-level review of fossil fuel production could draw on a variety of inputs, including national reports, as well as data collected by non-state actors, such as the information collected as part of the Production Gap reports and the Global Registry of Fossil Fuels. In addition, this global assessment could in itself feed into the global stocktake under the Paris Agreement.

4.4. Financial mechanism

One means of reducing financial support to the fossil fuel industry and providing fiscal support to renewable alternatives would be through the creation of a Global Transition Fund (Newell and Simms, 2020a). This could be financed by a carbon tax or a redirection of fossil fuel subsidies. Though currently a proportion of those subsidies support the livelihoods of poorer energy consumers (through kerosene subsidies for farmers in India, for example), they also the form of tax breaks and credits for major fossil fuel companies. Principles for equitably generating and distributing the funds would need to be agreed, as is the case with any multilateral fund (such as the Global Environment Facility (GEF) or Green Climate Fund (GCF)) or treaty specific funding arrangements. For example, the GEF has a policy and guidelines on a 'System for Transparent Allocation of Resources' which uses a combined formula of global benefits (including contributions to climate action), country performance (including an institutional assessment), and a GDP index (GEF, 2018). There are also important questions pertaining to where the fund is hosted, which organisation oversees it, and whether the fund needs to be an entirely new entity or can be integrated with operational multilateral funds. Precedents for such a fund include the Multilateral Fund of the Montreal Protocol.

Regarding the financing of commitments under pillar 3 of the treaty,

while there are limits to how far the regional and sectoral dimensions of just transitions can be addressed through international law, financial support could be provided for retraining and regional redevelopment or through easements and compensation. Capacity-building work and exchange of best practice could also be enabled and facilitated by a secretariat to the treaty in conjunction with other funding bodies such as the GCF or GEF, as well as regional and multilateral development banks. There are many precedents for this, from the GEF serving as a key financing and technology transfer mechanism for the UNFCCC to the World Bank using its Climate Investment Funds or Carbon Finance Assist programme to support the development of Clean Development Mechanism projects under the Kyoto Protocol. Indeed, the World Bank Group is the largest multilateral funder of climate investments in developing countries, delivering over US$26 billion in climate finance in 2021 (World Bank, 2021).

There are also proposals for climate easements in the form of compensation for revenues foregone. Limited precedents include the Yasuní-ITT proposal, but there is also growing interest in debt-for-climate swaps. The Yasuní model suggests an interesting, but also challenging, precedent whereby a commitment to forgo revenues from oil production was proffered in exchange for compensatory finance from the international community (Sovacool and Scarpaci, 2016). However, insufficient funds were committed by the international community and licensing for oil extraction in the Yasuní national park went ahead. To overcome this barrier, Pellegrini et al. (2021) propose a hybrid institutional mechanism that combines a reverse auction model, where rights holders over proven reserves are compensated for forgoing extraction, with socio-environmental values. However, such a mechanism must include a clear route to international arbitration, much like in international investment agreements, to ensure that rightsholders cannot continue with extraction after receiving compensation (Pellegrini et al., 2020).

4.5. Institutional arrangements

Many multilateral regimes can evolve over time. One way of doing so is through the creation of treaty bodies that can guide the further development of the regime. This includes decision-making bodies (such as conferences or meetings of the parties of various multilateral environmental agreements), bureaucracies (e.g., secretariats) and scientific advisory bodies (akin to the IPCC or the Technical and Economic Assessment Panel advising the parties to the Montreal Protocol).

With regard to the decision-making body, a key question is whether this would involve all parties, or just a subset thereof (as is the case for instance of the Human Rights Council). While the latter may make the decision-making process more efficient, it may also challenge the input legitimacy of the process. A related question is whether decisions should (always) be made by consensus, or whether (some) decisions can be taken through majority voting. While a consensus-based process may strengthen the input legitimacy of the treaty, an entirely consensus-based model would hinder meaningful progress if laggards were effectively given a veto over proposals to expand and deepen commitments to production limits.

A dedicated scientific body – such as a Global Commission on Fossil Fuels – would be important for providing input into negotiations based on the latest scientific thinking regarding available carbon budgets and how far fossil fuel-related commitments need to be realigned accordingly. Any institution would need to have flexibility built into its design to revise agreed production limits considering the latest scientific evidence from the Intergovernmental Panel on Climate Change; and to revise country commitments based on changing energy profiles and the availability of alternative technologies.

4.6. Non-state and subnational actors

Treaties are commonly created by states, for states. Non-state and subnational actors are not among the addressees of treaties. Even where the treaty purports to regulate non-state actors – e.g., the new treaty on business and human rights currently under negotiation (De Schutter, 2016) – the primary subject remains the state. In the context of the FF NPT, focusing on states alone would miss out on the opportunity to engage with a wide array of actors, from subnational authorities in fossil fuel-producing nations where the federal government is reluctant to join the treaty, to progressive businesses and investors eager to support the just transition away from fossil fuel production. Such an ambitious treaty would also require the active backing and engagement of civil society that has proved to be crucial in driving the conclusion of treaties on arms control.

Following recent examples in international environmental governance, the FF NPT could provide for the engagement of non-state and subnational actors in various ways. First, the treaty can be accompanied by a separate platform through which such actors can make their own commitments to support the treaty (e.g., by phasing out fossil fuel production and/or providing financial support). This could follow the model of the Global Climate Action platform maintained by the UNFCCC. To ensure that such pledges are transparent and accountable, specific criteria could be developed that non-state and subnational actors would need to meet before a commitment can be included (see Chan et al., 2021). Second, the treaty can provide for active participation by non-state and subnational actors through the institutional arrangements. This could include allowing for input into decision-making (e.g., through submitting reports or statements), or allowing participation in the review processes established under the treaty (van Asselt, 2016) including with regard to compliance, as noted above, drawing on precedents from regional trade regimes. Also here, there may be a need for minimum criteria to avoid possible conflicts of interest (e.g., through the participation of fossil fuel companies). One possible model to follow here would be the WHO's Framework Convention on Tobacco Control, whose policies acknowledge the fundamental conflict between tobacco companies and the public health goals of the Convention.

5. Conclusion and outlook

There are a number of rationales driving interest in and support for a fossil fuel treaty, but most coalesce around the ever more obvious need to align current and planned fossil fuel production with the goals of the Paris Agreement. Rather than explore political pathways for securing such an agreement as others have done (van Asselt and Newell, 2022), here we have sought to advance an understanding and appreciation of the possible building blocks of a FF NPT with reference to contemporary and historical precedents and parallels. We explored the possible scope, aims and principles that could underpin such a treaty before looking at commitments under each of the three key pillars. Thereafter, we reviewed potential procedures and mechanisms for implementation and compliance aimed at assessing progress, incentivising cooperation, and deterring free-riding.

Though the treaty would provide an overarching institutional architecture for supply-side climate policies, it would also provide global oversight and further amplify a series of trends which are unfolding anyhow around: stranded assets, the falling price of renewables, growing waves of activism, litigation, and first-mover alliances. Hence assessments of the political viability of proposals for an FF NPT need to be situated within this broader context. For example, several countries have already shown progressive leadership as 'first movers' in leaving fossil fuels in the ground. The supply-side climate policy approach was first attempted by Ecuador through its Yasuní-ITT Initiative. France then announced in December 2017 it would phase out oil and gas exploration and production, a move then followed by Belize (which announced a moratorium on all offshore oil activity in late December 2017), Denmark (which implemented a ban on onshore oil and gas exploration in February 2018 and an oil and gas phase out in 2020), New Zealand (which banned new offshore oil exploration licences in April 2018), and

Ireland (which enacted a ban on future oil exploration licences in September 2019). Countries such as Denmark have also moved rapidly from being major investors in oil and gas to leaders in renewables, captured most clearly in the renaming of DONG (Danish Oil and Natural Gas) as Ørsted, while former major coal producers such as Germany have introduced phase-out policies. These first movers are charting a new terrain in climate policy that, if spread and developed into a global governance norm, can influence major fossil fuel producers (Green, 2018).

Several former fossil fuel producers such as Germany and the United Kingdom are also part of the Powering Past Coal Alliance which aims both to secure commitments from governments and the private sector to phase out existing unabated coal power and encourage a global moratorium on the construction of new unabated coal-fired power plants. Denmark is now a founding member of the new Beyond Oil and Gas Alliance, which seeks to encourage first-mover countries to go beyond both oil and gas (BOGA, n.d.). There is potential for others to follow in their footsteps. It has been suggested elsewhere that such supply-side clubs could prepare the political ground for a treaty which then draws in other members as trust is built and momentum gathers (van Asselt and Newell, 2022). The appeal for major fossil fuel producers of being involved in a multilateral treaty initiative is that the inevitable wind-down of fossil fuels will be coordinated in a multilateral forum, and overseen in a more orderly fashion, where reporting and compliance measures would deter free-riding by countries which otherwise deter major producers from adopting such measures. This would be considered preferable to the disorderly exit from fossil fuels that has been triggered by the Russian invasion of Ukraine, for example. As Simms and Newell (2022) argue, '[r]eactive measures will always be necessary. But rather than staggering from crisis to crisis, one of the additional benefits of the Fossil Fuel Non Proliferation Treaty … is that withdrawing from climate polluting fuels could be made easier and be done in a fair and orderly way.'

Researchers, drawing on a fossil fuel cuts database, found that 1532 initiatives have now been implemented to date covering moratoria, bans, limits, subsidy removals, and fossil fuel divestments (Gaulin and Le Billon, 2020). This demonstrates both a rapid growth in the number of supply-side initiatives taken during the past decade, but also their highly uneven adoption across the world, underscoring the need for a multilateral framework to advance a more universal approach. Indeed, there have been calls within the UNFCCC process to broaden these commitments with Pacific Island leaders creating the Suva Declaration calling on parties to initiate fossil fuel moratoria, especially on coal mining. Support has also been forthcoming from senior figures such as former Irish President and over 100 former Nobel laureates for an FF NPT, and even US vice-President Kamala Harris called for 'a first-ever global negotiation of the cooperative managed decline of fossil fuel production' in her presidential campaign (Darby, 2020). Most recently, Vanuatu became the first nation state to support the treaty, while calls have also come from the foreign Minister of Tuvalu, the Climate Minister of New Zealand, and the President of Timor Leste (an oil producing country), as well as EU parliamentarians. The example of the nuclear NPT suggests that even in the face of resistance, treaties can be agreed within a short space of time. Despite its limitations, the NPT was concluded in three years at the height of the Cold War, signed by 191 states and enjoys near universal membership and high levels of compliance (Kaplow, 2022).

But support is not just coming from states. Campaigns are also increasingly aimed at phasing out fossil fuel finance being deployed by multilateral development banks, bilateral donors and governments' use of export finance. Recent moves by the European Investment Bank and commitments from the World Bank to withdraw finance from fossil fuels show these are having an effect. The Lofoten declaration for a managed decline of fossil fuel production created in August 2017 and now signed by 600 organisations from over 76 countries put this question front and centre. Subnational action might also have an important role to play, where SAFE Cities is a growing network of cities, counties, and other communities that Stand Against Fossil Fuel Expansion (55 so far), and a number of key cities including Amsterdam, Barcelona, Los Angeles, Paris, Sydney, Toronto, and Vancouver have endorsed the idea of a treaty to limit fossil fuels. There are also moratoria in place on hydraulic fracturing ('fracking') in hundreds of subnational jurisdictions including France, Germany, Ireland, Scotland, and Wales. Investors and corporations are also increasingly subject to divestment campaigns, boycotts, and other pressures to withdraw support for new fossil fuel investments as witnessed in recent shareholder revolts. Even ExxonMobil, one of the most strident opponents of climate action, was defeated in a May 2021 shareholder vote by an activist investment firm demanding that the company accelerate a transition to clean energy (Newell, 2021).

Historically, civil society mobilisation has been crucial to building support for new treaties. For example, the Treaty for the Prohibition of Nuclear Weapons which was officially adopted at the Unite Nations in 2016, with 122 states in favour, one against, and one abstention. The move came on the back of a huge civil society mobilisation. As Newell and Simms (2020b) note: 'a bold group of countries including Costa Rica, New Zealand, Mexico, Ireland and South Africa, with the backing of a massive civil society campaign, decided to bypass the obstruction of the nuclear powers and create a new treaty to ban nuclear weapons. It was the result of a global mobilisation under the umbrella of the International Campaign to Abolish Nuclear Weapons, a coalition of more than 500 partner organisations in over 100 countries.' Indeed, whilst it might be naïve to imagine that major fossil fuel producers would be the first to join a fossil fuel treaty, there is symbolic and political value to treaties whose membership expands over time in generating momentum and seeding new norms, while reinforcing others through cross-referencing existing principles and bodies of international law, as we propose here.

It is also the case that the function and identity of international bodies and coalitions is not fixed. This even holds for the Organization of the Petroleum Exporting Countries (OPEC), which might be considered to have the most to lose from a Fossil Fuel Non-Proliferation Treaty. As Dobson (2020, 2) notes:

> 'the preamble of the [OPEC] agreement implicitly regrets the extent to which Members "must rely on petroleum income to a large degree in order to balance their annual national budgets," noting that such dependence leaves them vulnerable to "dislocation[s] detrimental" to their economies from fluctuations in the oil price. It further notes that "Petroleum is a wasting asset and to the extent that it is depleted must be replaced by other assets". OPEC's founding treaty thus not only recognized the dangers of oil dependence, but also the necessity of transitioning its members' economies towards different and sustainable sources of wealth generation. For OPEC to become a responsible international organization, therefore, committed to managing a swift and equitable transition away from a global economy dependent on oil, would not only safeguard its members interests; it would mark a return to, not a departure from, its founding principles."

Despite these political reconfigurations and growing momentum, powerful incumbent actors continue to plan for the further exploration and production of fossil fuels regardless of the many reports and chorus of statements that such plans are incompatible with the need to accelerate and deepen climate action. Indeed, some states and business actors are using the crisis in Ukraine as an excuse to expand fossil fuel production, despite the attention the war brings to the relationship between fossil fuels and conflict and the opening it could create to expand domestic energy security through expanding renewable energy (Ekins and Newell, 2022). The success of a multilateral supply-side treaty is far from guaranteed amid such a turbulent and volatile geopolitical landscape, but analysing key dimensions of such an agreement is an important and worthwhile endeavour so that as and when a political opportunity to advance cooperation on this most critical of issues

presents itself, we will have prepared the ground.

CRediT authorship contribution statement

Peter Newell: data collection, Conceptualization, Methodology, Investigation, analysis, Writing – review & editing, Funding acquisition, Project administration, Supervision. **Harro van Asselt:** data collection, Conceptualization, Methodology, Investigation, analysis, Writing – review & editing, Funding acquisition, Project administration, Supervision. **Freddie Daley:** data collection, Conceptualization, Methodology, Investigation, analysis, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

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