

Pathways to an International Agreement to Leave Fossil Fuels in the Ground

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Abstract

To achieve the Paris Agreement's temperature goal, fossil fuel production needs to undergo a managed decline. While some frontrunner countries have already begun to adopt policies and measures restricting fossil fuel supply, an outstanding question is how international cooperation in support of a managed decline of fossil fuel production could take shape. This article explores two possible pathways—one following a club model and the other more akin to a multilateral environmental agreement. Specifically, the article discusses the participants in an international agreement; the forum through which cooperation will take place; the modalities, principles, and procedures underpinning the agreement; and the incentives to induce cooperation. The article concludes that the most likely scenario at this juncture is the emergence of club arrangements covering particular fossil fuel sources and groups of actors that, over time, give rise to growing calls for a more coordinated and multilateral response.

Fossil fuels—coal, oil, and gas—are the single largest contributor to greenhouse gas emissions. Further fossil fuel production may therefore jeopardize the achievement of the long-term temperature goal of the Paris Agreement to keep global warming well below 2°C and pursue efforts to stay below 1.5°C (International Energy Agency 2021; Stockholm Environment Institute et al. 2021; Welsby et al. 2021). Remarkably, however, recognition of the need to reduce fossil fuel production is entirely absent in the treaties and decisions that form the basis of the international climate regime (Piggot et al. 2018). This is the rationale for governance proposals to address the supply of fossil fuels and not just the greenhouse gases they emit when burned.

Acknowledging the linkages between fossil fuel production and climate change, a growing number of countries have adopted measures restricting fossil fuel supply, including moratoria, extraction taxes, and reforms of fossil fuel producer subsidies (Carter and McKenzie 2020; Erickson et al. 2018; Gaulin and Le

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Billon 2020; Lazarus and van Asselt 2018). While such supply-side measures can complement demand-oriented climate policies (Green and Denniss 2018), their effectiveness would be strengthened by international cooperation. International cooperation can help build trust that other countries are taking action (Piggot et al. 2020). Absent international coordination, constraining supply from some countries can increase economic incentives for others to increase production (Le Billon and Kristoffersen 2019). Moreover, from the perspective of climate justice, “leaving the allocation of ‘who may extract?’ to market forces risks placing the greatest burden of transition on those least able to carry it” (Kantha et al. 2018, 119) and fails to address the structural inequities in market access and imbalances of power that allow incumbent fossil fuel industries to benefit from fossil fuel subsidies and other forms of government support. Addressing these issues, international institutions can help by setting overall goals; putting in place mechanisms to strengthen transparency and accountability; offering capacity-building, financial, and technological support; and disseminating information, allowing for learning across countries (Rayner 2021).

Several proposals have been put forward for international cooperation to facilitate the winding down of fossil fuel production, including a Fossil Fuel Non-Proliferation Treaty (Newell and Simms 2020), a Coal Elimination Treaty (Burke and Fishel 2020), a supply-side climate treaty that would incorporate supply-side nationally determined contributions (NDCs) (Asheim et al. 2019), and using existing avenues with the United Nations Framework Convention on Climate Change (UNFCCC) (Piggot et al. 2018). Moreover, in the run-up to the Glasgow Climate Summit in November 2021, first steps toward international cooperation were taken in the form of the launch of the Beyond Oil and Gas Alliance (BOGA), an initiative by the governments of Costa Rica and Denmark that seeks to align oil and gas production with the Paris Agreement.

These proposals and developments raise several important questions, including what an international agreement on winding down fossil fuel production would look like and how international cooperation on this issue can be fostered. Exploring two idealized pathways—a club arrangement and a treaty modeled after a multilateral environmental agreement (MEA)—this article analyzes these questions, addressing, first, the participants in an international agreement; second, the forum through which cooperation will take place; third, the modalities (i.e., ways of working), principles, and procedures underpinning the agreement; and fourth, the incentives to induce cooperation. By doing so, we elucidate the various options and trade-offs in the design of an international supply-side agreement and sketch the political dynamics that may facilitate or hinder the adoption of such an agreement.

Theoretically, we draw on and contribute to scholarship on club arrangements (Eckersley 2012; Falkner et al. 2022; Green 2017; Hovi et al. 2019) and transnational climate change governance (Bulkeley et al. 2014) when considering a club on fossil fuel supply and the broader literature on international regime design when analyzing the potential content of a supply-side treaty,

generating insights about the ways in which club arrangements can prefigure and prepare the ground for multilateral agreements. We also draw on, and contribute to, the growing body of scholarship on supply-side climate policy and to practical thinking about the form such policies might take at the international level. Methodologically, our approach is to draw on historical parallels from existing club arrangements and MEAs and insights from associated literatures while being attentive to the peculiar politics of governing fossil fuel extraction.

The Wider Politics of an International Agreement on Fossil Fuel Production

The emergence of any international agreement on fossil fuel supply will likely be the result of a confluence of political and economic factors favoring more ambitious action and a new approach to the issue. Any supply-side agreement will need to harness and engage with these drivers of change and potentially incorporate them within its processes and mechanisms.

Economically, this includes changes in the price and availability of alternatives to fossil fuels, particularly renewable energy technologies such as wind and solar—whose prices have fallen dramatically in recent years. For many countries, further investments in a fossil-based infrastructure could lock in a higher-cost fossil energy path and lead to stranded assets and decreased competitiveness in a global energy market moving in the opposite direction (Van de Graaf 2018). The desirability of a move away from fossil fuels is underscored by a growing realization on the part of key financial actors, such as sovereign wealth and pension funds, that investments in fossil fuels may become stranded (Semieniuk et al. 2022). A key role for an international agreement on fossil fuel supply will be to support the accelerated diffusion of renewable technologies and financial support necessary to transition away from fossil fuels. Steering finance away from fossil fuels is a task any club or MEA would have to share with international economic institutions, including multilateral development banks. Concerted pressure from each, particularly withdrawing financial support to fossil fuels, could drive states to join a new initiative.

Socially, momentum is likely to come from resistance to new fossil fuel infrastructure by social movements and pressure groups. In North America, Indigenous groups have played a key part in struggles, for example, over the Keystone XL and Dakota Access pipelines (Gilio-Whitaker 2019; Indigenous Environment Network 2021). This resistance coexists with more “insider” advocacy around specific proposals for new fossil fuel projects (Carter and McKenzie 2020; Piggot 2018). Temper et al. (2020) find, for example, that more than a quarter of fossil fuel projects encountering social resistance have been canceled, suspended, or delayed. Campaigns are also increasingly aimed at phasing out public finance for fossil fuels. Recent moves by the European Investment Bank to end lending for fossil fuels and commitments from the World Bank and a growing number of export credit agencies suggest that these are having an effect.

Cities are also lending their support to supply-side policies. SAFE Cities is a growing network of subnational authorities that Stand Against Fossil Fuel Expansion, and several cities, including London, Los Angeles, Paris, and Sydney, have endorsed the idea of a Fossil Fuel Non-Proliferation Treaty.

Civil society pressure will be vital both to securing a club arrangement and then exerting pressure on other states to join, and to launching negotiations on a multilateral treaty. Active participation in either forum will be key to the accountability and, ultimately, the effectiveness of supply-side commitments. Informal monitoring and verification of commitments and national-level advocacy to drive the level of ambition beyond first movers will be crucial to broadening and deepening international cooperation.

Another source of pressure comes from the recent waves of litigation targeted at fossil fuel producers. Litigation has emerged against individual fossil fuel projects (e.g., coal mines in Australia), against individual fossil fuel companies (e.g., Shell in the Netherlands), and against “carbon majors” as a whole (in the Philippines) (Setzer and Higham 2021). Litigation may enhance pressure on states and corporations to demonstrate their commitment to tackling climate change by joining a club arrangement, which might constitute an attractive short-term strategy for many, or to ultimately support a multilateral effort, which would ensure that the costs and benefits of supply-side cooperation are more evenly shared rather than borne by actors targeted by litigation.

This combination of pressures will be key to socializing the need for supply-side policies and building support for anti-fossil fuel norms (Green 2018a). Nongovernmental organizations (NGOs) have a major role to play in this regard, just as they have done in the context of earlier campaigns, for instance, to ban land mines and whaling (Epstein 2008; Rutherford 2000). Targeting major state and private fossil fuel producers through litigation and activism and amplifying economic signals—including by bringing about reductions in fossil fuel demand—will be crucial to bringing pressure to bear on countries and regions that would be reluctant to join a club arrangement and might otherwise play a laggard role in an MEA. They will also be important to circumscribing space for fossil fuel expansion beyond the reach of either a club arrangement or a new treaty.

Set against these developments, however, are several powerful states and industry actors vigorously opposed to any suggestion that production should be limited by international law or through a club arrangement. The power of these incumbents and their ability to stall more ambitious climate action should not be underestimated (Depledge 2008; Newell and Paterson 1998). Incumbents may, for example, invoke international investment agreements to challenge or prevent fossil fuel phaseout policies or the participation of states in any international agreement (Tienhaara et al. 2022). Power is unevenly distributed between international institutions within and beyond the regime complexes on energy and climate change, and we can anticipate significant contention around any international agreement that limits production from international

economic institutions. A club arrangement might be thought to be less threatening in this sense by virtue of its soft-law nature and therefore more likely to gain traction in the short term. But ultimately, to be effective, strong inducements for cooperation and disincentives for noncompliance will be required such that questions of “whose rules rule” cannot be entirely avoided.

Two Models for an International Supply-Side Agreement

Two broad, idealized models for an international agreement on fossil fuel supply can be identified: first, a club model, in which a subset of states (and other actors) forms a coalition and crafts a non-legally binding international agreement to address fossil fuel production in the same way that states are cooperating to phase out coal-fired power through the Powering Past Coal Alliance (PPCA); and second, an MEA model, which would follow the more traditional structure of a multilateral environmental regime built on a legally binding treaty, with broad membership and supporting institutional arrangements.

Two caveats are necessary. First, these idealized models are based on assumptions that may not necessarily hold true in practice. For instance, clubs can—at least in economic theory—be based on legally binding arrangements and be accompanied by an enforcement mechanism (e.g., Nordhaus 2015). Conversely, participation in MEAs can be limited, at least at their inception. In what follows, we therefore seek to indicate where existing or proposed clubs or treaties align or diverge from these models. Second, although the models are presented separately, they may well be related, as a club arrangement could form a building block toward a global regime.

The Club Model

The club model means that an international agreement on fossil fuel supply would be pursued among a subset of like-minded countries. Compared to a multilateral negotiation process, a club approach offers a means for first-mover countries to proceed with a degree of flexibility in terms of the legal form and procedures to be followed, reducing the complexity of negotiations (Victor 2006, 2015).

In terms of participation, a club could involve a small but growing group of “first movers”—that is, countries that have already committed to phasing down fossil fuel production. Several countries have adopted such supply-side policies. For instance, oil and gas moratoria have been announced by France (December 2017), Belize (December 2017), Denmark (February 2018), New Zealand (April 2018), and Ireland (September 2019). Already we see a first-movers approach emerging in relation to fossil fuels and climate change, specifically for coal-fired power (PPCA) and oil and gas production (BOGA).

A club approach could also engage climate-vulnerable countries that are at particular risk if other countries continue to produce fossil fuels. Although

climate-vulnerable countries hardly produce fossil fuels of their own, they can add important moral weight to any initiative (de Águeda Corneloup and Mol 2014) and, in the case of the Pacific islands, exert pressure at the regional level (Morgan 2017), both diplomatically and otherwise (e.g., blocking the transportation of fossil fuels through territorial waters). Some small island states (e.g., Fiji, Vanuatu) are already members of the PPCA. Moreover, at the Pacific Islands Development Forum's Leaders' Summit in 2015, Pacific island nations called for "a new global dialogue on the implementation of an international moratorium on the development and expansion of fossil fuel extracting industries ... as an urgent step towards decarbonising the global economy" (Pacific Islands Development Forum 2015, para. 19(g)).

The club model could easily bring subnational and nonstate actors—such as cities, regions, NGOs, and businesses—into the fold. Involving subnational and nonstate actors can help move an international coalition on fossil fuel supply forward, particularly where federal governments are unwilling to do so (cf. Hale 2018). The involvement of nonstate and subnational actors would extend cooperation to "fossil-free zones," where all kinds of actors commit to making their own contributions to making the world free of fossil fuels (Green 2018c). For instance, the club could include corporations that have moved beyond fossil fuels or set agreed timelines and reporting procedures for their phaseout, following the example of companies that have adopted "science-based targets" (Walenta 2018). The involvement of nonstate actors can also bolster transparency in the negotiations and help ensure public accountability (key to ensuring that public pressure leads to the ratcheting up of commitments). The PPCA includes a variety of subnational and nonstate actors (including subnational authorities from countries that are not members, as well as businesses and investors). BOGA's initial members also include subnational authorities (e.g., California), and nonstate actors can participate in the alliance as "friends of BOGA" (see later).

States and other actors could pursue the creation of a fossil fuel supply club through existing forums or the creation of a new one. In terms of existing forums, the United Nations Environment Programme—which has supported the *Production Gap Reports*—has played a key role in the development of cooperative initiatives that clearly seek to support the goals of the international climate regime, for instance, by cofounding and administratively supporting the Climate and Clean Air Coalition on short-lived climate pollutants (Unger et al. 2020), which also happens to address methane emissions from the oil and gas sector. The PPCA and BOGA are examples of states creating a dedicated new institution. Each has a small secretariat hosted by NGOs (E3G and Pembina Institute for the PPCA; the International Institute for Sustainable Development for BOGA).

Given the flexibility in terms of membership, a club can specify commitments for both states and nonstate actors, for instance, a broad commitment to phase out fossil fuels by a given date. Such commitments could be differentiated

by club members. For example, BOGA distinguishes between “core members” (authorities committing to end new oil and gas production and setting a “Paris-aligned date for ending oil and gas production”), “associate members” (authorities that have taken supply-side measures, such as ending public finance for oil and gas exploration abroad), and “friends of BOGA” (authorities and nonstate actors that have signed the BOGA declaration, which calls for “a socially just and equitable global transition to align oil and gas production with the objectives of the Paris Agreement”) (Beyond Oil and Gas Alliance, n.d.).

Following the examples of the PPCA and BOGA would mean that club commitments are unlikely to be shaped in the form of legally binding obligations. Even so, informal commitments to restrict fossil fuel supply can help entrench a social norm to wind down fossil fuel production (Green 2018a, 2018b). Indeed, the PPCA shows how a few countries, in this case, the United Kingdom and Canada, can rapidly “internationalize” a new idea, in this case, phasing out unabated coal-fired power (Blondeel et al. 2020). The Alliance grew from 27 members since its beginning in 2017 to 165 members by late 2021 and has come to attract important coal regions as members, such as Germany and North Macedonia.

Although clubs can generally be characterized by limited institutionalization, it is possible to put in place mechanisms to track progress (e.g., regular reports by members, or independent reviews), thereby exerting some influence on domestic policy making (Friedrich 2013). Furthermore, a club can enable action “on the ground” by establishing specific work streams or specialized initiatives or by hosting regular meetings. In the context of a supply-side club, specific activities could include carrying out studies on how to align fossil fuel production with climate goals, collecting data on fossil fuel production (Green and Kuch 2022), fostering stakeholder dialogue and sharing best practices (e.g., on planning for a just transition), and facilitating clean technology cooperation. Although rare in the case of transnational climate governance, such activities may also extend to standard setting (Bulkeley et al. 2014). For instance, mirroring the PPCA, financial institutions joining a supply-side club could be required to commit to divesting assets from fossil fuels.

A key open question is whether and how such a club should grow to bring on board “reluctant” countries (Hovi et al. 2019), which in this case means major fossil fuel producers. The PPCA and BOGA examples show that this may be challenging, as the costs of phaseout and capacity to bear these costs are crucial determinants of membership. For the PPCA, with certain notable exceptions (e.g., Germany), “countries pledge to phase out coal only when potential stranded assets, employment losses, regional impacts and other costs are low” (Jewell et al. 2019, 596). Moreover, a phaseout is “more likely to be pursued by independent and transparent governments in wealthy countries, which have the capacity to bear substantial political, social and economic costs” (596). This suggests that first movers would need to consist of, or otherwise be joined by, wealthier countries. Another factor that may help or hinder the

growth of a club arrangement is its scope. A more limited scope may make it easier for states to participate (Busby and Urpelainen 2020). For instance, the PPCA excludes coal mining from its scope, focusing solely on coal-fired power production, which enables countries willing to phase out the latter, but not the former, to join.

To induce participation, club theory further suggests that a coalition would need to provide for excludable member benefits or impose sanctions on nonmembers (Keohane and Victor 2016). In the context of international cooperation on restricting fossil fuel production, the (mitigation) benefits generally accrue to the global community. Nevertheless, it may be possible to agree on other benefits linked to an agreement, for instance, through sharing mitigation technologies. Moreover, even the positive reputational effects of belonging to a first-mover supply-side club could be considered tangible benefits (Green 2017). Sanctions for nonparticipants are harder to envisage in the context of a supply-side club, though members could decide to introduce trade measures targeting third-country fossil fuel exports following the logic of border adjustments on imports of carbon-intensive products (e.g., steel) from countries not subject to carbon constraints, for which there is already some support. Doing so would likely need to be based on a legally binding arrangement and turn the club into what Falkner et al. (2022) term a “transformational club” (see also Nordhaus 2015). In addition to providing for club benefits or sanctions against nonparticipants, a supply-side club could try to expand through members promising to deepen their commitments on the condition of new members joining (Hovi et al. 2019). Such flexibility may be particularly important to ensure that “reluctant” fossil fuel-producing states are not “locked out” by ambitious commitments made by the “enthusiastic” countries at the club’s inception.

The MEA Model

Bringing together a large number of countries to cooperate on the managed decline of fossil fuel production could also follow the model of existing MEAs. The features that set this idealized model apart from the club model are a greater number of participants; an agreement in the form of a legally binding supply-side treaty (Burke and Fishel 2020; Newell and Simms 2020); and a high degree of institutionalization, including a decision-making body and dedicated secretariat.

A legally binding treaty generally signals a strong commitment, as for most states it requires ratification at the domestic level, usually involving parliaments. Moreover, even in the absence of an enforcement mechanism, legally binding obligations may exert a “compliance pull,” for instance, by making noncompliance less attractive due to the reputational damage caused. Last, treaties are more easily enforceable in domestic legal orders (Bodansky 2015; Friedrich 2013). The intergovernmental nature of a treaty would mean that nation-states are the

primary participants, though a treaty—following the example of the Paris Agreement—could still create space for nonstate and subnational actors to contribute.

Common elements in most MEAs include a specification of the overall objective and key principles underpinning the treaty, (substantive and procedural) obligations for parties, institutional arrangements, mechanisms for reporting and review as well as promoting compliance, and financial and technical assistance.

In terms of the treaty objective, this could be explicitly linked to the Paris Agreement, for instance, restricting any fossil fuel production that is inconsistent with the temperature goal of the Paris Agreement. The treaty could also aim to halt the development and expansion of (new) fossil fuel projects and infrastructure, without any reference to international climate change treaties, acknowledging the broader sustainable development benefits around health, improved access to energy, and reduced conflict associated with moves away from fossil fuel extraction. If the goal of a treaty is to phase out fossil fuel production to achieve climate goals, this would require setting a “burnable carbon” budget that would provide the baseline and parameters for specific obligations to constrain production (cf. Calverley and Anderson 2022). One issue to be resolved would be whether such baselines would be founded on existing reserves or current levels of production, a judgment that has differential implications for state-owned enterprises as opposed to private investors (Le Billon and Kristoffersen 2019).

Given uneven endowments of fossil fuels between countries, different historical responsibility for emissions from fossil fuels to date, and unequal capacity for transitioning away from fossil fuels, shared underlying principles would be required to guide the setting of commitments (van Asselt 2021). Some of these principles already underpin the UNFCCC, and their acceptance by more than 197 states strengthens the argument also to apply them in the context of a supply-side agreement. A key principle in this regard is that of “common but differentiated responsibilities and respective capabilities.” This principle can inform the sequencing of commitments linked to a mixture of fuel source, levels of development, current emissions, and past use of fossil fuels. In terms of fuel source, some scholars have proposed the elimination of coal (Burke and Fishel 2020; Collier and Venables 2014), but to be effective, oil and gas would also need to be included. In terms of levels of development, other MEAs have employed time lags on commitments, such as the Montreal Protocol, where developing countries have a “grace period” for implementing phaseout measures. However, while such types of differential treatment may account for the circumstances in fossil fuel-dependent developing countries, they may also unnecessarily delay the transition toward cleaner energy in these countries.

The rationale for the sequencing is further underpinned by the “polluter pays” principle. In the context of a supply-side agreement, Kartha et al. (2018, 122) suggest that this would extend to an “extractor pays principle,” whereby in

the context of a limited overall “extraction budget” for keeping warming below the Paris temperature goal, 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.” In other words, justice principles suggest that the first countries to abandon fossil fuel extraction should be the wealthiest states with the largest carbon-intensive fossil fuel reserves from which they have benefited historically (Muttitt and Kartha 2020). A qualification to this general principle might be that it “only applies to people once a certain standard of living is reached,” or on the flip side, “with greater capacity come greater ethical obligations to contribute to the global transition” (Kartha et al. 2018, 123). The process of prioritizing 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 2019).

Other relevant principles include those on the prevention of harm and that of nonregression, with Article 3 of the Paris Agreement calling for “progression over time” to lock countries into ratcheting up ambition. The preamble of the Paris Agreement also calls on parties to “consider their respective obligations on human rights,” many of which are compromised or directly violated by the expansion of fossil fuels (Savaresi and McVey 2020). Another principle highlighted by the Paris Agreement is that of a “just transition,” which underlines the importance of minimizing negative social and economic impacts for fossil fuel-dependent workers and communities, while creating alternative job opportunities and providing social protection (International Labour Organization 2015).

Concerning the specific obligations a treaty would set, several options exist. The proposal for a Fossil Fuel Non-Proliferation Treaty translates the three pillars of the Nuclear Non-Proliferation Treaty to the fossil fuel context as follows: first, “nonproliferation”—limits on new production and extraction of fossil fuels; second, “disarmament”—a managed decline of existing reserves and infrastructures; and third, “peaceful use”—support for non-fossil fuel development, among others, through a dedicated financial mechanism (Newell and Simms 2020). The latter could include specific obligations for states to plan for a just transition away from fossil fuel production. Under the proposal for a Coal Elimination Treaty, states agree on a specific target date for the phaseout of coal, following the Montreal Protocol on ozone depletion, which specifies dates for the phaseout of harmful chemical substances (Burke and Fishel 2020). Another model would be for a treaty to oblige states to (regularly) submit supply-side pledges, following the example of the Paris Agreement’s NDCs (Asheim et al. 2019).

In terms of institutional arrangements, following standard practice in MEAs, a decision-making body (e.g., Conference of the Parties) to the agreement would meet regularly to review progress and advance cooperation. The voting and decision-making procedures for a supply-side agreement could take

several forms, from consensus to majority voting. An entirely consensus-based model would almost certainly hinder meaningful progress if laggards were effectively given a veto over proposals to expand and deepen commitments to production limits. Any new architecture might also require a dedicated scientific body to update negotiations based on the latest scientific thinking regarding available carbon budgets and their implications for fossil fuel–related commitments. 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.

To incentivize participation and promote implementation and compliance, many MEAs incorporate a system for reporting and review. The regular reporting of reliable and comparable data in support of the agreement can help track progress toward overall goals and encourage reciprocal actions by other states (Chayes and Chayes 1995). Moreover, reporting can help government officials and other stakeholders better assess whether fossil fuel production plans are aligned with the Paris Agreement, as well as the extent of economic (e.g., stranding) risks associated with such plans and projects (Stockholm Environment Institute et al. 2021). To ensure that government reports are credible, reports could undergo independent reviews, for instance, by experts—a common practice under the UNFCCC and many other MEAs—or by other governments, following the practice of “voluntary peer reviews” of fossil fuel subsidies by G20 countries (Aldy 2017).

To the extent governments are unwilling or unable to comply with their commitments, the treaty could provide for a mechanism to promote implementation and compliance. In many MEAs, states have opted for a facilitative model of such a mechanism, focusing on “soft” measures that could support states in returning to compliance (e.g., financial support or capacity building) (Doelle 2021). For developing countries participating in a supply-side treaty, such a model may make it more attractive to participate. However, for those states that do sign up but are unwilling to comply, some “sticks” in the form of enforcement measures may also be necessary. In principle, as Asheim et al. (2019, 327) suggest, a treaty to limit fossil fuel supply is “relatively easier to enforce because there are considerably fewer major producers than consumers of fossil fuels, and it is feasible to monitor—in particular, from reservoirs pledged to remain undepleted.” Aside from trade measures (e.g., restricting fossil fuel imports), such measures could also be in the form of withdrawal of benefits (e.g., barring a state from accessing financial support) or public shaming leading to reputational costs. Linking back to the differential treatment outlined earlier, states that have low capacities and a high dependence on fossil fuels could be exempted from such enforcement measures (Muttitt and Kartha 2020).

Another way of inducing cooperation is through a financial mechanism. Along with its trade measures against nonparties, one of the main ways

through which the Montreal Protocol attracted participation was its innovative Multilateral Fund (Barrett 2003). Following this example, Newell and Simms (2020) propose a “Global Transition Fund” to support developing countries. Specifically, the fund would provide support for alternative energy pathways both to avoid lock-in and to meet the costs of changing direction by redirecting financial support for fossil fuels (Newell and Simms 2020).

Some have argued that financial support for moving away from fossil fuels could come in the form of compensation for leaving fossil fuels in the ground, for instance, through “climate easements” compensating for revenues forgone (Snyder and Ruyle 2020). In this vein, in the climate negotiations in 2011 and drawing on its Yasuní-ITT initiative, Ecuador put forward the concept of “net avoided emissions” as a voluntary mechanism to offer incentives to leave fossil fuels in the ground (Köhler and Michaelowa 2014). However, the design of such a compensation mechanism would be fraught with challenges, including calculating the environmental benefits, estimating the economic losses incurred from forgoing exploitation of reserves, ensuring that fossil fuels remain untouched over time, and avoiding perverse incentives (Köhler and Michaelowa 2014; MacIntosh and Constable 2017; Pellegrini et al. 2021). While financial assistance to less developed countries that are highly dependent on fossil fuel production would be important, as Newell and Simms (2020, 1050) point out, there is “a fine line between compensation and what other countries perceive to be extortion.” Any financial mechanism that is linked to the value of fossil fuel reserves would need to be accompanied by independent verification to ensure that environmental benefits are credible and financial support provided is proportionate. In addition to financial support, incentives for developing countries to participate could be in the form of provisions on technology transfer and technical assistance in planning for a just transition.

Assessing the Models

There are pros and cons and trade-offs to consider in assessing the two idealized models. Criteria for such an assessment might include, first, the relative speed of reaching agreements; second, the level of regulatory ambition and degree of potential participation of actors and sectors; and third, the equity concerns involved (Biermann et al. 2009), because these cover key issues regarding effectiveness, inclusiveness, and fairness.

First, regarding speed, it will be easier to pursue supply-side policies through a smaller club arrangement in the first instance, one not weighed down by the requirement to reach agreement between potentially hundreds of states that would also need to ratify any deal. While treaties can be slow to negotiate, much depends on the initial scope and ambition of multilateral negotiations. Moreover, there are exceptions, as illustrated by the Nuclear Non-Proliferation Treaty, which was concluded in less than three years.

Second, turning to potential effectiveness, greater participation, with all else being equal, strengthens the environmental effectiveness of an agreement (Stavins et al. 2014). Likewise, covering all (major) fossil fuel producers and thereby preventing leakage effects would strengthen the effectiveness of an international supply-side agreement. Much will thus depend on the extent to which major fossil fuel producers can be persuaded to join an international regime that obliges them to relinquish fossil fuel reserves. On the one hand, such producers might be attracted to a non-legally binding club arrangement with less enforceability. On the other hand, a club faces free-riding risks, and financial support for the transition would likely only be available within the context of a multilateral endeavor. A multilateral approach could also help to address the prospect of the “green paradox” (Sinn 2012): the concern that countries might race to extract resources that could become “stranded,” hence driving up fossil fuel production in the short term. More probable, however, is that credible attempts to restrict supply will induce expectations of high fossil fuel prices and stimulate investment in low-carbon alternatives as well as reducing consumption of fossil fuels worldwide. This then becomes a key argument for ensuring the global coverage of a fossil treaty over time (Newell and Simms 2020). When proposing bans and restrictions, as would be required for supply-side policies, treaties are often also preferred to club arrangements, as evidenced by agreements on land mines, tobacco control, and ozone-depleting substances, where monitoring and enforcement are essential parts of international cooperation. With a club arrangement, there is less pressure for laggards to join first movers and less scope for using privileged market access as an inducement to cooperate (as with the Montreal Protocol). Pressure to join, raise ambition, and comply with the agreement’s goals and commitments will depend on high levels of participation from nonstate and subnational actors, which might include their own commitments to phase out fossil fuels. There is scope for nonstate and subnational actors to be actively involved in both a club and an MEA, though provisions for formal participation are often clearer in the latter and more dependent on the whims of states in the former.

Third, regarding the management and resolution of complex equity issues such as historical responsibility and uneven access to alternatives energy sources, an MEA should be better placed to deal with differentiation concerns framed around key principles, such as “common but differentiated responsibility and respective capabilities” and “just transition,” and addressed through financial arrangements that exist in many MEAs. It could draw on existing precedents and formulations of equity principles to account for historical inequities and uneven capacity to transition in the present. Clubs may raise both substantive and procedural equity concerns. Substantive equity concerns could arise if club benefits primarily accrue to developed countries or if certain measures taken by club members—for example, trade restrictions—disproportionately impact countries in the Global South. Procedural equity concerns may arise if decisions by club members exclude countries that are affected by those

decisions, resulting in what Eckersley (2012) terms “exclusive minilateralism.” Having said that, the equity implications of any international agreement on winding down fossil fuel production depend, first and foremost, on which countries participate in such an agreement.

As noted earlier, though we have introduced and assessed the club and MEA idealized models as distinct pathways, depending on their design, they may resemble each other in terms of participation, legal form, and level of institutionalization. Moreover, a club could both broaden, that is, grow in terms of number of participants, and deepen, that is, grow in terms of its legal and institutional strength. Likewise, an MEA can start small and attract parties over time. As noted previously, a growing number of states and subnational authorities (such as cities) are adopting supply-side policies, and there is increasing interest in potential institutional venues to consolidate and expand these commitments. We have witnessed the formation of club arrangements through the PPCA and BOGA. As mechanisms to establish principles, agree on soft targets, and set norms in train, such clubs undertake important political work in preparing the ground for deeper and wider forms of international cooperation.

Conclusions

While the number of supply-side policies adopted is growing, their adoption across the world remains highly uneven, underscoring the need for international cooperation. There are many potential forms that an international agreement to keep fossil fuels in the ground could take and multiple routes to achieving it. It is possible to envisage a coalition of first movers forming a club arrangement that expands over time as more states feel emboldened to join, faced both by growing pressure to do so and the enhanced viability of development pathways beyond fossil fuels. The global energy economy is not static, and institutional mechanisms will need to be flexibly designed to respond to the changing realities of countries’ energy and emissions profiles, which in turn impinge upon the commitments that might be expected of them. The fact that the climate regime that thus far has failed to place limits on the production of fossil fuels and the Paris Agreement does not even mention them underscores the importance and urgency of an international governance response that seeks to fairly leave the majority of remaining fossil fuels in the ground.

The most likely scenario at this juncture is the emergence of club arrangements covering particular fossil fuel sources and groups of actors that, over time, give rise to growing calls for a more coordinated and multilateral response. While a club arrangement is more likely in the near term, to adequately address the range of issues we have discussed in this article, we believe a multilateral treaty would be required to effectively coordinate supply-side policy responses to the climate crisis. Such a pathway is unlikely to be linear and is far from guaranteed in a world facing multiple crises and demands on policy makers’ attention and resources. Opposition to further and more ambitious supply-side

policies will also be fierce. There will always be nonparticipants and violations and strong opposition to proposals to restrict the supply of what remain highly profitable sources of energy. Yet the initial lack of engagement or resistance of major fossil fuel producers is not an argument for abandoning this endeavor. Rather, one of its core functions is to articulate the will of the international community to generate irreversible momentum to accelerate the transition away from fossil fuels and socialize the idea of limits on production. The latest scientific reports have underscored, once again, the imperative of acting now to radically decarbonize the global economy, which of necessity implies limiting fossil fuel production.

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Corrected Proof