Raising the cost of climate action?

Investor-state dispute settlement and compensation for stranded fossil fuel assets

Kyla Tienhaara and Lorenzo Cotula

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Contents

List of figures, tables and boxes

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Acronyms

ASEAN	Association of Southeast Asian Nations
BIT	bilateral investment treaties
DCF	discounted cash flow
ECT	Energy Charter Treaty
EU	European Union
FET	fair and equitable treatment
FPS	full protection and security
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
ISDS	investor-state dispute settlement
LNG	liquefied natural gas
NAFTA	North American Free Trade Agreement
OECD	Organisation for Economic Co-operation and Development
SOE	state-owned enterprise
UNCITRAL	United Nations Commission on International Trade Law
UNCTAD	United Nations Conference on Trade and Development
US	United States of America

Executive summary

Climate change, the energy transition and investor-state dispute settlement

Global efforts to combat climate change will require a transition to renewable energy and government action to reduce reliance on fossil fuels such as coal, oil and gas. If followed through, such action will create stranded assets – in other words, economic assets affected by premature write-downs or downward revaluations, or converted to liabilities. Businesses will likely demand some form of compensation and many governments may decide to meet these requests, in whole or in part. The international legal regime that protects foreign investment can have far-reaching repercussions for decisions about asset stranding and compensation.

More than 2,600 investment treaties protect the assets of multinationals against adverse state conduct and allow them to bring disputes to an international arrangement known as investor-state dispute settlement (ISDS). This arrangement enables foreign investors to sue states over conduct they believe breaches investment protection rules, and to obtain compensation if the claim is successful.

Foreign investors may resort to ISDS to sue states over measures to phase out fossil fuels. Even in the absence of legal proceedings, the explicit or implicit threat of recourse to ISDS can enhance businesses' position in negotiations with states. As a result, more public funds may be spent on compensating the fossil fuel sector than would otherwise be the case, making it more costly – and thus more difficult – for states to take energy transition measures.

Investment treaties and ISDS could require states to pay large compensation amounts to fossil fuel businesses

This report develops a framework for assessing the extent to which energy transition measures could result in ISDS claims. It also provides a quantitative case study of the coal power sector. The framework outlines potential asset stranding in the three main segments of fossil fuel value chains: extraction, transportation and processing/distribution/combustion. Major fossil fuel extraction companies have already extensively and successfully used ISDS. Further, prevailing interpretations of investment treaties would allow a considerably broader range of actors to bring ISDS claims over energy transition measures. These include fossil fuel companies from across the value chain and financial investors that hold direct or indirect, majority or minority equity stakes in companies operating in the industry.

ISDS tribunals have used different approaches to determine the value of assets when awarding compensation. But when valuing assets that can generate profits, these tribunals have often considered the discounted value of the entire

cash flow the asset would have produced over its life cycle. Coupled with the way ISDS tribunals have interpreted and applied the substantive provisions of investment treaties, this has resulted in investors being awarded compensation in circumstances where damages would not be available under national law, or in large amounts that bear no relationship to the (often much smaller) amounts they invested in the business. This can affect the compensation that states – and ultimately taxpayers – pay to fossil fuel businesses for energy transition measures.

Treaties with ISDS protect most foreign-owned coal power plants worldwide

In practice, states' exposure to potential ISDS claims depends on the extent to which treaties with ISDS apply to fossil fuel investments. This report presents the findings of a case study of the coal power plant sector. As a particularly carbon-intensive industry, coal power generation provides an emblematic case to explore these issues. The practical relevance of ISDS to the sector is highlighted by the existence of ongoing or threatened ISDS proceedings in connection with coal plant phase-outs in Canada and the Netherlands, and by reports that the German government has negotiated large compensation packages with coal power companies, possibly in part to avoid ISDS.

Based on a new dataset, the case study assessed the extent to which treaties with ISDS protect foreign-owned coal plants worldwide. The dataset includes 257 coal power plants that are known to involve foreign investment and present a reasonable risk of asset stranding. The findings indicate that at least 75% of these plants are protected by at least one treaty with ISDS. However, treaty coverage was determined solely on the basis of the home state of the parent company. A deeper dive into outward foreign investment from the United States indicates that the real coverage by treaties with ISDS is likely to be significantly higher once we take into account the complex corporate structures of coal power businesses, because the existence of subsidiaries in third countries could provide investors access to additional treaties.

Our findings also shed light on the uneven geographic distribution of these liabilities, with Europe and Southeast Asia emerging as key regional hotspots. But while there has been significant concern about fossil fuel companies using ISDS to challenge climate action in Europe and North America, countries in the Global South may be more exposed to potential liabilities over stranded assets. Assets such as coal power plants are often younger in these countries, so investors are more likely to suffer financial losses in the transition to cleaner energy forms. For example, one treaty alone covers 12 coal plants in Indonesia that could lose US$6.8–7.9 billion in sunk costs in a Paris-aligned phase-out plan. Our case study also highlights that certain treaties, such as the Energy Charter Treaty (ECT), play a particularly significant role in protecting foreign-owned coal power plant assets.

A multilateral treaty ratified by many states involved in the coal power industry, the ECT protects at least 51 power plants exposed to stranded asset risk.

From evidence to action

States can enact energy transition measures while also complying with investment treaties if they fully compensate investors for projected losses. But there are lively debates about whether fossil fuel businesses should be compensated, and on what terms, for asset stranding that results from climate policy, and some have argued that the scale and pace of the necessary transition may call for businesses to be only partially compensated, if at all. Given the large amounts at stake, ISDS can provide leverage to the fossil fuel industry and strengthen its position in negotiations with governments over possible compensation. This can shift the distribution of the costs of public interest action between taxpayers and businesses, and ultimately make it more difficult for states to regulate in the public interest.

To meet the aims of the Paris Agreement, states and supranational entities such as the European Union (EU) should preserve their ability to facilitate the low-carbon energy transition. Depending on the context, in relation to investment treaties and ISDS this may involve:

- terminating investment treaties with ISDS provisions, particularly older treaties that contain unqualified investment protections and do not address sustainable development issues, potentially through a multilateral instrument for coordinated treaty termination;
- radically modernising or, if unsuccessful, terminating or withdrawing from the ECT, and for states that are not yet parties to the ECT, carefully considering energy transition issues before deciding to join;
- multilaterally reforming investment treaties and ISDS, including through the (narrowly circumscribed) process at the United Nations Commission on International Trade Law (UNCITRAL), particularly on issues that can affect regulatory chill and negotiations in the shadow of ISDS, such as damages; and
- forging new approaches to address energy transition issues in any investment treaty negotiation – for example, through exclusions and carve-outs for energy transition measures or fossil fuel investments, and by reconfiguring investment protection standards to safeguard the right and duty of states to regulate in the public interest.

With regard to energy transition policies, states and supranational entities such as the EU should consider measures to more fully take into account the issues associated with investment treaties and ISDS. Depending on the context, this may involve:

- promoting awareness and debate on investment treaties and ISDS in global policy spaces related to climate change, including the United Nations Framework Convention on Climate Change and the Paris Agreement;
- addressing ISDS issues in proposed plurilateral or multilateral treaties to phase out fossil fuels; and
- developing national policy approaches that can sustain the energy transition while also mitigating the risk of ISDS claims – for example, using reverse auctions to acquire outstanding debt on coal-fired power plants in exchange for closure.

In national and international policy arenas characterised by substantial economic interests and power imbalances, pressure from advocacy organisations can be an important driver of – or even a prerequisite for – public action. Over the years, activists have played an important role in promoting energy transition measures and raising awareness about the place of ISDS in wide-ranging policy areas, including energy transition. In continuing and upscaling these initiatives, advocacy organisations could:

- promote transparency on – and documentation and public scrutiny of – the use or threat of ISDS in connection with energy transition measures;
- develop collaborations between organisations in the Global North and South to ensure multinational corporations are held accountable in their home states for actions that they take to delay the energy transition in host states;
- raise awareness of ISDS issues in climate policy forums; and
- promote mainstreaming of climate goals in investment treaty policy.

1. Introduction

As the unprecedented measures taken to contain the COVID-19 pandemic stalled many economic activities worldwide, global greenhouse gas emissions dropped dramatically – by 17% globally in April 2020, at the peak of the lockdowns (Le Quéré *et al.* 2020a). Further, the fallout from the pandemic destabilised several carbon-intensive industries, exacerbating challenges predating the crisis. For example, travel restrictions had a dramatic impact on aviation (Elliott 2020). Reductions in economic activity depressed oil prices, compounding the impacts of earlier economic contractions and price wars (Hussain 2020) and leading to a "scale of the collapse in oil demand … [that] is well in excess of the oil industry's capacity to adjust" (IEA 2020a). The reduction in energy demand also caused financial trouble for the coal sector, which was already struggling in many countries before the pandemic (Rowlatt 2020).

Nevertheless, emissions began rebounding as soon as lockdown restrictions were eased in the major economies (Harvey 2020; Le Quéré *et al.* 2020b), putting the world back on the path of 3°C or more of warming by the end of the century.[1] Even if 2020 emissions end up being 7% lower on average than they were in 2019, as envisaged in some high-end predictions, this will be less than the 7.6% annual reduction required to meet the Paris Agreement 1.5°C objective (UNEP 2019). In effect, the pandemic has starkly illustrated that emissions reductions on the scale required will not occur without sustained government action to facilitate a fundamental transition away from fossil fuel production and consumption, towards low-carbon energy sources.

It is well established that the low-carbon energy transition will create stranded assets, or "environmentally unsustainable assets [that] suffer from unanticipated or premature write-downs, downward revaluations or are converted to liabilities" (Caldecott *et al.* 2013: 7). While asset stranding can result from market conditions and technological innovation, stranding that directly results from government actions, such as bans on extraction or fossil fuel phase-outs, has triggered debates over how the costs should be distributed between businesses and taxpayers. Research indicates that, when governments force or accelerate asset stranding, many businesses expect to be financially compensated (Sen and von Schickfus 2020).

Policy transitions of all kinds involve complex considerations (see, for example, Kaplow 2003 for a conceptual framework), and expectations of compensation payments for energy transition measures raise difficult political and philosophical issues. In practice, many governments may decide to pay fossil fuel businesses

1 Climate Action Tracker. See https://climateactiontracker.org/global/temperatures/ (accessed 15 May 2020).

some level of compensation to strand their assets (Schulz 2020; Wacket 2020; Pinzler 2020), with experts arguing that, given the scale and pace of the necessary transition, vis-à-vis limited public funds, "offering less-than-full compensation is fair, reasonable, and pragmatic" (Caldecott and Mitchell 2014: 66). But while national policy approaches may differ, the international legal regime that protects foreign investment can have far-reaching repercussions for decisions about asset stranding and compensation.

More than 2,600 bilateral investment treaties and preferential trade agreements protect the assets of foreign investors and give them access to an international arrangement known as investor-state dispute settlement (ISDS). This enables foreign investors to sue states over conduct that they believe breaches international investment protection rules. Cases are settled via arbitration, by especially convened tribunals; in treaties concluded by the European Union (EU), they are to be settled by institutionalised tribunals. If the claim is successful, tribunals typically award monetary compensation. The United Nations Conference on Trade and Development (UNCTAD) has documented 1,023 known treaty-based arbitrations worldwide.[2] Of these, 173 cases (almost 17%) were initiated by claimants whose business involved extracting, transporting, refining, selling or burning fossil fuels or providing services to fossil fuel companies.[3]

Foreign investors may resort to ISDS to sue states over measures to phase out fossil fuels. Even in the absence of legal proceedings, the explicit or implicit threat of recourse to ISDS can enhance the position of businesses in negotiations with states. As a result, more public funds may be spent on compensating the fossil fuel sector than would otherwise be the case, partly because – as we will see in this report – tribunals have often awarded large compensation amounts. This can make it more costly for states to take energy transition measures.

While some research has examined the legal aspects of how investor claims over climate policies have been and could be framed (Miles 2010; Van Harten 2015; Tienhaara 2018; Brauch *et al.* 2019), this report is a first attempt to quantify the proportion, and to some extent the value, of the most carbon-intensive assets (fossil fuels and associated infrastructure) covered by ISDS. The report outlines trends and magnitude in asset stranding and discusses the possible intersections of investment treaties with different segments of the fossil fuel industry. Based on a novel dataset, it also presents a case study of the coal power sector, measuring the extent to which ISDS covers foreign-owned coal plants worldwide. In linking ISDS to stranded assets, the analysis may be of interest to two distinctive communities of practice: those working on investment treaties and ISDS, and those working on climate policy and the energy transition.

2 UNCTAD. Investment dispute settlement navigator. See https://investmentpolicy.unctad.org/investment-dispute-settlement (updated 31 December 2019, accessed 9 April 2020).

3 Based on a search of UNCTAD's Investment dispute settlement navigator (as of January 2020) for the terms 'gas', 'oil', 'petroleum', 'hydrocarbons' and 'coal' and further investigation into cases involving power production where the energy source was not immediately clear in the description of the dispute.

Our findings point to: the significant scale, in monetary terms, of potential asset stranding, assessed against global commitments on climate change; the extensive use that fossil fuel companies have historically made of ISDS; and the large amounts of damages that the valuation methods deployed by ISDS tribunals can generate. Further, case study findings indicate that ISDS protects most foreign-owned coal plants at risk of asset stranding worldwide, and that phase-out measures could come with substantial price tags. The case study also highlights the geographic concentration of potential ISDS claims in the coal sector, with Europe and Southeast Asia emerging as regional hotspots. The report provides pointers for further empirical work of this nature, covering fossil fuels other than coal or different segments of the value chain.

In Section 2, we provide an overview of issues concerning climate change and asset stranding. Section 3 discusses the place of ISDS in the energy transition, and Section 4 presents findings from the case study of the coal power sector. The conclusion (Section 5) identifies key implications for ongoing ISDS reform discussions.

2. Climate change and stranded assets

2.1 The carbon budget

In October 2018, the Intergovernmental Panel on Climate Change (IPCC) issued a stark warning: governments have less than 12 years to take action to transform our energy systems if we are to avert catastrophic climate change (IPCC 2018). The report concluded that, by 2030, we must collectively reduce global greenhouse gas emissions by 45%.

Burning fossil fuels is the most significant source of greenhouse gases (IPCC 2018). A substantial fraction of known fossil fuel reserves is 'unburnable' if we are to keep to 1.5–2°C of warming, as per the Paris Agreement (McGlade and Ekins 2015). In other words, the world has a limited 'carbon budget' – the amount of greenhouse gas emissions that we can afford to burn while remaining within the ambition of the Paris Agreement. Climate scientists now generally agree the 2°C goal is inadequate (IPCC 2018). To have a reasonable chance of meeting even that inadequate goal, one-third of known oil reserves, half of known gas reserves and over 80% of coal reserves must remain unused (McGlade and Ekins 2015). In addition, "little or no new CO_2-emitting infrastructure can be commissioned, and … existing infrastructure may need to be retired early (or be retrofitted with carbon capture and storage technology)" (Tong *et al.* 2019: 373).

Reducing reliance on fossil fuels as a source of energy is therefore a key priority for climate policy. Thus far, most government initiatives have focused on driving down demand for fossil fuels through investments in energy efficiency and renewable energy, and through carbon pricing arrangements such as carbon taxes and emissions trading schemes (OECD 2017; Tvinnereim and Mehling 2018; Ball 2018). Depending on the circumstances, investors might claim that such policies breach the protections provided in investment treaties, and there have been reports of at least one ISDS threat (Miles 2010), but no publicly known ISDS cases have been initiated to date against this type of policy.

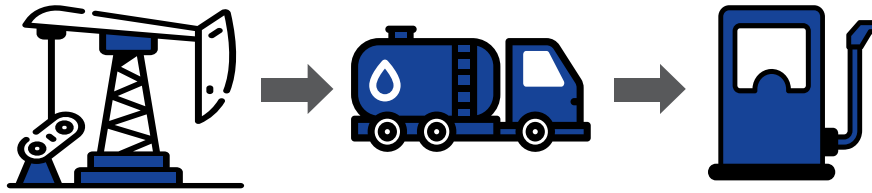
In recent years, scholars, activists and some policymakers have concluded that demand-side initiatives must be complemented with more active phase-out plans (starting with coal power, for example, as proposed by the Powering Past Coal Alliance) and measures to restrict the supply of fossil fuels (Collier and Venables 2014; Lazarus and van Asselt 2018; Gaulin and Le Billon 2020). Supply-side measures could include removing fossil fuel subsidies; downscaling or terminating fossil fuel extraction projects; and restricting the development of infrastructure to transport fossil fuels, such as pipelines. These types of policy have more direct impacts on specific investments and are therefore more likely to be challenged through ISDS. As we discuss in this report, several ISDS cases have arisen in relation to these types of policy.

2.2 Fossil fuel assets

As a broad generalisation, the fossil fuel sector – including coal, oil and gas – is generally divided into three main segments in the value chain: upstream, transport and downstream. Upstream activities include exploration and extraction. The key upstream assets are the fossil fuel reserves themselves. The majority of proven oil reserves are found in Venezuela, Canada, Russia and the Middle East. However, the United States (US) also has substantial reserves as do some countries in Africa, particularly Nigeria and Libya (BP 2019; OPEC 2019). Gas reserves are less concentrated, but the largest known ones are in the US, Russia, Turkmenistan, Iran and Qatar, while the largest coal reserves are in the US, Russia, China, Australia and India (BP 2019).[4] Asset stranding in this part of the value chain occurs when known fossil fuel reserves are left in the ground because it is uneconomic or illegal to exploit them.

Transport of fossil fuels can occur over land or sea. The assets associated with this part of the value chain include pipelines, rail, ports and ships, including specialised ships to transport liquefied natural gas (LNG). As of June 2020, there were 230 gas pipelines, 51 oil pipelines and 300 LNG terminals proposed or under construction; most of these pipelines are in the US, Canada, India and Indonesia, and most of the LNG terminals are in Australia, Canada, China, Indonesia and the US.[5] Asset stranding in this part of the value chain occurs when infrastructure projects are cancelled, not completed or not used to their full potential and sunk investment is lost as a result.

Figure 1. Segments of the fossil fuel supply chain



Upstream Industry
- Geological surveys
- Drilling and mining

Midstream Industry
- Refining
- Transport (pipelines, ships, rail, trucks, etc.)

Downstream Industry
- Distribution and retail
- Power production

Credits: Flaticon/Goodware/Freepik

4 Also, World Coal Association. Where is coal found? See www.worldcoal.org/coal/where-coal-found (accessed 6 May 2020).
5 Global Gas & Oil Network. Global Fossil Infrastructure Tracker. See http://ggon.org/fossil-tracker/ (accessed 6 May 2020).

Downstream operations include refining (for oil), distribution (for example, for use in vehicles) and power generation. As many fossil fuel companies have already divested from the retail side of distribution (Vamburkar and Polson 2017), refineries and power plants represent the largest source of stranded assets for the sector in this part of the value chain. Retiring refineries and power plants before the end of their 'economic lifetime' results in a loss for the business (Kefford *et al.* 2018).

The oil industry has invested tens of billions of dollars globally in refineries in recent years, leading to overcapacity (Cunningham 2020), with US$52 billion going into the construction of new refineries in 2019 alone (IEA 2020b). The surge in investment is also shifting the regional distribution of refineries: most new builds are in the Middle East and Asia, including two mega refineries in China (IEA 2020b).

Global Energy Monitor's Coal Plant Tracker contains 7,655 coal-fired units[6] (30 megawatt or larger) that are operating, under construction or proposed (as of January 2020).[7] The US and Europe have fewer and comparatively older plants, making the transition less difficult; China and India face the biggest challenges in the transition away from coal power (Johnson *et al.* 2015; Kefford *et al.* 2018). Meanwhile, gas accounts for 23% of all power generation (BP 2019; IEA 2020c). One database that covers 82% of installed capacity lists almost 4,000 gas power plants worldwide.[8] Investment in gas power has averaged around US$51 billion over the last few years (IEA 2020b).

2.3 Stranded asset projections

The fossil fuel industry has continued to invest in further exploration activities and new infrastructure despite the clear implications of the carbon budget (Carbon Tracker Initiative 2019) and governments have continued to plan for fossil fuel developments that are inconsistent with their commitments to the Paris Agreement (SEI *et al.* 2019). And although "asset stranding and significant falls in values in the fossil fuel industry are not new … the scale of such an outcome under, for example, an effective global climate policy would be entirely new. It would also imply a permanence not normally considered during commodity price slumps" (Manley *et al.* 2017: 5).

There is considerable uncertainty about what assets might be affected and how financial institutions, companies and governments can manage the risk of stranded assets (Caldecott 2017).[9] However, recent studies have attempted to put a monetary value on potential stranded assets under different scenarios. Despite

6 A power plant can be made up of several facilities known as units. It is important to distinguish the two because a unit can be retired while the plant continues to operate.
7 Global Energy Monitor. Global Coal Plant Tracker. See https://endcoal.org/tracker/ (accessed January 2020).
8 Global Energy Observatory et al. Global Power Plant Database v1.2.0. Accessed 17 August 2020.
9 While this report only discusses the fossil fuel sector, there is potential for stranded assets in other industrial sectors such as cement, iron and steel (see Tong et al. 2019), which could increase the number of potential ISDS cases.

various methodological challenges, these projections suggest that the amounts are stake are substantial.

For example, the cumulative value of stranded assets in the power sector in G20 countries between 2016 and 2050 could be up to some US$1.6 trillion if the world follows a 'delayed policy action' scenario (Saygin *et al.* 2019). Under this scenario, the renewables and energy efficiency measures required to remain within the carbon budget, beyond what is already planned for, are only deployed after 2030. Globally, the value of stranded assets could be as much as US$1.8 trillion for the power sector alone. The estimated value of stranded assets is lower under a scenario where ambitious action on climate change is taken sooner, because such action would deter further investments in carbon-intensive assets that would eventually have to be stranded. Meanwhile, the estimated value of stranded assets in the upstream oil and gas industry is US$3–7 trillion (IRENA 2017).

3. How investment treaties and ISDS come into play

3.1 Investment treaties and ISDS in outline

ISDS refers to international arrangements for settling disputes between a foreign investor and the host state. By taking a dispute to ISDS, the foreign investor will seek to enforce a commitment that the state has entered into through a treaty, law or contract. The investor will allege that the state violated that commitment. ISDS adjudicators typically settle these disputes by issuing binding rulings known as awards. The main remedy ISDS adjudicators have awarded to investors is payment of compensation.

This report only considers ISDS based on international treaties (rather than contracts or national laws). These are mostly bilateral investment treaties (BITs); they also increasingly include wider regional or bilateral economic treaties that contain an investment chapter (we refer to these collectively as 'treaties with ISDS'). These treaties aim to promote investment flows between the state parties, although there is no consistent evidence that they achieve this (see Pohl 2018). The treaties establish obligations about how states must protect and possibly admit investments by nationals of the other state(s) within their own territory.

Formulations vary considerably but investment treaties typically require states to treat foreign investors or investments at least as favourably as investments by their own nationals or by nationals of other states. They also usually require states to accord foreign investment minimum standards of treatment, such as 'fair and equitable treatment' (FET) and 'full protection and security' (FPS), with FET being interpreted as protecting the 'legitimate expectations' investors had when they made the investment. In addition, investment treaties set standards for any expropriations to be lawful, typically requiring states to compensate investors at full market value. Expropriation clauses usually cover both direct expropriation, which involves transfer of ownership, and so-called indirect expropriation, which relates to regulatory measures that, while not transferring ownership of an asset, fundamentally affect its use. A growing minority of treaties also deals with investment liberalisation.

There are thousands of investment treaties worldwide and, while most present important commonalities in their provisions, there is a significant – and growing – diversity of approaches. For example, first-generation treaties primarily focused on investment protection. But some more recent treaties feature provisions that seek to reconcile investment protection with a state's right and duty to regulate in the public interest. This can involve, for example, a more specific affirmation of the circumstances under which the FET and FPS standards would be breached, more precise guidance on determining whether a regulatory measure constitutes an indirect expropriation and general exception clauses that enable states to

regulate in the public interest. Many of these recalibrated approaches to investment treaty drafting are yet to be tested in ISDS cases, so the extent to which they make a difference to ISDS outcomes remains unclear (Spears 2010; Cotula 2014; and for an initial empirical study, Berge 2020). Some recent investment treaties also feature various 'sustainable development' provisions, though these are often non-mandatory, unspecific or unenforceable (see UNCTAD 2020a for a recent overview of trends).

Under most treaties, disputes are typically settled by ad hoc (especially established) arbitral tribunals. The arbitrations can be conducted under different sets of rules, and there is considerable variation in the specifics. Under most arbitration rules, however, the parties appoint a panel of three arbitrators to settle the dispute. Often, each party appoints one arbitrator, with the chair either jointly appointed by both parties or by the party-appointed arbitrators. Individuals appointed as arbitrators are usually private lawyers or legal academics. Once the arbitration is complete, the tribunal disbands. Arbitrators can be appointed even where the government refuses to co-operate, and proceedings can continue even if the government does not take part. Widely ratified multilateral treaties such as the New York and Washington Conventions facilitate the enforcement of pecuniary awards.[10] These features mean that ISDS has legal bite against non-complying states.

Investors have initiated over 1,000 known ISDS cases based on investment treaties over the years (UNCTAD 2020b), challenging state conduct in wide-ranging policy areas from taxation, finance and energy to public health, redistributive reform and environmental protection, to name but a few. Recent years have witnessed consistently high numbers of new cases (UNCTAD 2020b). The boom has been fuelled by:

- investors' direct access to international redress, without needing to exhaust local remedies first;
- broad interpretations of the protections provided to foreign investors, made by ad hoc tribunals; and
- large compensation awards that sustain an international industry of adjudicators, lawyers and financiers.

3.2 Potential claimants

Public action to phase out fossil fuels can result in foreign investors bringing ISDS claims under an applicable investment treaty. Depending on the circumstances and treaty formulation, this could involve, for example, claims that the action discriminated against the foreign investor or frustrated the investor's legitimate expectations. It could also involve claims of indirect expropriation, particularly

10 United Nations Convention on the Recognition and Enforcement of Foreign Arbitral Awards (New York, 10 June 1958); Convention on the Settlement of Investment Disputes between States and Nationals of Other States (Washington DC, 18 March 1965).

if phase-out measures substantially deprive the investors of the economic use of their assets, as is the case with coal power plant closures. Claims can respond to arbitrary, opportunistic or discriminatory measures, though investment treaties do not require conduct to be such for certain standards to be breached, so it is possible that claims might target measures that are neither arbitrary, opportunistic nor discriminatory.

To bring an ISDS claim, a business would need to show that it is a foreign investor holding an investment protected under an applicable treaty with ISDS. The treaties tend to provide broad definitions of 'investors' and 'investments', and fossil fuel ventures would usually qualify. Generally, the treaties do not restrict protections to private businesses alone; they would usually protect investments by both private entities and state-owned enterprises (SOEs), so both types of company can usually access ISDS. While SOEs in the fossil fuel sector have historically operated primarily in domestic markets, many have moved into foreign investment in recent years (Mayer and Rajavuori 2017). Chinese SOEs are particularly significant players in the energy sector, with large investments in coal (see Section 4). However, at least in oil and gas, private sector companies have the greatest exposure to potential asset stranding (Carbon Tracker Initiative 2018).

Just 20 companies – sometimes referred to as 'carbon majors' – are responsible for one-third of all greenhouse gas emissions.[11] However, although several carbon majors have made successful ISDS claims in the past (see Table 1), they only represent the upstream segment of the fossil fuel chain. As such, they are a small portion of the pool of potential claimants that could foreseeably challenge climate policies under investment treaties.

In addition to companies directly engaged in upstream, midstream and downstream fossil fuel sector activities, financial investors and shareholders are also likely to be able to bring ISDS cases. Company shares are a protected form of investment under most treaties with ISDS, which typically protect both directly and indirectly controlled investments. Unlike the approaches that prevail under corporate law in many national legal systems, ISDS tribunals have interpreted investment treaties in ways that enable shareholders to bring claims not only for direct losses – for example, compressions of shareholder rights – but also for indirect ('reflective') losses resulting from measures that adversely affect the company the shareholders have invested in (Gaukrodger 2014; Arato *et al.* 2019).

These features considerably broaden potential claimants to a wide range of financial investors that hold direct or indirect, majority or minority equity stakes in fossil fuel companies. A single dispute could expose states to multiple claims by the firm and its direct and indirect shareholders, and in aggregate terms the arrangement can significantly increase the exposure of states to ISDS claims. Reports suggest that 54% of all known ISDS cases initiated under the Energy

11 Climate Accountability Institute. See https://climateaccountability.org/carbonmajors.html (accessed 29 May 2020).

Charter Treaty (ECT) "were filed by private equity funds or other types of financial investors" (Eberhardt, Olivet and Steinfort 2018).

Table 1. Success by carbon majors (and shareholders) in ISDS

Company	Carbon major rank	ISDS wins	Total awarded (US$, millions)
Chevron	2 (2017)	2	77.7 + pending award against Ecuador
ConocoPhillips	13 (2017)	1	8,446*
ExxonMobil	4 (2017)	3	1,800
Occidental	55 (2013)	2	1,840
Repsol	45 (2013)	1	5,000**
Total	17 (2017)	1	269.9
Yukos shareholders	48 (2013)	5	1,846 + 40,000 + 8,203 = 50,049***

Sources: UNCTAD Investment Dispute Navigator[12] and Climate Accountability Institute[11]
* Figure adjusted based on analysis of award
** Awarded through settlement
*** Only includes three largest shareholder awards

3.3 Historical use of ISDS by the fossil fuel industry

Around 17% of the ISDS cases listed in the UNCTAD Investment Dispute Settlement Navigator as of January 2020 (at least 173 cases) stem from investments in or related to the fossil fuel sector.[13] Approximately 38% of these cases relate to the extraction of oil and gas, and another 26% relate to gas supply, distribution and combustion in power plants. The remainder relate to transport of oil and gas, oil refining and the extraction and burning of coal. Investors in these cases are overwhelmingly from Europe (64%) and North America (27%), while the main host regions for disputes are Europe and Central Asia (33%) and Latin America (36%). Most of the cases (77%) have been brought under BITs, although it is notable that, with 15% of cases, the ECT is the most-used single treaty.

Of the 173 cases, 40 had been settled, 52 remained pending and 10 had been discontinued. In total, 71 cases had reached a final award in the arbitration proceedings, with the investor being successful – that is, state liability was found and damages were awarded – 59% of the time. As already noted, several successful claimants are carbon majors (see Table 1). It is also notable that seven of

12 See https://investmentpolicy.unctad.org/investment-dispute-settlement (accessed January 2020).
13 Another eight cases involve electrical power generation, but the source of the energy is unclear.

the top ten largest awards in ISDS to date, all delivered since 2012, have involved fossil fuel companies or shareholders (see Table 2).

Table 2. Top 10 largest ISDS awards to date (fossil fuel cases highlighted in darker blue)

Short case name	Amount awarded (US$, millions)	Year of award
Hulley Enterprises v Russia	40,000	2014
ConocoPhillips v Venezuela	8,446	2019
Veteran Petroleum v Russia	8,203	2014
Tethyan Copper v Pakistan	4,087	2019
Unión Fenosa Gas v Egypt	2,013	2018
Yukos Universal v Russia	1,846	2014
Occidental v Ecuador (II)	1,769	2012
Mobil and others v Venezuela	1,600	2014
Crystallex v Venezuela	1,202	2016
Oschadbank v Russia	1,111	2018

Source: Adapted from Bonnitcha and Brewin (2019).

Most ISDS cases involving fossil fuel investments to date have not revolved around climate policy or limits to extraction related to environmental concerns. However, a small number of relevant cases have been threatened or initiated (see Table 3), which could be forerunners in a new wave of disputes as government measures to address the climate crisis become more stringent. Arguably, even cases that do not revolve around environmental measures can have indirect reverberations for measures to tackle climate change. Providing the industry with what is, in effect, a form of free risk insurance is equivalent to a subsidy (Johnson *et al.* 2019; Brauch *et al.* 2019).

Table 3. ISDS cases (and known threats) involving fossil fuel companies related to climate/environmental policy

Company	Host state	Year	Treaty	Subject of dispute	Outcome
Vattenfall	Germany	2009	ECT	Environmental restrictions on coal power plant	Settled
Lone Pine	Canada	2013	NAFTA	Ban on gas fracking	Pending
TransCanada	US	2016	NAFTA	Cancellation of Keystone XL pipeline project	Discontinued after government allowed project to proceed
Rockhopper	Italy	2017	ECT	Ban on offshore oil exploration within 12 nautical miles of the coast	Pending
Vermilion	France	2017	ECT	Ban on fossil fuel extraction by 2040	Threat not acted upon following changes in proposed legislation (Sachs *et al.* 2020)
Westmoreland	Canada	2018*	NAFTA	Compensation for coal phase-out	Pending
Uniper	Netherlands	2019	ECT	Compensation for coal phase-out	Consultation stage

Source: UNCTAD Investment Dispute Settlement Navigator
*This case was dropped and then reinitiated in 2019 after corporate restructuring.

3.4 Valuation of fossil fuels and related assets in ISDS

Investment treaties are typically silent on how ISDS tribunals should determine the amount of damages owed to investors if a treaty breach occurs. Most treaty clauses on expropriation set the compensation standards the state must uphold for the expropriation to be lawful. These provisions often require states to pay 'prompt, adequate and effective' compensation. They also link adequacy of compensation to the 'fair market value' of expropriated assets, though most treaties do not dictate the precise methods to determine this value. Some treaties also contain provisions governing compensation for losses in case of armed conflict or other emergency (Beharry and Méndez Bräutigam 2020).

In most cases, however, investment treaties do not specify the damages applicable to situations where the state breaches the provisions of the treaty – for example, through unlawful expropriations, discriminatory conduct or violations of the FET or FPS standards. In these situations, ISDS tribunals have relied on generally applicable international law, which calls on states to "wipe out all the consequences" of illegal acts.[14] When awarding compensation, many ISDS tribunals have interpreted this as requiring the state to pay investors the cash flow they would have earned if the measure had not been implemented. In the case of (direct or indirect) expropriations, this involves determining the asset's market value by calculating the overall cash flow the investors would have earned over the entire project duration, had they been able to implement the project (see Box 1).

Box 1. Valuation and compensation

Valuation is the process to determine the value of an asset. Different methods exist, which can lead to different conclusions. Some valuation methods consider an asset's 'book value' (that is, the original cost of the asset minus depreciation, amortisation and liabilities), while others consider its ability to generate income over time. For example, the discounted cash flow (DCF) method determines value by projecting how much money the asset will generate (or would have generated) in the future and applying a discount rate.

Compensation rules determine the relationship between an asset's value and the amount due as compensation. In regulating expropriation, many legal systems recognise that several public and private interests may be at stake, so the law often requires consideration of factors besides market value when determining compensation. For example, the Constitution of South Africa (Section 25(3)) affirms that compensation for expropriation must be just and equitable, considering the assets' market value and other factors such as the history of its acquisition and use, and the purpose of its expropriation.

In human rights litigation concerning interferences with enjoyment of the right to property, the European Court of Human Rights held that, to strike a fair balance between public and private interests, compensation must be "reasonably related" to market value; but it also clarified that this "does not … guarantee a right to full compensation in all circumstances", and that in specific situations legitimate public interest objectives "may call for less than reimbursement of the full market value".[15]

On the other hand, the expropriation clauses typically found in investment treaties require states to pay investors prompt, adequate and effective compensation, with adequacy being typically determined by the asset's full market value. Although the compensation standard an investment treaty requires for an expropriation to be lawful is conceptually distinct from the damages a tribunal should award in case of expropriatory treaty violations, in practice the two would in most cases be expected to produce similar outcomes, because both aim to reflect the asset's market value.

14 Paragraph 125, Factory at Chorzow case (Germany v Poland). See www.worldcourts.com/pcij/eng/decisions/1928.09.13_chorzow1.htm

15 Paragraph 54, James and Others v United Kingdom. See https://hudoc.echr.coe.int/

The lack of comprehensive rules in investment treaties and the availability of diverse valuation methods grant ISDS tribunals extensive discretion. As a result, tribunals have reached different conclusions on applicable methods and the quantification of damages, creating inconsistent jurisprudence. Further, applying 'forward-looking' valuation methods such as DCF can lead to highly speculative exercises, due to the inherent difficulties of forecasting cash flow over long periods of time, while key project parameters such as commodity prices are subject to fluctuations and unpredictability.

The situation has led some ISDS tribunals to grant foreign investors large amounts of damages, which may bear no relationship to the (often much smaller) amounts they invested in the business (Bonnitcha and Brewin 2019). Coupled with the way ISDS tribunals have interpreted and applied the substantive provisions of investment treaties, this situation has also resulted in investors being awarded compensation in circumstances where damages would not be available under national law (Gaukrodger and Gordon 2012; De Mestral and Morgan 2016), or in amounts that exceed what national courts, or even international human rights courts, would be likely to award (see, for example, De Brabandere 2015). Close to 50 ISDS awards are known to have ordered more than US$100 million in damages (Bonnitcha and Brewin 2019), with the extractive industries featuring prominently in this list. In one case concerning a dispute with the government of Pakistan, the tribunal awarded US$4 billion in compensation; this was reportedly almost as much as the International Monetary Fund bailout agreed two months previously to save Pakistan's economy from collapse (Bonnitcha and Brewin 2019).

These problems are particularly acute in the fossil fuel sector, given the inherent volatility of fossil fuel markets and the uncertainty around how changes in technology and policy will impact the sector. For example, in disputes concerning oil reserves, ISDS tribunals tend to rely on past oil prices to forecast lost future profits. However, this approach does not necessarily consider the changes in oil prices that a successful transition towards renewable energy might entail (Tienhaara *et al.* 2020). Oil prices are also affected by different factors and are vulnerable to shocks, as illustrated by their volatility over the first half of 2020. The industry was hit particularly hard by the lockdown measures taken to address the COVID-19 pandemic and in April 2020, the West Texas Intermediate price (the key US benchmark for oil) went negative for the first time in history (Reed and Krauss 2020).

3.5 How investment treaties and ISDS can affect states' ability to address climate change

Damages is the main remedy under international investment law. One might say, therefore, that ISDS has no direct impact on governments' ability to regulate: states can enact measures so long as they compensate investors. However, this conclusion obscures some far-reaching implications of ISDS. First, ISDS can

affect the way the costs of public interest action are distributed between states and businesses. As discussed in Box 1, investment treaties can require states to compensate foreign investors according to more generous standards than those set in the national constitution and international human rights law. Depending on country context, the constitution may be said to reflect the 'social contract', with taxpayers ultimately bearing the costs attributed to the state. As such, this issue deserves public scrutiny and debate.

Further, investment treaties' emphasis on market value and the large compensation amounts awarded by some arbitral tribunals mean that complying with investment treaty obligations can create a significant burden for public finances, particularly in low- and middle-income countries. In addition, inconsistent ISDS jurisprudence creates uncertainty and makes it difficult to predict the outcome of ISDS cases. These factors could have indirect impacts "on the way in which host states exercise their regulatory powers" (Bonnitcha 2014: 114), because the prospect of expensive and uncertain ISDS challenges could discourage states from acting in the first place. The literature refers to this phenomenon as 'regulatory chill' (Tienhaara 2009, 2011, 2018; Cotula 2014; Van Harten and Scott 2016; Schram *et al.* 2018).

The notion of regulatory chill suggests that in some instances (not all, or there would be no ISDS cases) states will fail to take public interest action as a result of concerns about ISDS (Tienhaara 2011). This outcome could take different forms – a state may, for example:

- systematically vet proposed legislative, regulatory or administrative measures to pre-empt possible ISDS challenges ('internalisation chill'; see, for example, van Harten and Scott 2016);
- abandon or delay a proposed measure following an explicit or implicit threat of ISDS proceedings ('threat chill'; Tienhaara 2011); or
- abandon or delay a proposed measure following ISDS threats or actual claims against other states that adopted similar measures ('cross-border chill'; Tienhaara 2018).

Where states are unwilling to take public-interest measures due to vested interests, ideological positions or other political economy factors, concerns about regulatory chill interrogate whether and how ISDS can affect the ability of citizen groups to successfully advocate for those measures, for example if authorities invoke the treaties as a ground for resisting policy change (Cotula 2017).

While regulatory chill is inherently difficult to demonstrate due to methodological challenges and data accessibility issues (Bonnitcha 2014), a growing body of evidence has documented instances of regulatory chill in diverse policy areas such as public health (Peterson 2013), environmental regulation (Gross 2003; Tienhaara 2009) and natural resource legislation (Phillips Williams 2016). Some arbitrators have also explicitly acknowledged or even voiced concerns about

regulatory chill;[16] while a senior US policymaker stated that, although the US has never lost an investor-state arbitration, in certain situations national public interest regulation "ha[d] not been put in place because of fears of ISDS" (US House of Representatives 2018).

All three types of regulatory chill may be relevant in the context of climate policy-induced asset stranding. However, cross-border chill is potentially the most concerning. ISDS proceedings can last for years, leaving substantial uncertainty about whether the investor's claims will be successful and increasing potential scope for cross-border chill. This issue is likely to affect high- and low-income countries in different ways. In the Global North, where stricter climate action should be taken first (in line with the principle of common but differentiated responsibilities and respective capabilities), certain circumstances – such as the older fleet of coal power plants – mean that scope for asset stranding in some sectors is more limited. On the other hand, some countries in the Global South have more substantial potential for asset stranding. They also often have more limited resources to defend ISDS cases. As governments in these countries become aware of an ISDS case in the Global North, they may come under pressure to abandon or delay necessary climate policy measures.

While the literature on regulatory chill tends to frame outcomes in binary terms (whereby the state either adopts or refrains from adopting certain measures), ISDS can also have other impacts that fall short of delaying or reversing policy decisions. For example, if a state enters into negotiations with private sector actors on possible financial compensation for asset stranding measures, the threat of ISDS, or even just its availability, could enhance the negotiating power of businesses that have a vested interest in the fossil fuel industries.

This is because legal claims, and the outcome of a dispute should it go to litigation, create 'bargaining endowments' capable of affecting the balance of negotiating power between the parties, and ultimately the outcome of negotiations (Mnookin and Kornhauser 1979; see also Hale 1943). The effects of negotiating 'in the shadow of the law' have been documented in a vast literature covering wide-ranging situations, including family disputes (Mnookin and Kornhauser 1979), land relations (Hesseling 1992), contractual issues (Chakravarty and MacLeod 2009), copyright law (O'Rourke 2003), international trade law (Busch and Reinhardt 2000; Steinberg 2002) and investment relations (Cotula 2012). In Germany, where the government agreed to pay large compensation amounts to companies affected by the country's coal exit (see Matthes *et al.* 2020 for a detailed assessment of the compensation payments), reports suggested that avoiding ISDS claims was an important consideration in the negotiation (see Box 2).

16 For example, 'Dissenting opinion of Professor Donald McRae', paras. 48, 51 in *William Ralph Clayton and others v. Canada*. See www.italaw.com/sites/default/files/case-documents/italaw4213.pdf

Box 2. Compensation in Germany's 'coal exit'

Germany has agreed to pay €4.35 billion in compensation to operators of lignite (brown coal) power plants, which will close by 2035 in the country's phase-out plan (Schulz 2020). Hard coal power plants will be phased out by 2038 and will be provided with transition payments if they switch to gas; they will also have the option to apply for compensation if they choose to shut down (those with the lowest bids will be compensated) (Wacket 2020). Some environmental groups criticised this compensation arrangement, with WWF Germany suggesting that it might perversely result in coal-fired power generation remaining longer than markets would normally allow (Wehrmann 2020).

The compensation package was agreed even though "the German parliament's research service concluded that the German state is not liable to compensate plant operators" (Hagen *et al.* 2019: 30). Some have speculated that ISDS has played a role in this decision. Tobias Stoll, a law scholar, analysed a draft contract that the government aims to have coal power companies sign and concluded that the government was paying substantial compensation to avoid ISDS (Pinzler 2020). The contract reportedly contains a clause whereby companies waive their right to pursue international arbitration over the coal exit.

Businesses can also pursue certain claims for compensation in national courts and this can affect negotiations as well. For example, lawsuits were threatened against the government of Alberta (Canada) for its coal phase-out plan before it negotiated 'transition payments' with a number of companies (Morgan 2016). However, the wider range of situations for which investment treaties and ISDS would offer damages, the large monetary awards associated with ISDS, and the uncertainty surrounding the outcomes of ISDS proceedings would magnify impacts when negotiations occur in the shadow of ISDS.

4. A case study: phasing out coal power plants

4.1 Overview of trends

Power generation is a critical sector for climate action as it accounts for more than 40% of all CO_2 emissions from fossil fuel combustion (IEA 2017a). Coal power is particularly problematic: calculations suggest that CO_2 emitted from coal combustion has made the single largest contribution (0.3°C) to the 1°C increase in global average temperatures that we have already experienced (IEA 2019). To meet the objectives of the Paris Agreement, the world must phase out coal power by mid-century (Kefford *et al.* 2018). However, it would be sensible to phase out coal power faster than that, as it is now cheaper to build new renewable energy capacity "than continuing operation of 39 percent of the world's existing coal capacity" (Rocky Mountain Institute *et al.* 2020: 12). There have been several global-level initiatives to transition away from coal power, including the Powering Past Coal Alliance (Jewell *et al.* 2019; Blondeel *et al.* 2020).

Although coal power has stagnated or declined in countries in the Global North, the total global installed capacity more than doubled from 1,000 gigawatts in 2000 to over 2,000 in 2015 (IEA 2017b) and nearly 600 gigawatts of new capacity are scheduled to come online by 2030 (Cui *et al.* 2019). About three-quarters of this new capacity is projected to be built in only five countries: China, India, Indonesia, Turkey and Viet Nam (Cui *et al.* 2019).

There are two types of power plant retirement: end-of-life retirement, for plants that have reached the end of their technical lifetime (typically 40–50 years); and early retirement. It is widely accepted that even if all projects currently proposed and under construction were cancelled, a significant number of plants would still need to be retired early to meet the Paris goals (Kefford *et al.* 2018; Pfeiffer *et al.* 2018; Cui *et al.* 2019). Coal power plants involve relatively long payback periods, which means sunk costs may not be recouped by an investor if a plant is forced into early retirement (Pfeiffer *et al.* 2018). While environmental advocates have argued that payoffs to coal plant operators would be unjustified (ClientEarth 2019a), or even of doubtful legality (ClientEarth 2019b), analysts predict that there is a "high likelihood of calls for compensation" from coal plant investors when governments adopt phase-out policies (Kefford *et al.* 2018: 300).

Coal power phase-out plans have already given rise to one ISDS proceeding, while negotiations are ongoing around a possible second claim. The ongoing proceeding, Westmoreland Mining Holdings v. Government of Canada, relates to the claim by a US coal mining company against the government of Canada.[17]

17 Westmoreland Mining Holdings LLC v. Government of Canada. See bit.ly/2Rk2lXQ (link to pdf) and bit.ly/2FprEVJ (link to pdf)

The company owns and operates several coal mines that feed directly into coal-fired power stations in the Canadian province of Alberta. In 2015, Alberta adopted a plan to phase out coal-fired power by 2030, as part of its Climate Leadership Plan.[18] Without the infrastructure to export coal, the climate plan resulted in a de facto phase-out of local thermal coal mining. To ensure support for the plan, major electricity companies in the province (all Canadian-owned) were provided with transition payments to facilitate the switch to gas and renewable energy (Government of Alberta 2016). The claimant did not receive such transition payments. In the ISDS claim, the company argues that its exclusion amounts to discrimination and unfair treatment in breach of the North American Free Trade Agreement (NAFTA). The government noted that the payments were aimed at electricity providers, rather than coal mine operators, in exchange for converting their power generation to gas and renewable energy as part of a transition plan.

A possible second ISDS claim related to coal phase-outs is brewing in the Netherlands, which passed a law in December 2019 banning coal power generation from older plants from 2025 and newer plants from 2030. Prior to the adoption of the law, German company Uniper Benelux threatened to launch an ISDS case under the ECT (ClientEarth 2019c; Keating 2019; Niemelä *et al.* 2020). The potential claim concerns the company's €1.7 billion investment in 2007 in the Maasvlakte Power Plant 3, which started operating in 2016 (Wynn 2017). In May 2020, the Dutch government confirmed that Uniper had requested negotiation of an amicable settlement under the ECT (Charlotin 2020). It has been reported that other investors may also pursue similar claims (Keating 2019).

While these proceedings are still ongoing, or are yet to be formally launched, the developments illustrate in tangible ways the role ISDS can play in coal power phase-outs (see also Box 2 on Germany's coal exit, p 22).

4.2 Assessing potential for future ISDS cases related to coal power phase-outs

To assess the potential for future ISDS threats and claims, we have developed a dataset of foreign-owned coal power assets at high risk of stranding that are protected by investment treaties. Data concerning coal power plants, their location and the investor's nationality is based on the Global Coal Plant Tracker database published by Global Energy Monitor.[19] Data on investment treaty coverage is based

18 Government of Alberta. Phasing out coal. See https://alberta.ca/climate-coal-electricity.aspx (accessed 1 June 2020).
19 See https://endcoal.org/tracker/ (accessed January 2020).

on UNCTAD's International Investment Agreements Navigator.[20] We compiled data from the two sources to measure treaty coverage based on plant location and investor nationality. For a selection of the plants, we also integrated asset-level phase-out schedules provided by Carbon Tracker to aid us in the calculation of asset stranding. The Appendix provides more detail on data sources and methods for the case study. Our dataset itself is available online.[21]

Our methodology presents a very conservative estimate of assets that are vulnerable to ISDS claims over coal phase-out stranding, due to the following issues:

- It was only possible to map treaty coverage based on parent company headquarters, but investors can structure investments through subsidiaries to maximise treaty coverage (see Box 3). This is true also for plants that are exclusively owned by domestic companies. We excluded these from our analysis but, depending on the circumstances, they could be structured to benefit from ISDS protection (a practice termed 'round-tripping'; see, for example, Nougayrède 2015).
- It was impossible to capture potential claims by investors upstream and downstream in the value chain – for example, mining companies that provide coal to power plants, as reflected in the Westmoreland v. Canada case.
- It was impossible to capture potential claims by financial investors or shareholders. Research by the Dutch institute Profundo indicates that, as of September 2019, 1,922 investors were holding bonds and shares worth almost US$276 billion in coal plant developers (Urgewald 2019).
- The Global Coal Plant Tracker database reflects power plants that are operating, under construction, permitted or announced as of January 2020. It is a snapshot at a particular point in time and cannot reflect ownership changes and other changes in conditions since that time. Further, the power sector globally is expected to invest around US$7.2 trillion more in power plants and grids over the coming decade (Pfeiffer *et al.* 2018). Much of this will be into coal and gas plants, significantly increasing the pool of potential ISDS-covered plants.
- The analysis only covers potential ISDS claims based on investment treaties. It does not consider possible claims based on contracts or national laws.

It is also important to note that our dataset provides a snapshot valid at a particular point in time (January 2020). This picture is subject to revision as a result of changes in the coal sector and the investment treaty landscape, and as more data becomes available.

20 See https://investmentpolicy.unctad.org/international-investment-agreements (accessed January 2020).
21 https://www.iied.org/sites/default/files/foreign_owned_coal_plants.xls

Box 3. Protection of outward US investment

Our dataset included 14 coal power plants that appeared to involve US investors unprotected by a treaty between the US and the host state where the plant is located. Closer examination found that two of these plants were incorrectly labelled in the Global Energy Monitor ownership of coal plants database and did not involve US investors. Another plant in Northern Ireland was sold to a Czech investor in 2019 and is now protected under the ECT, and another in Indonesia involved a US subsidiary of a Japanese company, so would be protected under the Indonesia-Japan Economic Partnership Agreement. Of the ten remaining investments, a review of publicly available information indicates that at least seven are structured in such a way that they would be covered by ISDS, as detailed in table 4 – though in one case the relevant treaty is not yet in force. Four of these plants are in Germany and will close within a decade under the coal exit plan (see Box 2).

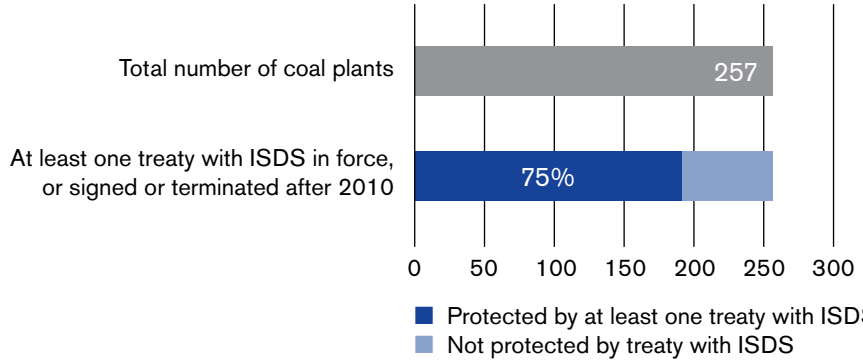
Table 4. Coal power plants with US outward foreign investment indirectly covered by ISDS

Name of plant	Host state	Location of relevant subsidiary	Treaty with ISDS
Bremen-Farge power station	Germany	Netherlands	ECT
Romerbrucke power station	Germany	Netherlands	ECT
Wilhelmshaven Engie	Germany	Netherlands	ECT
Zolling power station	Germany	Netherlands	ECT
Ib Valley power station	India	Mauritius	India-Mauritius BIT
Banten Suralaya power station	Indonesia	Singapore	ASEAN Comprehensive Investment Agreement
Chipata power station	Zambia	Ethiopia	Common Market for Eastern and Southern Africa Investment Agreement (not yet in force)

4.3 Most foreign-owned coal plants are protected by at least one ISDS treaty

Despite the conservative approach taken, the findings indicate that most foreign-owned coal power plants are protected by at least one treaty with ISDS. Globally, 257 coal plants that have remaining economic life and are at risk of stranding have clear foreign ownership. Of these, at least 75% (192 plants) are protected by at least one treaty with ISDS (see Figure 2), based on the investor's home and host states alone. This figure includes treaties with ISDS that are in force, treaties terminated after 2010 that, by virtue of their 'survival clause', could still protect investments made while the treaties were in force, and treaties signed after 2010 but not yet in force, which could come into force in the foreseeable future. Restricting the analysis to those treaties with ISDS that are currently in force would reduce the treaty coverage to 184 plants (72%).

Figure 2. Number of coal plants protected by treaties with ISDS



The US outward foreign investment case study (Box 3) suggests that the investment treaty coverage would look substantially larger if we could consider the additional opportunities for ISDS claims that may be embedded in the complex corporate structures of coal power plant businesses. Indeed, most of the US investments that were labelled as unprotected in our dataset are covered through subsidiaries based in third countries that have a treaty with the host state.

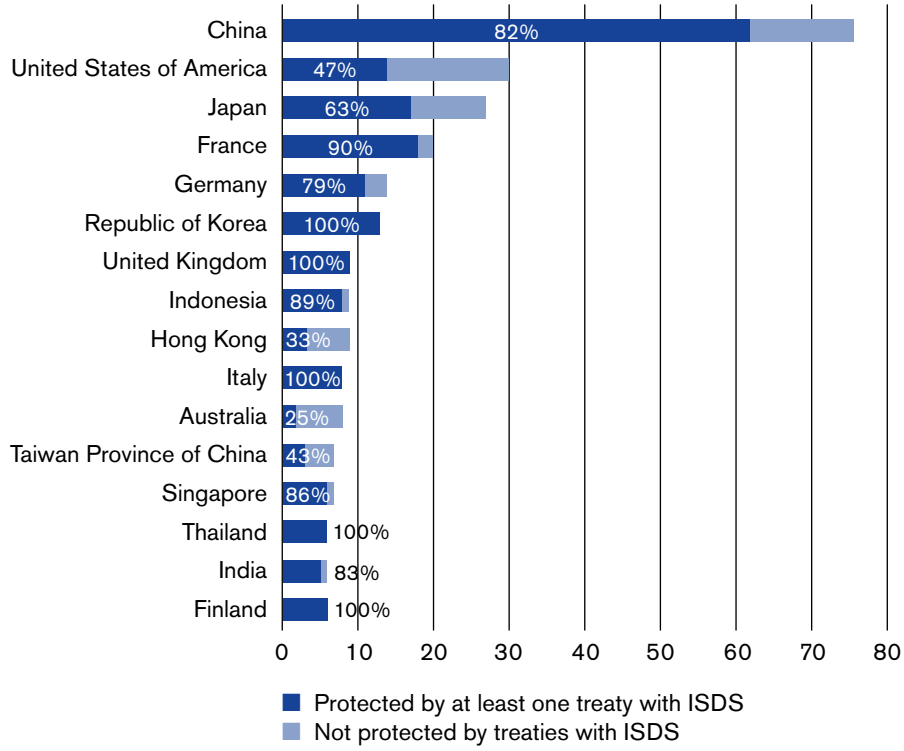
4.4 Geographic distribution and regional hotspots

In geographic terms, the power plants and related treaty coverage are unevenly distributed. With regards to the investors' home states, China emerges as a country with a particularly high number of power plants overseas that are protected by at least one ISDS treaty (Figure 3). China is the largest investor in coal plants that have remaining economic life and risk of stranding, by a significant margin (see Figure 4). China, with 15 protected coal plants that have remaining economic life and are

at risk of stranding (Figure 4), is also exposed to some risk from ISDS. Indonesia emerges as a host country with a high number of foreign-owned plants and a large share of ISDS coverage, while countries such as Chile, Pakistan, Poland and Viet Nam display lower numbers but higher shares of treaty coverage (Figure 4).

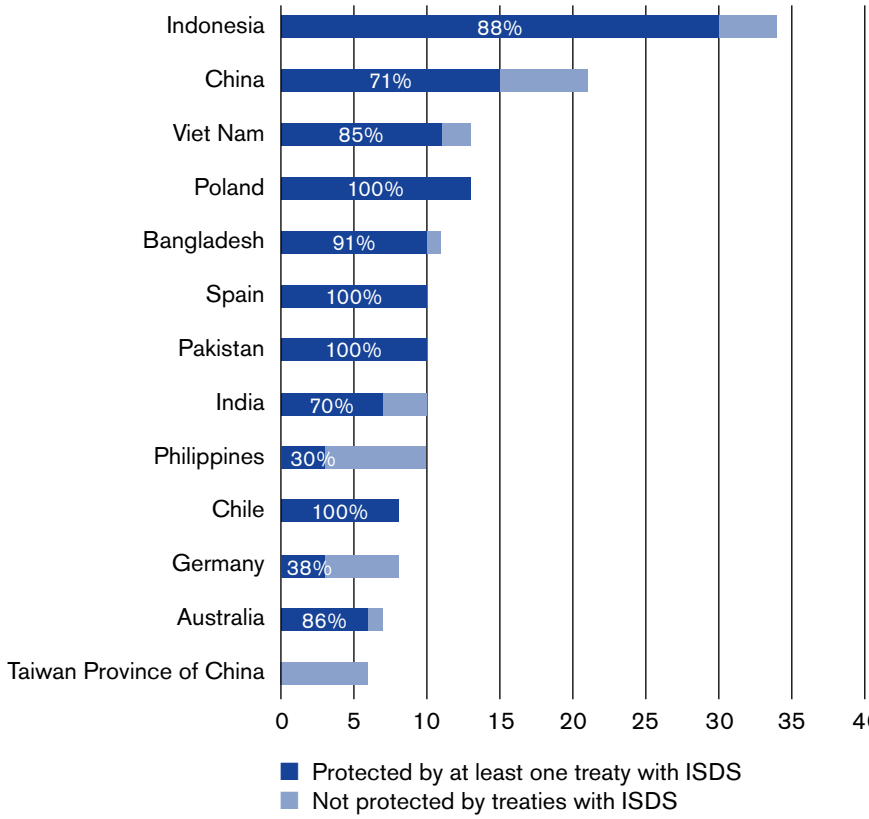
This country variation reflects significant regional concentration, with Europe and Southeast Asia emerging as major regional hotspots. In Southeast Asia, one treaty between China and the Association of Southeast Asian Nations (ASEAN) protects at least 36 plants. In Europe, the ECT protects at least 47 coal plants that have remaining economic life and are at risk of stranding. As discussed in Table 4, the ECT covers at least four additional coal plants as a result of the ways corporate structures are organised, based on analysis of US outward foreign investment alone. Determining the value of these potentially stranded assets creates major methodological challenges due to a lack of relevant data, uncertainties surrounding valuation methods and outcomes, and other factors. In ISDS cases, the valuation figures put forward by the parties, and ultimately by the tribunal, can vary significantly.

Figure 3. Number and percentage of foreign-owned coal plants/investors protected by at least one treaty with ISDS, by investor home state



Note: Plants involving more than one investor appear with multiple entries, one per investor. Only countries with more than five plants/investors are included.

Figure 4. Number and percentage of foreign-owned coal plants protected by at least one treaty with ISDS, by host state



Note: Only countries with more than five plants are included.

However, a preliminary assessment indicates that substantial sums are involved. Take Indonesia, where the China-ASEAN treaty alone protects 12 coal plants for which asset-level Paris-aligned phase-out dates are available.[22] Applying the methods used by Saygin *et al.* (2019), we estimate that stranding these assets could cost US$6.8–7.9 billion, depending on whether one assumes that the economic lifetime of a plant is equivalent to its technical lifetime (around 40 years) or shorter (we used 20 years for the lower end of the range). The method we used approximates stranded value as "the remaining book value of fossil fuel-fired power plants substituted before the end of their anticipated technical lifetime" (Saygin *et al.* 2019: 108–109; see the Appendix for further details). We chose this method because of its simplicity and because we had access to all the necessary data to

22 Seven additional plants covered by this treaty were not included in the Carbon Tracker asset-level dataset.

make the calculations. We are not suggesting that this method would be used by governments when developing compensation schemes (see Matthes *et al.* 2020 for a discussion of the German approach and some alternatives) or by ISDS tribunals when awarding damages. As noted above, many ISDS tribunals have used DCF when awarding damages for profit-generating ventures and this could result in significantly higher amounts than sunk costs alone (Bonnitcha and Brewin 2019). As a result, ISDS tribunals could award significantly more than the stranded value we have calculated for each plant. Finally, and as emphasised above, the issue is not only whether companies will threaten or initiate ISDS cases, and what the outcomes will be; it is also about how the 'shadow' of ISDS can affect compensation and other negotiations between governments and businesses.

5. Conclusion

5.1 Summary of findings

If the world is to meet internationally recognised climate targets, governments will need to undertake measures to phase out various fossil fuel activities, defined broadly to include coal, oil and gas. This report developed a framework for assessing the extent to which measures to promote the low-carbon energy transition might result in firms resorting to international agreements to protect foreign investment. We discussed potential asset stranding in the three segments of fossil fuel value chains – extraction, transportation and processing/distribution/combustion – and the substantial monetary values placed on projected stranded assets.

We focused on international arrangements to protect foreign investment through treaties between two or more states that allow investors from one state to bring disputes with another state to an arrangement known as ISDS. Major fossil fuel extraction companies have already made extensive and successful use of this arrangement. But ISDS arrangements would also allow a considerably broader range of actors to bring claims over possible energy transition measures. These include fossil fuel companies from across the value chain (from extraction to distribution and combustion) and financial investors that hold direct or indirect, majority or minority equity stakes in companies operating in the industry.

Broad discretion for arbitral tribunals and the use of forward-looking valuation methods have produced uncertainty in the arbitral jurisprudence; on several occasions, they have led to extremely large amounts of damages in favour of foreign investors. As a result, ISDS could require states, and ultimately taxpayers, to pay large compensation amounts to fossil fuel businesses for measures to support the energy transition. While states can enact measures if they compensate investors, the large amounts at stake can shift the ways in which the costs of public interest action are distributed between taxpayers and businesses. This would make it more costly for states to regulate in the public interest. It would also strengthen the fossil fuel industry's position in negotiations with governments over possible compensation for phase-out measures.

To illustrate the scale of the issues, we presented the findings of a case study on one part of the fossil fuel industry: the coal power plant sector. This focused on a single commodity (coal) and a single segment of the value chain (combustion). As a particularly carbon-intensive industry, coal power generation provides an emblematic case to explore these issues. The practical relevance of ISDS to the coal sector is highlighted by the existence of ongoing or threatened ISDS proceedings in connection with plant phase-outs in Canada and the Netherlands. Based on a new dataset created by combining the Global Coal Plant Tracker database and UNCTAD's International Investment Agreements Navigator, the case study assessed the extent to which treaties with ISDS protect foreign-owned coal plants worldwide.

At least three-quarters of the 257 foreign-owned plants in the global dataset are protected by at least one treaty with ISDS. This figure was calculated considering the investors' home and host countries alone. A deeper dive into US outward foreign investment indicates that the real coverage by treaties with ISDS is likely to be significantly higher once we take the complex corporate structures of coal power businesses into account. Further, these findings do not capture potential claims by ancillary investors (for example, mining companies that provide coal to power plants) and claims by financial investors holding equity stakes in the companies.

Our findings shed light on the uneven geographic distribution of these liabilities, with Europe and Southeast Asia emerging as key regional hotspots; China as a key outward investor having considerable ISDS-protected assets overseas; and Indonesia, Pakistan and Viet Nam, among others, as countries hosting many ISDS-protected plants. They also indicate that the ECT protects at least 51 coal plants that are at risk of stranding in a Paris-compliant scenario.

5.2 Next steps and policy recommendations

There is much we do not yet know, and there is therefore a need for further research, building on the framework and the case study contributed by this report. For example, the approach developed for the coal power plant case study can be expanded upon both vertically, to include the entire coal value chain (including extraction), and horizontally, to include oil and gas activities. One challenge is that access to reliable data on these sectors often requires subscription to expensive commercial databases, which may hamper further empirical research in this area. Additional analytical work on valuation aspects and possible ways to consider potential claims from financial investors holding equity stakes in fossil fuel businesses would also be useful.

In analysing the risks to states from stranding in oil and gas activities, it is also important to consider the specific circumstances of low- and middle-income countries (Bos and Gupta 2018, 2019). While all coal power needs to be phased out rapidly, the world will continue to rely on other fossil fuels for some time. Countries in the Global South with unexploited deposits of fossil fuels may face not only stranded resources, leaving them with limited options for economic development, but also potential liability for stranding them (Bos and Gupta 2019; UNU-INRA 2019). Assets such as coal power plants are often younger in developing countries, so investors are more likely to suffer financial losses in the transition to cleaner forms of energy. As such, while there has been significant concern about fossil fuel companies using ISDS to challenge climate action in Europe and North America, countries in the Global South may be more exposed to potential liabilities over stranded assets.

Even with the current state of the empirical evidence, ISDS can have far-reaching repercussions for decisions about the low-carbon energy transition – not only because businesses may initiate ISDS disputes, but also because of the under-

the-radar processes that ISDS can stimulate, including various forms of regulatory chill and negotiations in the shadow of ISDS. The large amounts of money at stake can make it more costly, and thus more difficult, for states to take the measures necessary to keep warming below 1.5°C. It can also create a disincentive for businesses to divest from fossil fuel assets.

To meet the Paris Agreement objectives, states and supranational entities such as the EU must address the issues associated with investment treaties and ISDS. Most investment treaties were concluded before the Paris Agreement, and the relationship between them raises issues of policy coherence.

With regard to investment treaties and ISDS, states and supranational entities should consider measures to preserve their ability to facilitate the low-carbon energy transition. Depending on the context, this may involve:

- **terminating treaties with ISDS, particularly the older treaties that contain unqualified investment protections and do not address sustainable development issues**. Researchers at the Columbia Center on Sustainable Investment have already undertaken considerable analytical and drafting work on the technical aspects of effecting this policy option (Johnson *et al.* 2018; see also CCSI, IIED and IISD 2019). Terminating treaties can be politically difficult, due to concerns that doing so might impair diplomatic relations and other factors. This is particularly the case for countries in the Global South, in their relations with higher-income countries that may provide significant levels of aid and investment. Considering the reverberations of ISDS on the energy transition shows that terminating treaties that are at odds with states' multilateral commitments under the Paris Agreement is a legitimate policy option (see also UNCTAD 2018, which includes treaty termination in the range of options for consideration). A coordinated solution, for example through a multilateral treaty termination instrument, could ease political concerns and make the process more efficient, and the ongoing, concerted termination of intra-EU investment treaties can provide a relevant comparator;
- **radically modernising — or, if unsuccessful, terminating or withdrawing from — the ECT**, which emerged in the case study as one of the key treaties protecting coal power. The ECT is also the most frequently invoked investment treaty in history, with 129 publicly known cases as of 25 March 2020.[23] The treaty has been undergoing a so-called modernisation process, with negotiations starting in late 2019 (UNCTAD 2020a; Saheb 2020; Shirlow and Abrahams 2020). While aligning the ECT with the Paris Agreement is not formally included as a topic for discussion (Bernasconi-Osterwalder and Brauch 2019), the EU's negotiating directives state that a "Modernised ECT should reflect climate change and clean energy transition goals and contribute to the achievement of the objectives of the Paris Agreement" (Council of the European Union 2019: 3). Our findings indicate that ECT members should embrace radical modernisation,

23 See the list of cases on Energy Charter Treaty, www.energychartertreaty.org/cases/list-of-cases/

finalising the process within a reasonable timeline. Should modernisation efforts fail, ECT members should consider terminating – or in default, withdrawing from – the treaty (see also Brauch 2019; Saheb 2020). Meanwhile, under the ECT's ongoing expansion efforts, several non-party states are being encouraged to accede to the treaty (see CEO *et al.* 2020). Our findings suggest these states should carefully consider energy transition issues before deciding to sign on;

- **multilaterally reforming investment treaties and ISDS**, through the (narrowly circumscribed) process at the UNCITRAL's Working Group III on ISDS Reform, and in broader policy dialogue forums such as UNCTAD and the Organisation for Economic Co-operation and Development (OECD). While the UNCITRAL Working Group has interpreted its mandate as restricted to procedural aspects, issues surrounding damages and reflective loss have repeatedly come up on its agenda (see, for example, Bernasconi-Osterwalder and Johnson 2019). These issues can affect regulatory chill and negotiations in the shadow of ISDS. Reform in these strategic areas could reduce the impact of ISDS in the low-carbon energy transition;
- **forging new approaches to address energy transition issues in the context of any investment treaty negotiations** – for example, through potential exclusions and carve-outs for energy transition measures or fossil fuel investments. These could build on examples such as the proposed Treaty on Sustainable Investment for Climate Change Mitigation and Adaptation (Brauch *et al.* 2019), which links standards of treatment to 'sustainable' investment criteria (see also Brauch 2018). More generally, concerns about the place of ISDS in the energy transition compound the case for reconfiguring the standards of protection applicable to foreign investment, to safeguard the right and duty of states to regulate in the public interest, in relation to energy transition and other policy issues.

For energy transition policies, states and supranational entities should consider measures to more fully take into account the issues associated with investment treaties and ISDS. Depending on the context, this may involve:

- **promoting awareness of and debate on investment treaties and ISDS in global policy spaces related to climate change**, including the UN Framework Convention on Climate Change and the Paris Agreement;
- **developing explicit provisions to address ISDS issues in emerging ideas about proposed plurilateral or multilateral treaties to coordinate supply-side energy transition policy issues and phase out fossil fuels**, such as the proposed Fossil Fuel Non-Proliferation Treaty (Newell and Sims 2019) or Coal Elimination Treaty (Burke and Fishel 2020). This could include removing ISDS (if available under an applicable investment treaty) for disputes between a state party and an investor from another party over actions taken to implement the phase-out treaty;

- **developing national policy approaches that can sustain the energy transition while also mitigating the risk of ISDS claims**, as any substantial reform of investment treaties and ISDS will most likely take time. This may include:
  - **for the coal power sector, operating reverse auctions to acquire outstanding debt on power plants in exchange for closure where appropriate** (Caldecott and Mitchell 2014; Rocky Mountain Institute *et al.* 2020). This could involve establishing a fund and then inviting coal plant owners to come forward with bids for the cost to phase out their plants. The lowest bids would win the auction, while regulations could set payment ceilings that decrease over time to encourage early action (Caldecott and Mitchell 2014). A structured and transparent process along these lines can avoid the problems associated with negotiating compensation payments with individual asset owners in the shadow of ISDS. While reverse auctions would involve the use of public funds to accelerate the transition away from coal power, if properly designed they "can ensure that plant owners do not realize excess profits" (Rocky Mountain Institute *et al.* 2020: 25). Proposals have also been developed for richer countries to finance such programmes in the Global South, and for including green conditions to ensure money is reinvested in renewables (Rocky Mountain Institute *et al.* 2020);
  - **suspending any programmes offering fossil fuel exploration licences or contracts**. There are more known fossil fuels reserves than can safely be burned if we are to avoid catastrophic warming. Governments should permit no further exploration to find additional reserves that will ultimately have to be stranded. In investment treaty terms, companies offered opportunities to explore for fossil fuels may develop 'legitimate expectations' that they will be permitted to exploit them, so this measure will help to reduce the number of ISDS claims associated with the energy transition.

In national and international policy arenas characterised by substantial economic interests and power imbalances, pressure from advocacy organisations can be an important driver of – or even a prerequisite for – public action. Over the years, activists have played an important role in promoting energy transition measures and raising awareness about the place of ISDS in wide-ranging policy areas, including energy transition. In continuing and upscaling these initiatives, advocacy organisations could:

- promote transparency on – and documentation and public scrutiny of – the use or threat of ISDS in connection with energy transition measures;
- develop collaborations between organisations in the Global North and South to ensure multinational corporations are held accountable in their home states for actions that they take to delay energy transition in host states;
- raise awareness of ISDS issues in climate policy forums; and
- promote mainstreaming of climate goals in investment treaty policy.

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Cases

Case name	Reference number	Year	Documents and links
Factory at Chorzow (Germany v. Poland)	1928 PCIJ (Ser.A) No.17	1928	Judgment, https://tinyurl.com/y6t29nay
James and Others v. United Kingdom	8 Eur. H.R. Rep. 123	1986	Judgment https://tinyurl.com/yy4pgu5v
Westmoreland Mining Holdings LLC v. Government of Canada	ICSID Case No. UNCT/20/3	2019–2020	Notice of arbitration and statement of claim (12 August 2019), https://tinyurl.com/y4cfbd5k Statement of defense (26 June 2020), https://tinyurl.com/yxuhpqlp
William Ralph Clayton, William Richard Clayton, Douglas Clayton, Daniel Clayton and Bilcon of Delaware Inc. v. Government of Canada	PCA Case No. 2009-04	2015	Dissenting opinion of Professor Donald McRae (10 March 2015), https://tinyurl.com/kj8u2o7

Appendix. Remarks on data sources and methods for the coal power plant phase-out case study

1. Applicable investment treaties

Data is from the UNCTAD International Investment Agreements Navigator as of January 2020.[24] The navigator contains data on agreements between two or more states to promote reciprocal investment. The unit of analysis is the investment agreement and the initial number of observations was 3,712.

We took the following steps:

1. Excluded duplicates of agreements.
2. Excluded treaties terminated before 1 January 2010 (assuming the survival clause of these treaties will have expired, though some survival clauses can extend over 15 or 20 years), treaties signed before 1 January 2010 that never came into force (assuming these treaties are now less likely to be ratified) and all treaties in negotiation.
3. Excluded treaties terminated by consent between the parties or replaced by another treaty (assuming the survival clause does not apply to termination by mutual agreement), and a small number of fixed-term treaties that had expired.

We also excluded the 2016 Trans-Pacific Partnership treaty because it never entered into force. It was replaced by the Comprehensive and Progressive Trans-Pacific Partnership, which entered into force in 2018 and was included in the dataset. However, we adjusted entries because, by virtue of side letters, compulsory ISDS does not apply between New Zealand and five countries: Australia, Brunei Darussalam, Malaysia, Peru and Viet Nam.

We only included treaties that provide for ISDS. For treaties the UNCTAD dataset refers to as 'mapped', this information was already present in the UNCTAD dataset. For treaties that were yet to be mapped, we initially restricted the pool by excluding:

- all bilateral investment treaties signed before 1968, as the first BIT with an ISDS clause dates to that year;
- all treaties signed by Brazil since 2015, as they have no ISDS;
- all treaties concluded by the EU, except those with Canada, Singapore and Viet Nam, which do have ISDS; and
- all framework, association and cooperation agreements, including US Trade and Investment Framework Agreements and a range of EU treaties.

24 https://investmentpolicy.unctad.org/international-investment-agreements

For the remaining treaties, we manually checked whether they included ISDS. For nine BITs, language constraints made this impossible; we assumed they feature ISDS.

When one party to an agreement is a regional economic organisation, such as the EU, we considered the treaty to apply to all its member states.

2. Global coal power plant data

Coal plant data is based on the Global Coal Plant Tracker database, which contains details of coal plants worldwide, as of January 2020.[25] The unit of analysis is the coal plant unit and the initial number of observations was 12,875. We included in our datasets all plants listed as 'announced', 'under construction', 'operating', 'permitted' and 'pre-permit', and excluded 5,132 units listed as 'cancelled', 'retired', 'mothballed' or 'shelved'.

Each plant may have more than one unit. Since we were interested in the plant rather than the specific unit, we aggregated all units pertaining to the same plant to have the dataset at plant level. The resulting number of observations was 2,858. Where a plant involved more than one investor (listed as 'parent' in the database), we disaggregated the relevant entry into multiple entries, with one per investor. The new unit of measure is then the combination of plant and investor, with a total number of observations ('plants/investors') of 3,876.

We sourced data on investor nationality from the EndCoal website (Global Energy Monitor 2020).[26] The website refers to the location of the headquarters office. Investment treaties can take different approaches to defining investor nationality – for example, a common one for legal entities is the country in which the company is incorporated. As a result, there may be some discrepancy between the criterion we used to reach a proxy indication of nationality and the criteria used in applicable investment treaties. During the analysis, we also identified at least one investor that had been incorrectly labelled in the dataset. Although we adjusted the dataset accordingly, we cannot rule out the possibility that we did not identify other such errors and this may have affected the validity of the final dataset. We dropped 51 plants/investors because the investor's nationality was not available.

The database included 1,864 Chinese-owned investments in coal plants in China. We removed these from the dataset, as we viewed it as unlikely that such investments would be structured to access investment treaties. Of the remaining 1,961 plants/investors, 1,634 involved domestic investors, while 270 coal plants involved foreign ownership by 327 foreign investors. We only considered plants involving foreign investment, though we recognise that domestic businesses might be able to structure their investments to benefit from ISDS protection ('round-

25 See https://endcoal.org/tracker/
26 Global ownership of coal plants (MW). See bit.ly/2RioVQu

tripping'). In the report, we use the shorthand 'foreign-owned' to designate all plants involving some level of foreign investment.

3. Carbon Tracker asset-level phase-outs and economic lifetime screening

We merged the dataset of foreign-owned coal plants with asset-level phase-out schedules for 6,750 units of coal plants, provided by Carbon Tracker in April 2020. We then eliminated plants from the dataset that we believed were low risk for stranding.

First, we identified seven coal plants as having the same business as usual and Paris-aligned phase-out dates (provided by Carbon Tracker), meaning that there would be no asset stranding if a government followed a Paris-aligned policy. However, asset stranding would still be possible if a government opted for a more ambitious phase-out. Of these seven plants, we identified one as having ISDS risk for this reason: the Maasvlakte 3 plant in the Netherlands, which already forms the subject of an ISDS threat, as discussed in Section 4.1. We kept this plant in the dataset and excluded the other six with no stranding under a Paris-aligned phase-out, deeming the risk of ISDS to be low as they all had a business-as-usual retirement within the next two years.

Second, we individually checked another 15 plants that began operating prior to 1980 (for which we did not have Carbon Tracker asset-level phase-out schedules) to determine whether they had any units that were under 40 years of age, assuming that units of 40 years+ were likely to have reached their economic life and were low risk for ISDS disputes. As a result, we removed the following seven plants:

- The Ventanas plant (Chile) and the Battle River plant (Canada), because the companies had already agreed to a planned retirement in compliance with climate policies adopted by Chile and the Canadian Province of Alberta.[27]
- The Kuchurgan plant (Moldova), because it can run on coal, oil or gas and reportedly has "used virtually no coal" since the 1990s.[28]
- Apatitskaya CHPP power station (Russia), because the company has already started retirement of units, and the last unit came online in 1964.[29]
- The Strakonice plant (Czech Republic), the Wilton Plant (UK) and the Morava plant (Serbia), as we found no evidence that they had been upgraded or evidence suggested that they were scheduled for retirement in the near future.[30]

27 See www.gem.wiki/Battle_River_power_station and www.gem.wiki/Ventanas_power_station
28 See https://euracoal.eu/info/country-profiles/other-eu-energy-community/
29 See www.gem.wiki/Apatitskaya_CHPP_power_station
30 Climate Analytics. See https://climateanalytics.org/briefings/eu-coal-phase-out/eu-coal-phase-out-detailed-information/ and Todorovic (2020)

We kept the following plants in the dataset:

- The Kolubara, Kostolac and Nikola Tesla plants (Serbia) and Jerada power station (Morocco), because new developments are planned involving Chinese investors.[31]
- The Bocamina plant (Chile), because the more recent second unit is not scheduled to retire until 2040.[32]
- The Jorge Lacerda plant (Brazil), because Unit 7 came online in 1997.[33]
- Swiecie Pulp Mill power station (Poland), because the last unit was commissioned in 2007.[34]
- Termopaipa power station (Colombia), because Unit 4 was built in 1999 and Unit 1 was upgraded in 2015.[35]

This reduced the dataset to 257 coal power plants with known foreign ownership and a reasonable risk of asset stranding.

4. Merged ISDS treaty / coal plant dataset

Following the operations above, we brought together data on ISDS treaties and on coal plants to construct our dataset. For each plant, the merged dataset reports the country where the plant is located, the nationality of the investor(s) and all the states with which the state where the plant is located has a treaty with ISDS. This dataset enabled us to determine, in an automated way, whether the host state where the plant is located has at least one treaty with the investor's home country, and whether the plant is protected by a treaty with ISDS. This analysis showed that 192 (75%) of the 257 foreign-owned coal plants were covered by at least one treaty with ISDS.

It is important to stress that this approach only considers the investor's home and host state. It does not consider treaties that may be applicable because of the investor's corporate structure. Equally, this method does not cover potential ISDS claims that may be brought by financial investors holding equity stakes in the businesses.

31 See www.gem.wiki/Kolubara_B_Power_Station, Todorovic (2020), www.gem.wiki/Nikola_Tesla_power_station, www.gem.wiki/Jerada_power_station
32 See www.gem.wiki/Bocamina_power_station
33 See www.gem.wiki/Jorge_Lacerda_power_station
34 See www.gem.wiki/Swiecie_Pulp_Mill_power_station
35 See www.gem.wiki/Termopaipa_power_station

5. Calculating the value of stranded coal plant assets

To test a method for calculating the value of ISDS-protected assets, we converted our plant-level data for ASEAN-China protected plants in Indonesia back into unit-level data. Adapting the method of Saygin *et al.* (2019), we calculated stranded asset value as "the remaining book value of fossil fuel-fired power plants substituted before the end of their anticipated technical lifetime" (Saygin *et al.* 2019: 108–109). We chose a method that relies on the asset's book value because we had access to all the necessary data to make the calculations. To estimate the capital expenditure for each unit, we multiplied the capacity of each unit in kilowatts by US$1,300/kw (the value adopted by Saygin *et al.* 2019 for non-OECD plants).

Subtracting the Paris-aligned phase-out dates (from Carbon Tracker) from the date it would reach 40 years (technical life) provided the number of years of unit life that would be stranded under Paris. We converted this to a fraction of life stranded by dividing it by the technical life (40 years). Finally, we multiplied the capital expenditure by the fraction of life stranded to estimate the dollar value for stranding the unit on a Paris-aligned schedule. This provided the estimate at the upper end of our range. As noted by Saygin *et al.* (2019), assuming that a plant's technical life equals its economic life can result in an overestimated stranded asset value, because some companies depreciate power plants over shorter periods of time. Therefore, we also conducted a second calculation that assumed an economic life that is half the technical life (20 years). This calculation provided the lower end of our range.

We recognise that this simplified method presents limitations. Valuation is itself a complex field presenting considerable uncertainty, and the valuation figures put forward by the parties to an ISDS case can vary significantly. The approach of using capital expenditure to approximate an investor's unrecouped sunk costs is a conservative method of estimating compensation in ISDS. In connection with businesses likely to be viable, arbitral tribunals have often used DCF to estimate lost future profits, rather than sunk costs alone (see, for example, Bonnitcha and Brewin 2019). This means that, for each plant, businesses would likely be able to make claims for much larger amounts than we have estimated.

Knowledge Products

Research Report

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Law

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Global efforts to combat climate change will require a transition to renewable energy and government action to reduce reliance on fossil fuels such as coal, oil and gas. If followed through, such action will create stranded assets – in other words, economic assets affected by premature write-downs or downward revaluations, or converted to liabilities.

To protect their assets from measures to phase out fossil fuels, foreign investors may resort to investor-state dispute settlement (ISDS), which allows them to bring disputes to an international tribunal and sue states over conduct they believe breaches investment protection rules, and to obtain compensation if the claim is successful.

Even in the absence of legal proceedings, the explicit or implicit threat of recourse to ISDS can provide leverage to the fossil fuel industry and strengthen its position in negotiations with governments over possible compensation. As a result, more public funds may be spent on compensating the fossil fuel sector than would otherwise be the case, making it more costly for states to take energy transition measures.

This report develops a framework for assessing the extent to which energy transition measures could result in ISDS claims; explores the extent to which treaties with ISDS protect foreign-owned coal plants worldwide; and provides policy recommendations to help states preserve their ability to facilitate the low-carbon energy transition.

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