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REPORT JULY 2024

INVESTMENT TREATIES ARE UNDERMINING THE GLOBAL ENERGY TRANSITION

MAPPING THE GLOBAL COVERAGE OF ISDS- PROTECTED FOSSIL FUEL ASSETS

EUNJUNG LEE & JORDAN DILWORTH





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About E3G

E3G is an independent climate change think tank with a global outlook. We work on the frontier of the climate landscape, tackling the barriers and advancing the solutions to a safe climate. Our goal is to translate climate politics, economics and policies into action.

E3G builds broad-based coalitions to deliver a safe climate, working closely with like-minded partners in government, politics, civil society, science, the media, public interest foundations and elsewhere to leverage change.

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Our partners



WWF-Norway

WWF-Norway is part of the global WWF network. WWF is a global environmental organization that fights against the biggest challenges of our time: the nature and climate crisis. WWF works for a future where people live in harmony with nature.

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SUMMARY

Globally, 2 gigatonnes (Gt) carbon dioxide equivalent (CO₂e) of potential annual greenhouse gas (GHG) emissions is protected via investment treaties.¹ The G7 is responsible for 50% of these emissions abroad, equivalent to over 40% of the G7's GHG emissions in electricity generation in 2022.²

Investment treaties are misaligned with the international efforts to achieve net zero emissions. Countries with climate ambition need to lead the reform of investment treaties to eliminate the risk posed by ISDS to the global energy transition.

Some of the wealthiest industrialised countries have been at the forefront of international efforts to accelerate the global energy transition. The G7 aspires to take a leading role in shaping the global climate agenda, including the latest commitment to phase out unabated coal power generation by the first half of the 2030s. The United Kingdom and France have initiated global coalitions to end public support for international fossil fuel projects. The United Kingdom and Canada are co-leading the Powering Past Coal Alliance (PPCA), a global alliance committed to the transition away from coal power. France and Spain are core members of the Beyond Oil & Gas Alliance (BOGA), having committed to phasing out oil and gas production.

However, investment treaties with investor–state dispute settlement (ISDS) provisions are at odds with these initiatives as they protect fossil fuel investments abroad. ISDS allows foreign investors to bring claims against host governments in international arbitration tribunals if their business interests are undermined by government measures. ISDS poses a risk to the global energy transition by delaying ambitious climate measures, raising the costs of climate

¹ “Potential annual emissions” refer to emissions from both fossil fuel assets currently in operation and those that will operate in the future. These figures therefore represent the potential annual emissions if all these assets were operational.

² All of the 2022 emissions data that we used for the purposes of comparison are based on the global warming potential (GWP) of 20 years and derived from **Climate TRACE Country Inventory**, accessed on 18 June 2024.³ Fossil fuel operations include coal mining, oil and gas production and operation, oil and gas refining and solid fuel transformation but do not include electricity generation.



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action, reducing the fiscal space to respond to climate change and encouraging further investments in fossil fuels.

This report shows which countries are most responsible for ISDS-protected GHG emissions and highlights the misalignment between investment treaties and other climate commitments. We mapped the global coverage of ISDS-protected fossil fuel assets and their associated GHG emissions, by analysing oil and gas fields, coal mines, and coal-, oil- and gas-fired power plants. We also identified who are most vulnerable to compensation claims from fossil fuel investors.

Key findings

- > Globally, investment treaties with ISDS provisions protect fossil fuel assets with the potential to collectively emit around 2 Gt CO₂e annually. This is 58% of the GHG emissions created by all of the continent of Europe's fossil fuel operations in 2022.³
- > Parent companies headquartered in the G7 are responsible for 50% (1 Gt CO₂e) of the total figure.⁴ This equals 40.6% of the G7's GHG emissions from electricity generation in 2022.
- > The United Kingdom protects more potential annual GHG emissions than any other country: 255 megatonnes (Mt) CO₂e. That is 3.8 times the GHG emissions resulting from all UK domestic fossil fuel operations in 2022.
- > Six of the top 15 countries that protect most overseas GHG emissions via ISDS have joined the Clean Energy Transition Partnership (CETP).⁵ CETP members committed to end new export finance support for overseas fossil fuel projects. However, they continue to protect investor interests in overseas fossil fuel investments through ISDS, undermining the global transition away from fossil fuels.
- > Spain and France – core members of BOGA – together protect 165 Mt CO₂e from ISDS-covered oil and gas fields. This is 3.3 times the GHG emissions that the two countries emitted domestically in 2022 in all fossil fuel operations. Despite being core members of the BOGA, they are slowing down the energy

³ Fossil fuel operations include coal mining, oil and gas production and operation, oil and gas refining and solid fuel transformation but do not include electricity generation.

⁴ We only included seven sovereign member states in the G7 emissions and excluded the European Union.

⁵ At COP26 in 2021, 34 countries and five public institutions committed to end new direct public finance support for overseas fossil fuel projects, such as export finance, by signing the Glasgow Statement. ⁶ IEA, 2024, **World Energy Investment 2024**



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transition of other oil- and gas-producing countries via treaty-based investment protection.

- > Egypt and Nigeria are at the highest risk of ISDS claims. Colombia (a friend of BOGA) and Indonesia (supported through a Just Energy Transition Partnership) are also highly exposed to ISDS risk, which means ISDS can get in the way of their transition efforts.

Countries leading efforts to accelerate the energy transition globally should therefore reform investment treaties with ISDS provisions to remove the investment protection offered to fossil fuel assets.

Recommendations

1. Recognise that the current investment treaty regime is incompatible with the global energy transition and consider options for investment treaty reform.
2. Pursue plurilateral action by collectively agreeing a reform option that can address the incompatibility between the investment treaty regime and climate action.
3. Integrate the investment treaty reform agenda into wider climate discussions in multilateral fora such as the G7, G20, and UNFCCC processes.



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CHAPTER 1

BACKGROUND

At COP28 in 2023, 198 countries agreed to transition away from fossil fuels in energy systems and set renewable capacity and energy efficiency targets. According to the International Energy Agency (IEA), meeting these goals requires a doubling of global clean energy investment by 2030 and a quadrupling in the developing world outside of China.⁶ Finance will be the focus of COP29 at the end of 2024. Discussions will be centred around how much money is needed for climate action in developing countries and how to fund this.

In the past couple of years, there have been various efforts to make finance more available for developing countries to address the climate crisis and channel investment away from fossil fuels and towards clean energy. Reforming the international financial architecture and tackling debt have become priorities in climate diplomacy to make more money available for emerging markets and developing countries. In 2021, 34 countries and five public institutions committed to end new direct public finance support for overseas fossil fuel projects, such as export finance. A similar pledge was then adopted by G7 leaders in 2022. At COP28, the Netherlands launched a coalition with 11 other countries to phase out fossil fuel subsidies.

However, investment treaties with investor–state dispute settlement (ISDS) continue to be overlooked in broader climate finance discussions, despite the protection offered by investment treaties being a barrier to redirecting investment away from fossil fuels.

Investment treaties and ISDS provisions

As of 2022, there are more than 2,500 investment treaties in force globally, most of which protect foreign investment via ISDS.⁷ ISDS allows foreign investors to bring claims against host governments in international arbitration tribunals if their business interests are undermined. ISDS originally aimed at protecting

⁶ IEA, 2024, **World Energy Investment 2024**

⁷ According to UN Trade and Development (UNCTAD), 2,584 stand-alone bilateral investment treaties (BITs) or investment chapters in free trade agreements are in force globally as of 2022. See UNCTAD, 2023, **World Investment Report**.



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foreign investors from excessive state interventions, such as nationalisation without due compensation. However, vague treaty language and wide discretion given to arbitrators have resulted in compensation awards for investors even in instances where governments are pursuing legitimate public policy objectives.⁸

ISDS has been controversial for decades because it puts corporate interests above other objectives and values, such as human rights, environment and climate.⁹ Still, it has become particularly relevant to addressing the climate crisis due to the protection given to fossil fuel investments. Historically, the fossil fuel industry has benefitted the most from the ISDS mechanism. Seven of the top ten largest ISDS awards – all exceeding \$1 billion – involve fossil fuels investments.¹⁰ Recent research has also found that fossil fuel investors have won at least \$82.8 billion in damages.¹¹

ISDS poses multiple risks to the global energy transition

The fear of high-value compensation claims can delay ambitious climate action and lock states into high-carbon pathways

A clear example of the “regulatory chill effect” is New Zealand having joined the Beyond Oil & Gas Alliance (BOGA) as an associate member, not a core member. Ahead of COP26, New Zealand’s Minister for Climate Change explained that becoming a core member “would have run afoul of investor–state settlements” as it requires committing to ending new concessions or licensing for oil and gas production.¹²

ISDS raises the costs of climate action

Even the mere possibility of claims via ISDS can lead to higher payouts to fossil fuel investors. For example, Germany offered Czech energy company LEAG €1.73 billion as compensation for the early phase-out of their lignite-fired power plants. This amount is allegedly about 50 times what the German government originally calculated LEAG should be paid. A German government spokesperson

⁸ E3G, 2023, **The climate crisis requires a new approach to international investment treaties**

⁹ Meyer et al., 2023, **The Brazilian G20 Presidency and the Case for Building a New Global Political Consensus on Energy and Finance**

¹⁰ IISD, 2020, **Valuing Fossil Fuel Assets in an Era of Climate Disruption**

¹¹ IIED and CCSI, 2023, **Investor-state dispute settlements: a hidden handbrake on climate action**

¹² Capital Monitor, 2022, **Cop26 targets pushed back under threat of being sued**



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admitted that the possibility of being sued through the Energy Charter Treaty (ECT) was one motivating factor for such an extortionate offer.¹³

One ISDS claim can significantly reduce the fiscal space for countries to respond to climate change

Australia is facing an ISDS case for not granting a coal mining lease, based on grounds including the GHG emissions associated with the coal produced by the mine.¹⁴ The investor is claiming damages of A\$41 billion, which is more than twice Australia's 10-year budget to grow clean industries.¹⁵ The impact on a state's fiscal space is even bigger for developing countries. In 2019, Pakistan was ordered to pay more than US\$5.8 billion in compensation for not approving a gold and copper mine development, which was tantamount to the bailout it secured from the IMF in the same year.¹⁶

ISDS encourages further investments in fossil fuels

ISDS insulates fossil fuel investors from transition risks by functioning as free state-backed insurance. Investment treaties with ISDS interrupt achieving Article 2.1(c) of the Paris Agreement, "making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development". The *Rockhopper v. Italy* case shows how ISDS misaligns investment flows with the energy transition. In 2017, the UK-based firm was awarded €190 million in compensation (excluding interest) for Italy having refused an oil drilling permit, which followed reintroducing a ban on offshore oil and gas exploration.¹⁷

Rockhopper has used the money to develop the Sea Lion oil fields in the Falkland Islands.¹⁸

¹³ Deutsche Welle, 2021, **Multi-billion euro lawsuits derail climate action**

¹⁴ The Queensland authorities refused to grant a mining lease for Galilee Coal Mine in Queensland, following the local court's recommendation which was based on the evidence of climate change and human rights impacts, including the Scope 3 emissions associated with the burning of the coal produced by the mine. The investor, Singapore-based mining company Zeph Investments, owned by Australian billionaire Clive Palmer, has recently brought two other ISDS claims against Australia. The damages claimed in the three cases total A\$409 billion. See Kluwer Arbitration Blog, August 2023, **Zeph Investments v Australia: The Latest in Investor-State Climate Change-Related Claims** and bilaterals.org, November 2023, **Clive Palmer uses another trade agreement to sue Australia, again, for \$A69 billion over refusal of Waratah coal mine permit**

¹⁵ According to the Federal Budget submitted by the Treasury in May 2024, Australia has earmarked A\$19 billion to invest in clean industries such as renewable hydrogen, low-carbon fuels, critical minerals and clean energy technologies during the next decade. See Climate Council, May 2024, **What's in this year's Federal Budget for climate?**

¹⁶ International Institute for Sustainable Development (IISD), 2020, **Compensation Under Investment Treaties: What are the problems and what can be done?**

¹⁷ UNCTAD Investment Dispute Settlement Navigator, **Rockhopper v. Italy**. Last accessed: 18th June 2024.

¹⁸ Rockhopper Exploration PLC, 2023, **Monetisation of Arbitration Award**



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Meanwhile, ISDS is not necessary to protect and attract renewable investments

Investment treaties are climate-agnostic, so they protect renewable investments as well as fossil fuel investments. However, ISDS is not critical to protect renewable investments and there are other de-risking tools available. A recent study conducted by Columbia Centre on Sustainable Investment (CCSI) finds that green investors see other instruments as more important than ISDS in risk mitigation.¹⁹ The study also finds that the investors do not consider ISDS a relevant factor when making investment decisions. In general, there is no conclusive evidence that investment treaties with ISDS help attract cross-border investments.

The current investment regime based on ISDS is fundamentally incompatible with the climate crisis. It is at odds with global efforts to achieve a timely energy transition. Realising this, since 2022 eleven European countries, including the United Kingdom, and the European Union have already left or decided to leave the ECT, the most invoked investment treaty. While this is a meaningful step forward the problem remains in nearly 2,500 other investment treaties, which protect fossil fuel investments in the same way the ECT does.

A gap in the existing analysis

Most systematic analyses of ISDS impact on climate have focused on the scale of the legal and financial risks of these provisions. The International Institute for Sustainable Development (IISD) has conducted a quantitative analysis of the known investment arbitrations in the fossil fuel industry, finding that the fossil fuel industry is the most litigious industry by number of cases.²⁰ Other analyses have sought to map fossil fuel assets covered by ISDS provisions and quantify the associated financial risks but they are limited in their scope of fossil fuel assets or geographical coverage.²¹ Due to the complexity of how compensation tends to be calculated in practice their chosen valuation methods offer a conservative estimate.

Our analysis contributes to this literature by broadening the scope of fossil fuel assets considered by globally mapping extensive upstream fossil fuels assets and

¹⁹ E3G, October 2022, **Clean investments shun Investor-State Dispute Settlements**

²⁰ IISD, 2021, **Investor-State Disputes in the Fossil Fuel Industry**, pp. 10–11

²¹ See Kyla Tienhaara and Lorenzo Cotula, 2020, **Raising the cost of climate action? Investor-state dispute settlement and compensation for stranded fossil fuel assets**; Oliver Moldenhauer and Nico Schmidt, 2021, **ECT data analysis: Results and Methods**; Kyla Tienhaara et al., 2022, **Investor-state disputes threaten the global green energy transition**.



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fossil fuel power plants. In addition, we focus on which countries pose high ISDS risks to other countries, rather than just looking at the exposure of host countries to ISDS risks, by estimating the annual greenhouse gas emissions of these ISDS-covered fossil fuel assets.



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CHAPTER 2

METHODOLOGY

Mapping fossil fuel assets covered by ISDS provisions

Our analysis covers four fossil fuel asset types – oil and gas fields, coal mines, coal-powered power plants, and oil- and gas-powered power plants – included in the Global Energy Monitor (GEM)’s publicly available databases and in Rystad Energy’s UCube database.²² We limited our scope to these assets due to incomplete ownership data and the complexity of calculating greenhouse gas emission estimates for midstream assets such as pipelines and terminals.

Depending on the database, we used asset-level and unit-level data for fossil fuel assets. In addition, we grouped fossil fuel assets into those currently operating and those that will operate in the future based on their specific status.²³ The results have been aggregated to present as country-level data.

We built a database of investment treaties that include ISDS provisions. We extracted data from the UN Trade and Development (UNCTAD)’s International Investment Agreement Navigator,²⁴ which provides a database of all international investment agreements – both bilateral investment treaties (BITs) and treaties with investment provisions. For some treaties, the UNCTAD database has mapped the inclusion of ISDS provisions. We identified the ISDS inclusion of the rest of treaties by making some assumptions and manually verifying the text where needed.²⁵ Besides treaties in force, we also included recently signed treaties and unilaterally terminated treaties where a sunset clause still applies. As a result, 2,463 treaties with ISDS provisions were used in our mapping analysis.

²² We used the Global Energy Monitor’s **Global Coal Plant Tracker (GCPT) (Jan 2024)**, **Global Coal Mine Tracker (GCMT) (Oct 2023)**, and **Global Oil and Gas Plant Tracker (GOGPT) (Aug 2023)**.

²³ Fossil fuel assets that are “producing” or “operating” were classified as currently operating, whereas fossil fuel assets with the status “announced”, “construction”, “discovery”, “permitted”, “pre-construction”, “pre-permit”, “proposed” and “under development” were classified as future operating assets. We excluded assets that have been abandoned, cancelled, closed, mothballed, retired, and shelved.

²⁴ UNCTAD, **International Investment Agreements Navigator**. Last accessed: December 2023

²⁵ For example, we assumed that all framework, association and cooperation agreements did not include ISDS provisions. See Annex A for full details on how the relevant investment treaties were selected.



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To map the ISDS coverage of fossil fuel assets, we identified whether the country where the asset owner's parent company is headquartered, and the country location of the fossil fuel asset, have an investment treaty with ISDS provisions (Figure 1).²⁶ This is a conservative approach as it does not consider the possibility of restructuring investments through entities in other countries to access ISDS or potential claims by shareholders. Our approach may therefore have excluded assets that could potentially have access to ISDS.

Flow diagram for ISDS coverage of fossil fuel assets

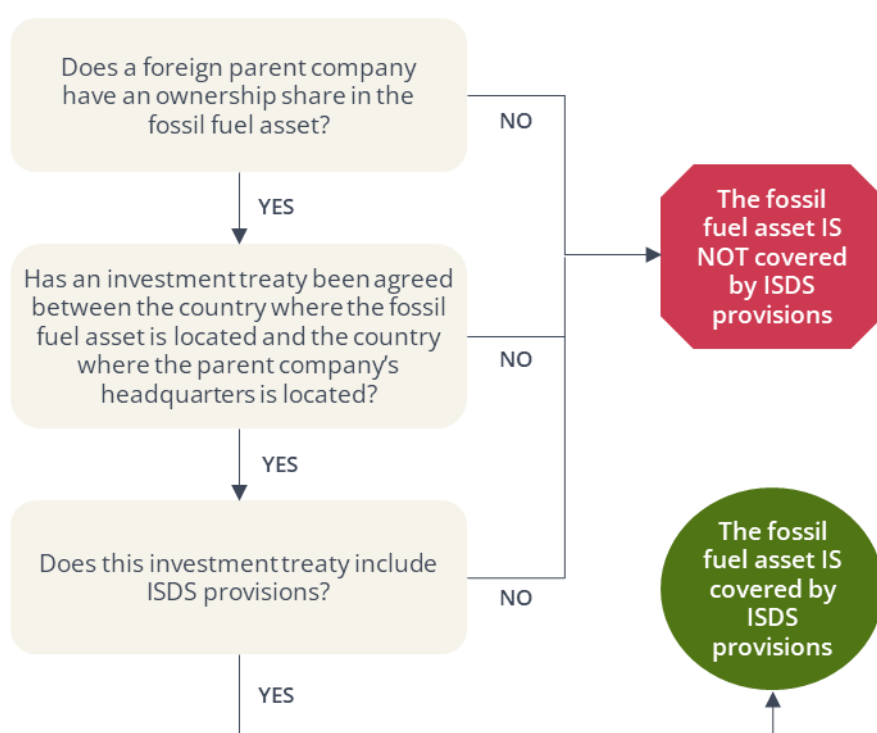


Figure 1: Fossil fuel assets in our analysis were considered as covered by ISDS provisions if the countries where the asset and its parent company are located have an investment treaty with ISDS provisions.

²⁶ For instance, if a fossil fuel asset located in Italy is owned by a UK-headquartered parent company and an investment treaty with ISDS provisions exists between these two countries, the fossil fuel asset is classified as being covered by ISDS provisions. The ownership information for parent companies has been drawn from GEM's databases and Rystad Energy's database. If the location of the parent company could not be found in these databases, we manually checked the headquartered location.



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Estimating the associated GHG emissions of ISDS-covered fossil fuel assets

Analysing the GHG emissions of protected assets illustrates the magnitude of the risk posed by ISDS to the energy transition. Annex A describes the full methodology for estimating annual GHG emissions. In the case of assets that will operate in the future, the estimates are for potential emissions, which are included in the total figures.

The scope of emissions captured in our calculation varies depending on the asset type due to data availability. Emissions from oil and gas fields include carbon dioxide (CO₂) and methane (CH₄) along the oil and gas supply chains: emissions from powering the energy required for the extraction, processing, refining and transport; emissions from gas flaring; and fugitive and vented emissions. On the other hand, emissions from coal mines and all power plants only include one type of GHG, CH₄ for coal mines and CO₂ for power plants.

For coal mines and coal-fired power plants, we followed GEM's publicly available methodologies to calculate GHG emissions.²⁷ For oil- and gas-fired power plants, we multiplied annual electricity generation per asset by the default CO₂ emission factor specific to fuel types identified by the IPCC.²⁸ For each oil or gas field, we estimated yearly production based on Rystad Energy's data and multiplied this by the IEA's emissions intensity factors, which we adapted to the 20-year Global Warming Potential (GWP).²⁹ For assets operating currently, we used the production data for 2024. For assets operating in the future, we divided the estimated lifetime production data by the number of active years to get average annual production.

CO₂e emissions were allocated to countries based on parent companies' ownership shares of fossil fuel assets. For instance, if a UK-based parent company owned a 20% share in a fossil fuel asset that emits 10 Mt CO₂e, the United Kingdom would be recorded as protecting 2 Mt CO₂e.

²⁷ Global Energy Monitor's **Estimating carbon dioxide emissions from coal plants** and **Estimating methane emissions from coal mines**.

²⁸ IPCC, 2006, **2006 IPCC Guidelines for National Greenhouse Gas Inventories**, Volume 2. Chapter 1, pp. 1.23 – 124.

²⁹ After converting these values to 20-year GWP, we used an emission factor of 175.77 kg CO₂e/bbl for oil fields and 139.62 kg CO₂e/bbl for gas fields. See IEA, May 2023, **Emissions from Oil and Gas Operations in Net Zero Transitions**



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Key terms

Fossil fuel asset: The databases we used had different levels of granularity, providing either asset-level or unit-level data. For oil and gas extraction, the database included data on individual fields. For fossil fuel plants, a unit refers to an individual facility within the multiple power-generating facilities that exist at a particular fossil fuel plant. For coal mines, GEM's coal mine tracker only provides asset-level data. We use the term "asset" for consistency across the databases.

Assets operating in the future To capture the entire range of potential ISDS claims and GHG emissions protected by ISDS, we have included fossil fuel assets in our analysis that are not currently operating. Fossil fuel assets that will operate in the future have the status "announced", "construction", "discovery", "permitted", "pre-construction", "pre-permit", "proposed" or "under development" in Rystad Energy's or GEM's databases.

Carbon dioxide equivalent (CO₂e): A metric used to compare the emissions from various greenhouse gases based on their global warming potential (GWP). The most used GWP measure is the 100-year GWP, which measures the warming effects of greenhouse gases over a period of a 100 years. However, this study uses a 20-year GWP to prioritise near-term actions and net zero ambition by 2050, and to capture that the impact of CH₄ on the climate is significant in the near term.

Potential annual greenhouse gas (GHG) emissions: The aggregated GHG emissions (CO₂e) from both currently operating fossil fuel assets and assets that will operate in the future. These are not potential annual emissions during one specific year.

Potential number of ISDS claims: This figure is meant to measure the risk posed by ISDS. A potential ISDS claim exists if an owner of a fossil fuel asset is headquartered in a different country to the country location of the asset and an investment treaty with ISDS provisions exists between these countries. Given that fossil asset often have multiple owners, more than one claim can be made per fossil fuel asset.



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Limitations

When identifying whether a treaty provides ISDS access, we did not look at qualitative aspects of different ISDS provisions but focused on the existence of any ISDS mechanism. For example, some bilateral investment treaties (BITs) require case-by-case consent from both parties to use ISDS, which reduces the likelihood of ISDS claims compared to when parties give umbrella consent to ISDS. In other cases, ISDS access is given only regarding certain disputes, such as many of China's BITs signed in the 1980s.³⁰

It is important to capture emissions from assets that will become operational in the future because even the assets not yet operating could still trigger ISDS claims if cancelled. In our analysis, we included emissions from operating assets and assets that will operate in the future to show potential emissions protected by ISDS. However, our figures should not be interpreted as potential annual emissions during one specific year.

To estimate emissions from assets that will operate in the future, we did not take into account different trajectories of fossil fuel production or electricity generation. Therefore, we assumed constant output of power plants and coal mines, and estimated the average production for oil and gas fields.

The emissions intensity factors that we used to calculate GHG emissions for certain asset types are conservative estimates because they do not capture the full range of GHG emissions. For example, we only estimated the CO₂ emissions for oil- and gas-fired power plants because we did not have complete data on the type of technology used for combustion. The type of technology used for combustion in an oil- and gas-fired power plant determines the non-CO₂ emissions of a plant, whereas CO₂ emissions are independent of the technology type used.

³⁰ Investment Treaty News, September 2017, **A Look into China's Slowly Increasing Appearance in ISDS Cases**



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CHAPTER 3 FINDINGS

Global overview

Globally, **6,860 (12%)** of the **58,281** fossil fuel assets we identified are protected by ISDS provisions. This represents **62.3%** of global fossil fuel assets owned, either entirely or partially, by foreign investors.

When we look at different asset types, upstream oil and gas fields are particularly well protected by ISDS. Therefore, the phase-out of oil and gas production is at particular risk from being interrupted by the ISDS mechanism. As Figure 2 shows, 80.0% of total potential ISDS claims could be brought against upstream oil and gas fields.

Potential ISDS cases globally by asset type



Source: Analysis by E3G. Aggregated data using Rystad Energy's UCube and Global Energy Monitor's GCPT, GCMT & GOGPT



Figure 2: Oil and gas fields and plants could lead to nine times as many ISDS cases as coal assets.



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In terms of GHG emissions, we estimate that 1.64 gigatonnes (Gt) CO₂e are currently protected annually by ISDS. If we also consider assets that will operate in the future, the potential annual GHG emissions protected globally by ISDS **increases to 2 Gt CO₂e.**³¹ This is 58.0% of the GHG emissions from all of the continent of Europe’s fossil fuel operations in 2022.

Who owns ISDS-protected emissions

Our analysis reveals that the protection offered by ISDS provisions to fossil fuel investors is not distributed equally. Most companies who own ISDS-protected fossil fuel assets are concentrated in the richest countries.

- > High-income countries are responsible for protecting 73.6% (1.47 Gt CO₂e) of potential annual GHG emissions protected by ISDS globally.³²
- > The countries that protect the most potential annual GHG emissions are the United Kingdom, China, Japan, France, and the United States. They collectively account for 53.1% of all potential annual GHG emissions protected by ISDS.
- > Parent companies headquartered in Europe & Central Asia and East Asia & Pacific are responsible for 81.4% (1.63 Gt CO₂e) of global ISDS-protected GHG potential annual emissions.³³

Our analysis identifies the extent to which investment treaties primarily protect investors in high-income countries. Figure 3 ranks the potential annual GHG emissions of fossil fuel assets protected by ISDS via parent companies headquartered in that country. To provide further granularity, associated GHG emissions have been broken down by asset type.

Six of the G7 member countries are among the top seven countries that are most responsible for ISDS-protected GHG emissions, Canada being the exception. Nine countries among the top 15 countries are G20 member countries. All top 15

³¹ We will use “potential annual emissions” to refer to emissions from both fossil fuel assets currently in operation and those that will operate in the future. These figures therefore represent the potential annual emissions if all these assets were operational.

³² World Bank, **World Bank Country and Lending Groups**. Last accessed: June 2024. We used the 2024 fiscal year for the income level of a country. We also refer to the World Bank classification for the geographical grouping.

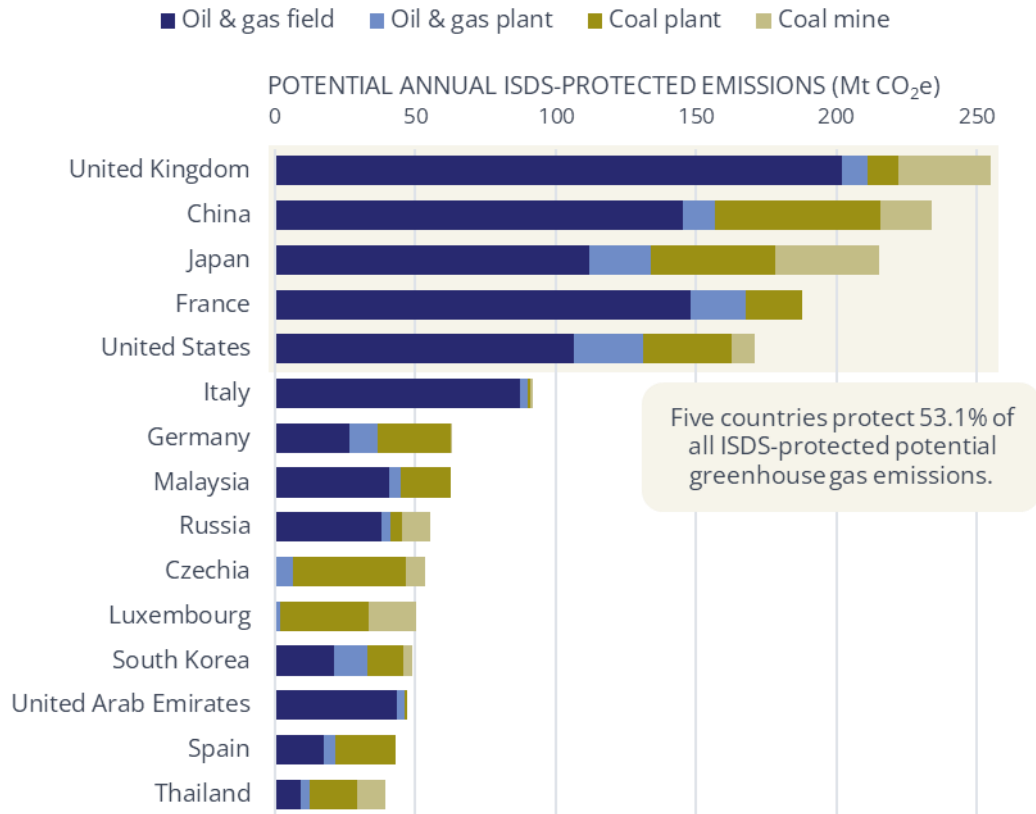
³³ Parent companies headquartered in Europe & Central Asia account for 921.6 Mt CO₂e (46.0%) and those in East Asia & Pacific, 707.5 Mt CO₂e (35.3%).



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countries are either high-income or upper-middle-income countries, protecting 80.1% of the total potential annual emissions protected via ISDS.

Potential annual GHG emissions protected by top 15 countries hosting companies with ISDS-protected fossil fuel assets



Source: Analysis by E3G. Aggregated data using Rystad Energy's UCube and Global Energy Monitor's GCPT, GCMT & GOGPT



Figure 3: High-income countries feature prominently among the countries that protect the most overseas GHG emissions through ISDS provisions. A group of five countries protects over half of these emissions.

It is worth noting that Japan, China, Luxembourg, Czechia, and the United Kingdom are the top five countries protecting GHG emissions from coal assets, accounting collectively for 298.5 Mt CO₂e (14.9%) of ISDS-protected GHG emissions. This is equivalent to 84.6% of the emissions from coal mining in Europe in 2022.



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Countries at risk from ISDS claims

Countries exposed to high risk of potential ISDS claims are less concentrated in specific regions or income groups, whereas rich countries are mostly responsible for ISDS-protected fossil fuel assets.³⁴

- > Egypt and Nigeria are exposed to the highest risk of ISDS claims associated with fossil fuel assets and both are lower-middle-income countries. Middle- and low-income countries are vulnerable to 60.4% of potential ISDS claims.³⁵
- > The Middle East & North Africa (26.3%), Europe & Central Asia (24.6%), and East Asia & Pacific (17.4%) are the most vulnerable to potential ISDS claims.
- > While the majority (51.4%) of potential ISDS claims could come from parent companies headquartered in Europe & Central Asia, this region is vulnerable to less than a quarter (24.6%) of potential ISDS claims.
- > Colombia and Indonesia are highly exposed to ISDS risks. ISDS is at odds with their current energy transition efforts, such as Colombia having become a friend of BOGA and Indonesia having launched its Just Energy Transition Partnership (JETP).

Figure 4 ranks the countries that are most vulnerable to potential ISDS claims. These charts have been broken down to reflect the risk posed to phasing out upstream fossil fuel production and fossil fuel combustion, and the breakdown between coal, and oil and gas.

Egypt alone accounts for 7.9% of all potential ISDS claims, and the top five countries are at risk to 27.7% of the total of potential ISDS claims. The top two countries – Egypt and Nigeria – are lower-middle-income countries. Seven of the top 15 countries are high-income countries. This might be because foreign investments in the energy sector overall do not flow enough into poorer countries.

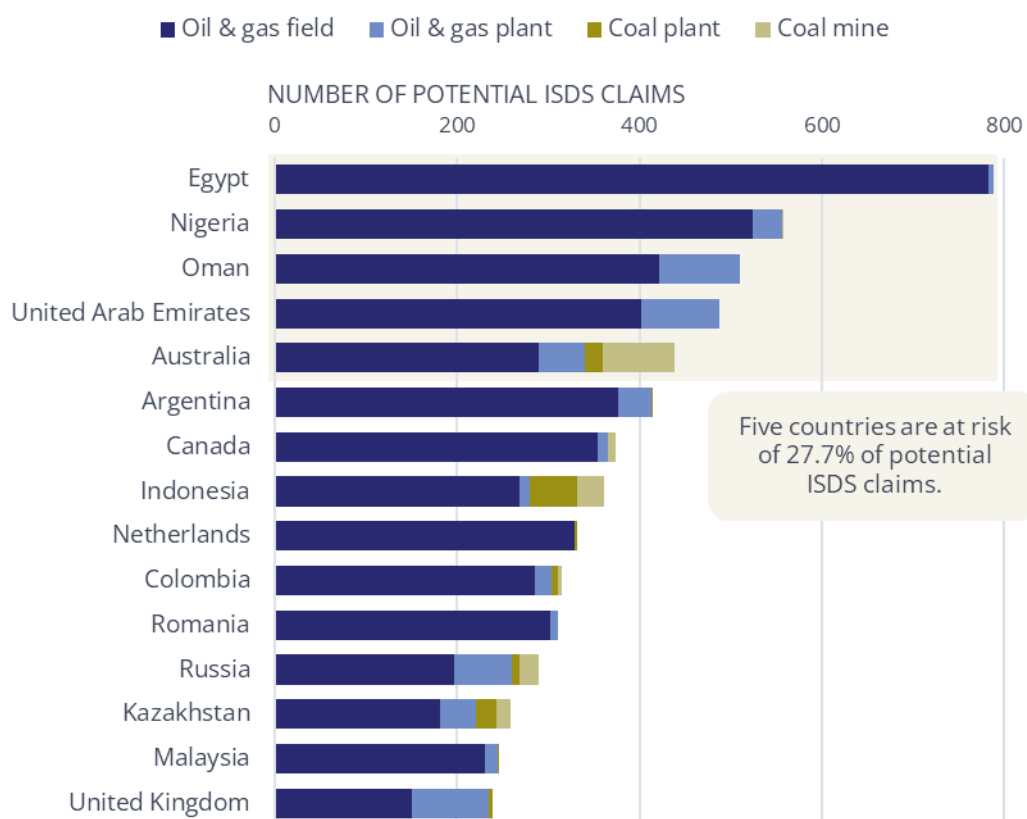
³⁴ The potential number of ISDS claims figure is meant to measure the risk posed by ISDS. A potential ISDS claim exists if an owner of a fossil fuel asset is headquartered in a different country to the country location of the asset and an investment treaty with ISDS provisions exists between these countries. Given that fossil asset often have multiple owners, more than one claim can be made per fossil fuel asset.

³⁵ Middle-income countries refer to lower-middle-income and upper-middle-income countries according to the World Bank classification.



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Top 15 countries most at risk of potential ISDS claims



Source: Analysis by E3G. Aggregated data using Rystad Energy's UCube and Global Energy Monitor's GCPT, GCMT & GOGPT



Figure 4: The countries most at risk of potential ISDS claims are less concentrated in specific regions or income groups than those that protect the most GHG emissions (Figure 3). Two lower-middle-income countries – Egypt and Nigeria – top the table.

These charts also reveal that, for the top 15 countries, most ISDS risk comes from oil and gas production. But while the phase-out of oil and gas production is at particular risk from ISDS claims, phasing out coal poses a risk in particular countries. Significantly, we found that Indonesia, a partner country of the G7-led JETP, is exposed to 82 potential ISDS claims against its coal assets.

The United Kingdom is the only member of the G7 that features in both Figure 3 and Figure 4; they are highly exposed to potential ISDS claims while simultaneously responsible for protecting GHG emissions abroad via ISDS. Given this double bind, the United Kingdom should be more motivated to change the



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system, compared to other rich countries who are not exposed to as much ISDS risk but whose investors benefit much from it.

These findings make it clear that the current investment regime protects fossil fuel interests of companies based in high-income countries while making certain middle- and low-income countries vulnerable to large claims associated with their fossil fuel assets.

Analysis of the G7 and international climate initiatives

We took a closer look at the countries that comprise intergovernmental fora and international climate initiatives, such as Clean Energy Transition Partnership, Beyond Oil and Gas Alliance (BOGA), and the Powering Past Coal Alliance (PPCA). This analysis clearly exposes how investment protection given to global fossil fuel assets via investment treaties is misaligned with some international efforts to phase out fossil fuels. Reforming investment treaties offers a way for countries pursuing ambitious international efforts to further accelerate the energy transition.

G7

The climate dissonance is most pronounced for the G7, which aspires to take a leading role in shaping the multilateral agenda and setting norms for government action. Parent companies headquartered in the G7 are responsible for 1 Gt CO₂e, which is 50.4% of the total ISDS-protected potential annual emissions (Figure 5). This is equivalent to 40.6% of the GHG emissions produced by G7 countries in electricity generation in 2022.

Looking more broadly at the G20, this grouping accounts for roughly 1.5 Gt CO₂e (73.0%) of potential annual GHG emissions coming from ISDS-covered fossil fuel assets globally.³⁶

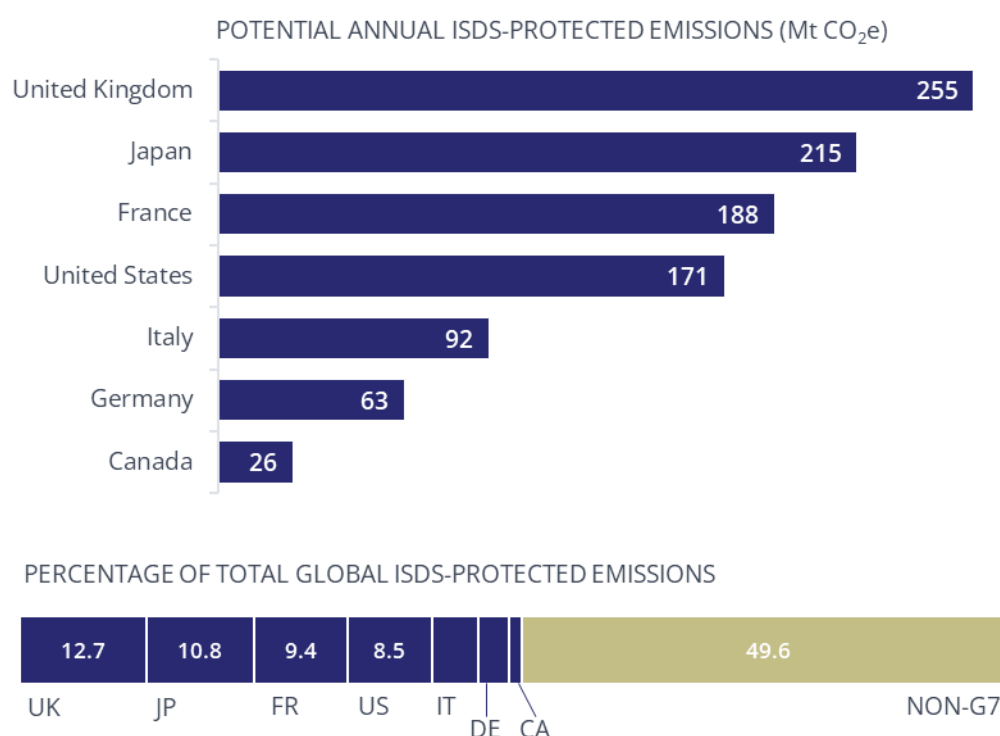
On the other hand, the G7 countries are vulnerable to only 10.0% of potential ISDS claims against fossil fuel assets. While accountable for the most emissions overall, the G7 are only responsible for 25.6% of ISDS-protected emissions in each other's countries.

³⁶ Like we did for the G7, we only included sovereign member states in the G20 emissions and excluded the European Union and the African Union.



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Greenhouse gas emissions protected by G7 countries



Source: Analysis by E3G. Aggregated data using Rystad Energy's UCube and Global Energy Monitor's GCPT, GCMT & GOGPT



Figure 5: G7 countries protect 50% of the total potential annual greenhouse gas emissions covered by treaties with ISDS. Among these, companies based in the UK, Japan, France and the US are responsible for the largest amounts of emissions.

Specifically in coal power generation, the G7 is responsible for 32.0% (141.2 Mt CO₂e) of potential annual GHG emissions from ISDS-protected coal power plants. This is more than half (57.4%) of the 2022 GHG emissions from electricity generation in Indonesia, which the G7 has been trying to help transition out of coal use through a JETP. This year, the G7 committed to phase out unabated coal power generation by the first half of the 2030s and cooperate with other countries towards no new coal power plants.³⁷ However, they are at the same time making it harder for other countries to end coal power generation by not addressing the current investment regime.

³⁷ Still, this G7 commitment falls short of 1.5 °C pathways. According to the IEA, the OECD countries need to phase out unabated coal power generation by 2030.



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Clean Energy Transition Partnership (CETP)

Investment treaties with ISDS provisions are also at odds with commitments to end new direct public finance support for overseas fossil fuel projects, such as export finance, made by certain countries at COP26. Despite the progress made by the signatories to the CETP in phasing out their international public support for fossil fuels,³⁸ indirect protection of private investment by fossil fuel investors is still available via ISDS.

Six of the CETP signatories are in the top 15 countries that protect most overseas emissions via ISDS. In particular, the United Kingdom and France rank first and fourth respectively in terms of the amount of GHG emissions that they are protecting via ISDS.³⁹ The UK protects 254.8 Mt CO₂e potential annual emissions in overseas fossil fuel assets held by its investors. This is 3.8 times the GHG emissions that the UK produced in 2022 in all fossil fuel operations. France protects 187.6 Mt CO₂e potential annual emissions. This is equivalent to 31.9% of the GHG emissions across all sectors in France in 2022. CETP signatories should also focus on ISDS reform as a means of unlocking the energy transition globally, to build on – and remain consistent with – their efforts on export finance.

Figure 6 shows which of the top 15 countries that protect greenhouse gases via ISDS have committed to end direct public finance support for overseas fossil fuel projects through the CETP.

Beyond Oil and Gas Alliance (BOGA)

France and Spain protect significant GHG emissions from overseas oil and gas fields via ISDS. As core members of the BOGA, they have committed to phasing out their oil and gas production by a certain date. However, by protecting investments in oil and gas production abroad they are currently at risk of slowing down the energy transition of other oil and gas producing countries.

Parent companies in France and Spain are collectively responsible for 165.1 Mt CO₂e of ISDS-protected potential annual GHG emissions resulting from oil and gas fields. This is 3.3 times the GHG emissions that the two countries emitted domestically in all fossil fuel operations in 2022. Strikingly, of the 286 potential

³⁸ According to the IISD, the signatories collectively moved \$6.5 billion out of fossil fuels and \$5.2 billion into clean energy in 2022. While this is significant progress, it is short of its potential to shift \$28 billion per year from fossil fuels to clean energy if the commitments are fully implemented. Please see IISD, 2023, **Putting Promises Into Practice: Clean Energy Transition Partnership signatories' progress on implementing clean energy commitments**.

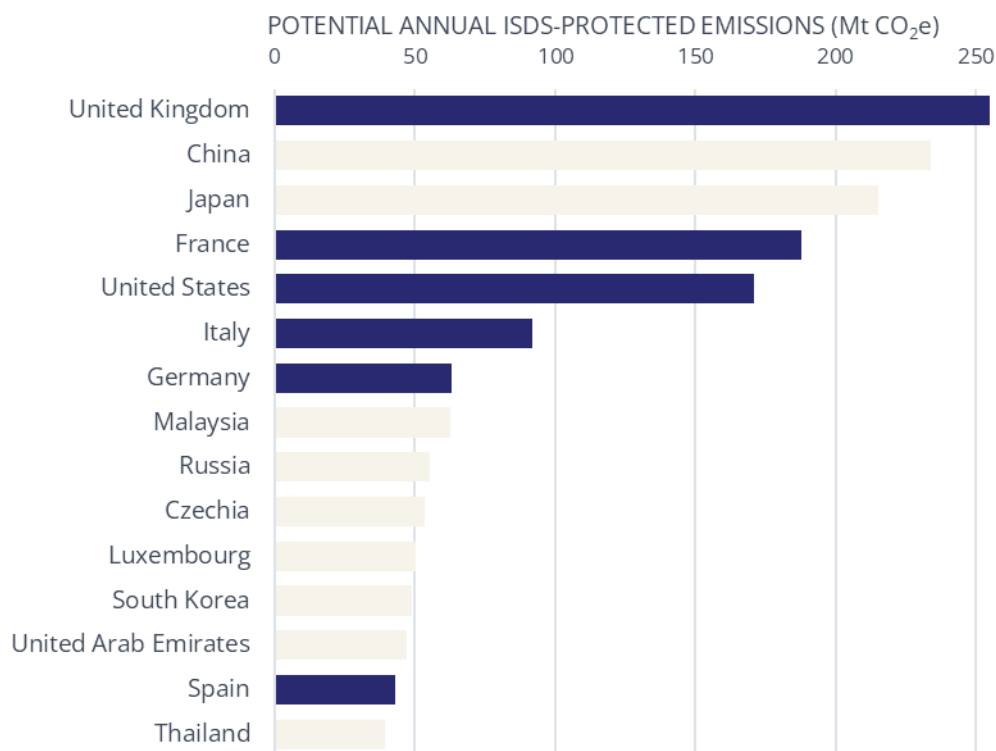
³⁹ While the UK has been leading the CETP by initiating the Glasgow Statement at COP21 in 2021, France also launched the Export Finance for Future (E3F) coalition in the same year.



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ISDS claims that could be made against Colombia, which has become a friend of BOGA, 22% could be made by parent companies headquartered in France and Spain.

Six of the top 15 countries by amount of greenhouse gas emissions protected are members of the Clean Energy Transition Partnership



Source: Analysis by E3G. Aggregated data using Rystad Energy's UCube and Global Energy Monitor's GCPT, GCMT & GOGPT



Figure 6: Countries committed to ending direct public finance support for overseas fossil fuel projects through the CETP still provide indirect protection of private investment by fossil fuel investors through ISDS.

Powering Past Coal Alliance (PPCA)

Globally, 60 national governments have joined the PPCA and committed to phase out unabated coal power generation by a specific date. However, investment treaties can affect the ambition of some of these national governments due to the potential risk of ISDS claims against the early retirement of coal plants.



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We found that over a quarter of the national governments that are members of the PPCA have domestic coal plants that are covered by ISDS provisions. As a result, 26.2% of the total global number of potential ISDS claims by parent companies with investments in coal plants could be made against national governments that have signed up to the PPCA. These potential claims protect 140.7 Mt CO₂e of potential annual GHG emissions from coal power generation.

National governments who are PPCA members have an opportunity to further accelerate the transition from coal power generation by reforming ISDS.



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CHAPTER 4

RECOMMENDATIONS

Our findings show that the richest nations that are expected, and claim, to lead global efforts to tackle climate change are in fact risking the energy transition of other countries by protecting fossil fuel assets via ISDS. Investment treaties with ISDS are misaligned with other international efforts to achieve net zero emissions.

As Mary Robinson, former President of Ireland and former United Nations Climate Envoy, succinctly put it:

“Governments cannot sign up to the Paris Agreement and other elements of the UNFCCC process and expect financial markets and business to align with climate objectives if the same governments continue to provide benefits to fossil fuel investment through the backdoor. We need to stop this cognitive policy dissonance!”⁴⁰

Without also tackling investment treaties, efforts to phase out fossil fuels and redirect international financial flows to support net zero ambitions will have a limited impact. Countries with climate ambition need to lead the investment treaty reform to remove the financial protection offered to fossil fuel assets.

However, countries are still far from taking concrete actions to reform investment treaties. Even the countries that have already withdrawn or decided to withdraw from the ECT have yet to seriously consider reforming other investment treaties.

Multilateral fora have been discussing investment treaty reform from different perspectives, but the discussions are not moving fast enough to address the climate urgency. Since 2021, the OECD has led discussions on the net zero alignment of investment treaties, which has helped to raise awareness of the

⁴⁰ The Elders, 2024, **Investment treaties must be aligned with climate goals**



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impact of investment treaties on climate.⁴¹ However, they are not at the stage of negotiating concrete outcomes yet.

Debates on procedural reform of ISDS have been ongoing since 2017 among a wider group of countries at the United Nations Commission on International Trade Law (UNCITRAL). Ultimately, the options on the table are too incremental to address the incompatibility between the investment treaty regime and climate action. UN Trade and Development (UNCTAD) has been a main forum to discuss investment treaty reform in the context of sustainable development, by providing analysis, capacity-building and a platform for discussions.

There are several reasons for the lack of progress in this policy area despite its importance:

1. Investment treaties have not been a part of wider climate discussions.
2. Some countries have more than 100 investment treaties in place and reforming investment treaties could be a daunting task, requiring lots of resources.
3. No reform option is a clear winner unless a country decides to adopt a principled stance against ISDS.
4. Bilateral investment treaties and free trade agreements are not sector-specific and would involve a wider range of interests than the ECT.

Despite these challenges, if the members of the G7 or climate initiatives such as CETP and BOGA are serious about honouring their climate commitments, they need to act on investment treaties. Countries that have already withdrawn or decided to withdraw from the ECT can ensure consistency in their climate ambition by tackling other investment treaties. Australia, Canada, and the United Kingdom should be more motivated to change the system because they are not only posing high ISDS risk to other countries but also highly exposed to inward risk.

Countries can start by:

1. Considering the options for investment treaty reform.
2. Collectively pursuing a plurilateral solution.
3. Bringing investment treaty reform to the forefront of climate discussions.

⁴¹ OECD, May 2024, **The Future of Investment Treaties**



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Investment treaty reform options

As a master of their own treaties, states need to ensure that reform efforts have legal certainty and an impact beyond making technical improvements. Reform options range from terminating treaties to upgrading treaty texts.⁴² States could eliminate ISDS risks to not only the global climate action but also broader public interest by taking a principled stance against ISDS in general. This includes terminating existing treaties or excluding ISDS in future treaties.⁴³

Carving out fossil fuel-related investment or climate measures from the coverage of investment treaties could be a way to quickly address ISDS risks to the energy transition given the climate urgency. However, such carve-out approaches could result in leaving in place other investments or measures that might still have an impact on climate action.

There are other options that could mitigate ISDS risks, although not eliminate them. They include limiting damages, reiterating states' right to regulate, or adopting environmental exception clauses. Capping the maximum amount of compensation that can be awarded could reduce the impact of ISDS on states' fiscal space. However, this approach would not remove financial protection fossil fuel investments. It is uncertain how effective inserting or strengthening certain provisions could be in restricting ISDS risks.

The need to pursue a plurilateral solution

It would be time-consuming and resource-draining for countries to tackle each treaty individually given the breadth of the existing investment treaty networks. In addition, some countries might worry about being seen as disruptive or investor-unfriendly if they made the first move to depart from the existing practice. Therefore, changes are more likely to happen if a group of countries work together.

The first step would be to share an understanding that the current investment treaty regime is incompatible with the global energy transition. Then the

⁴² Please see Centre for International Environmental Law (CIEL), January 2024, **A toolkit to safeguard fossil fuel measures from investment treaty claims** for a wide range of reform options in more detail: options to remove ISDS risks, to mitigate risks and to respond to risks.

⁴³ Australia and New Zealand have decided not to include ISDS in future treaties.



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countries can collectively agree to a reform option that addresses the incompatibility and create a plurilateral instrument to modify bilateral treaties among themselves. Once a group of countries sets a norm, it is likely that more countries might join such an instrument.

Bringing investment treaty reform to climate discussions

Integrating the investment treaty reform agenda in wider climate discussions at G7/G20 and UNFCCC processes can raise the visibility of the issue in the climate community. Therefore, we recommend that countries that have been spearheading climate action bring the investment treaty reform agenda to multilateral climate discussions. By doing so, they can build political support to reform the investment treaty regime in line with climate goals and initiate discussions on plurilateral action among like-minded countries. Countries like the United Kingdom and France can use the upcoming COP29, which will focus on climate finance, as an opportunity to start this process, and Canada can use its G7 Presidency in 2025 to shape the agenda.



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ANNEX A

SUPPLEMENTARY MATERIAL ON METHODOLOGY

This annex contains a detailed methodology for the analysis of global fossil fuel assets protected by investor–state dispute settlement (ISDS) mechanisms and the associated greenhouse gas (GHG) emission estimates.

Selection of relevant investment treaties

To determine whether an investment treaty with ISDS provisions exists between two countries, we built a database of investment treaties with ISDS provisions.

To do so, we extracted all investment treaties, either bilateral investment treaties or other treaties with investment provisions, from the UN Trade and Development (UNCTAD)'s International Investment Agreements Navigator.⁴⁴ At the time of import, the database contained 3,837 treaties, categorised as either signed but not in force, in force, or terminated.

Among these treaties, we first excluded those that:

- > Were signed before 1 January 2018 but never came into force, assuming that the probability of future enforcement is low.⁴⁵
- > Were replaced by a new treaty or terminated by mutual agreement, assuming that parties would have nullified the sunset clause.
- > Have expired or were unilaterally terminated if the sunset clause is no longer applied.

⁴⁴ UNCTAD, **International Investment Agreements Navigator**, last accessed: December 2023.

⁴⁵ We found that over 96% of treaties that were signed in the last ten years and are currently in force were ratified less than five years after signature.



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Then, we excluded the following treaties, based on ISDS inclusion:

- > Treaties where “mapping” information in the UNCTAD database showed that the treaty does not provide access to ISDS.
- > All framework, association and cooperation agreements, since these agreements tend to have limited investment-related provisions.⁴⁶
- > All treaties signed by Brazil since 2015 as it developed an alternative treaty model that excluded ISDS.
- > Treaties where “mapping” information was not available, but we manually verified the exclusion of ISDS.⁴⁷

This resulted in a database of 2,463 treaties with ISDS provisions.

We unpacked the signatories of each treaty to create a spreadsheet of bilateral relationships. If there is at least one treaty with ISDS provisions between two countries, we considered investments between these countries as being covered by ISDS provisions. If a treaty with ISDS has been unilaterally terminated but its sunset clause is still effective, we assumed that an asset operating currently or operating in the future would still have ISDS access at the date of termination of the treaty.

Scope of fossil fuel assets

To map the global coverage of ISDS-protected fossil fuel assets and their associated greenhouse gas (GHG) emissions, we needed data on annual production, status of operation, and start year, as well as information about ownership including parent company, ownership shares and the nationality of the parent company.

We based our analysis on the publicly released databases by Global Energy Monitor (GEM) and Rystad Energy’s UCube database. GEM has published several trackers on different types of fossil assets at the global level:

⁴⁶ This approach was used in a similar analysis conducted previously. See Kyla Tienhaara and Lorenzo Cotula, 2020, **Raising the cost of climate action? Investor-state dispute settlement and compensation for stranded fossil fuel assets**.

⁴⁷ In rare cases where it was not possible to verify ISDS inclusion due to language barrier or unavailability of the official text, we assumed that ISDS is included. We did not look at substantive provisions or details of the ISDS provisions.



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-
- > coal mines, and oil and gas fields
 - > coal terminals, LNG terminals, gas pipelines, and oil and LNG pipelines
 - > coal-fired power plants and oil- and gas-fired power plants.

We based our analysis on three trackers: Global Coal Mine Tracker,⁴⁸ Global Coal Plant Tracker,⁴⁹ and Global Oil and Gas Plant Tracker.⁵⁰ We did not include the other types of fossil assets in our analysis due to incomplete ownership data in those trackers and the complexity of estimating GHG emissions from midstream assets.

E3G worked with WWF-Norway to analyse upstream oil and gas extraction using Rystad Energy's UCube, which is their global asset-level oil and gas upstream database.

Our analysis comprises the following types of fossil fuel assets:

- > oil fields
- > gas fields and gas-condensate fields
- > oil and gas plants
- > coal plants
- > coal mines.

Status of assets

The GEM trackers categorise assets as having different statuses, such as proposed, operating, cancelled, mothballed, retired and shelved.⁵¹ We included all assets from announced to operating stages, assuming that the announced assets would go ahead. We excluded assets that were cancelled, mothballed, retired and shelved.

Rystad Energy's UCube also categorises assets based on different stages of their life cycle. For consistency with the GEM trackers, we included assets that had the status 'discovery', 'under development', and 'producing'.

⁴⁸ GEM **Global Coal Mine Tracker**, released October 2023. We incorporated some updates that we acquired via private communication with GEM.

⁴⁹ GEM **Global Coal Plant Tracker**, released January 2024.

⁵⁰ GEM **Global Oil and Gas Plant Tracker**, released August 2023.

⁵¹ GEM labels a project as "shelved" if there is a period of inactivity for more than two years.



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Mapping ISDS coverage of fossil fuel assets

Ownership of assets

Foreign investors can bring ISDS claims if their home country and the country where they made investments have an investment treaty with ISDS between them. Where possible, we aimed to provide ownership information of the parent company of the fossil fuel asset. We assumed the home country of an investor is where the parent company is headquartered. We excluded an asset if the tracker did not have data on who the parent company was.

GEM's Coal Mine Tracker has built-in data on the country location of the parent company's headquarters.

The Coal Plant Tracker has built-in data on which parent company owns the coal-powered power plant, but not on the country location of the parent company's headquarters. We used the following method to identify the headquartered location:

- > We referred to another GEM tracker, Global Ownership of Coal-fired Power Capacity (MW), which contains data on the headquartered location and registered location of parent companies. We used the registered location if the headquartered location was not available.⁵²
- > We referred to GEM's internal database if it had information on the relevant parent company.
- > If the information was not available, we searched for the company using the Global Legal Entity Identifier Foundation's (GLEIF's) Legal Entity Identifier Services and the London Stock Exchange Group's (LSEG's) PermIDs.⁵³ Otherwise, we manually checked by searching for the parent company online.

The Oil and Gas Plant Tracker does not have data on the country location of the parent company's headquarters. We used the following method:

- > We referred to GEM's internal database if it had information on the parent company. If not, we searched for the company using GLEIF's Legal Entity

⁵² GEM, 2024, [Global Coal Plant Tracker – Summary Tables](#).

⁵³ GLEIF, [LEI Search](#); LSEG, [PermID](#).



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Identifier Services and LSEG's PermIDs.⁵⁴ Otherwise, we manually checked by searching for the parent company online.

In some cases, an asset is owned by multiple entities. GEM trackers generally have data on ownership shares. However, when ownership share data was unavailable, we assumed equal ownership between different parent companies.

Rystad Energy's UCube database includes data on the headquartered country location of companies with an ownership share in an oil or gas field. The listed companies have two categories of ownership: consolidated and equity affiliates. A company was listed as an equity affiliate if it was an owner of one or more of the consolidated companies listed as having an ownership share in that asset. To ensure comprehensive coverage of ownership, we researched the ownership share of the equity affiliate in the consolidated company to recalculate the ownership share for that asset.

Country ownership of assets

If there was more than one owner of an ISDS-protected fossil fuel asset, we aggregated the ownership data on a country level. For instance, if two parent companies headquartered in the same country each had an ownership share of 20% in an ISDS-protected fossil fuel asset, that country's protection of this asset would be recorded as 40%.

Potential number of ISDS claims

The potential number of ISDS claims per fossil fuel asset it comprised of the number of parent companies with an ownership share in a fossil fuel asset.

For instance, if five parent companies each had an ownership share in a fossil fuel asset and an investment treaty with ISDS provisions existed between the headquartered locations of the parent companies and the country location of the fossil fuel asset, we would record the country location of the asset as being vulnerable to five potential ISDS claims.

⁵⁴ GLEIF, [LEI Search](#); LSEG, [PermID](#).



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Estimating annual GHG emissions of ISDS-covered assets

We calculated annual GHG emissions by multiplying annual production by emissions factors and using GEM's methodologies based on the type of fossil fuel asset.

Coal, oil and gas plants

Annual production

We calculated the plant's annual production by multiplying the plant's generation capacity data by 8760 (the number of hours in a day multiplied by the number of days in a year). No plant can produce power all of the time so to estimate annual production (MWh), we multiplied this annual generation capacity by a capacity factor.⁵⁵

$$Annual\ Production_{MWh} = (Capacity_{MW} \times 8760) \times Capacity\ Factor\%$$

We used capacity factors set out by GEM's respective methodologies for coal plants and oil and gas plants. For coal plants, a global average capacity factor of 53% was used.⁵⁶ For oil and gas plants, GEM methodology provided a country-level or regional capacity factor based on Ember's yearly electricity generation data release.⁵⁷

Emissions factors

For coal plants, we used GEM's built-in estimation of CO₂ emissions. Their methodology for estimating CO₂ emissions from coal plants is based on a plant's capacity, the plant's capacity factor, heat rate of plant, and the emissions factor of the type of coal used in the plants.⁵⁸

For oil and gas plants, GEM's methodology for estimating annual CO₂ emissions only covered gas plants. We adapted their methodology to cover both oil and gas plants. The annual CO₂ emissions of an oil and gas plant can be calculated using the following formula:

⁵⁵ A capacity factor is the ratio of actual or estimated generation produced to the maximum possible generation that could be produced.

⁵⁶ GEM, 2023, [Estimating carbon dioxide emissions from coal plants](#)

⁵⁷ GEM, 2023, [Estimating carbon dioxide emissions from gas plants](#)

⁵⁸ GEM, 2023, [Estimating carbon dioxide emissions from coal plants](#)



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$$\text{Annual Production}_{TJ} = \frac{\text{Annual Production}_{MWh} \times 3600}{10^6}$$

$$\text{Annual Emissions}_{Mt CO_2} = \frac{\text{Annual Production}_{TJ} \times \text{Emissions Factor}_{kg/TJ}}{10^9}$$

The default CO₂ emissions factors for combustion established by the Intergovernmental Panel on Climate Change (IPCC) in their 2006 IPCC Guidelines for National Greenhouse Gas Inventories provide a range of constants for calculating emissions using units of energy (TJ).⁵⁹

Firstly, we matched the fuel types in the GEM database for oil and gas plants with the fuel types in the 2006 IPCC Guidelines. The default value of the effective CO₂ emissions for each fuel type can be found in Annex B. GEM's database includes one or more fuel types for each plant, but data on the primary fuel used by a plant is not available. Where a plant uses more than one fuel type, we assumed that a plant used those fuel types equally. If a plant co-fired with a biomass or biofuel source, we excluded this plant from our analysis.⁶⁰

We calculated the emissions factor by adding together the default values of the effective CO₂ emissions for a plant's fuel types and divided the total by the number of fuel types used by the plant.

Finally, the annual CO₂ emissions (kg) were calculated by multiplying annual production converted to terajoules (TJ) by the appropriate default value of the effective CO₂ emissions. The annual emissions were converted into million tonnes by dividing the figure by a billion.

We do not account for the type of combustion technology used by a plant, due to a lack of data on technology type for both oil and gas plants. The methodology therefore only takes into account CO₂ emissions, which are independent of combustion technology as outlined in the IPCC 2006 Guidelines.⁶¹ We do not include estimates of other GHG emissions such as CH₄ and N₂O, which are strongly dependent on the combustion technology.

As such, our estimate provides a more conservative estimate than GEM's methodology for gas plants, which take into account other GHG emissions based

⁵⁹ IPCC, 2006, **2006 IPCC Guidelines for National Greenhouse Gas Inventories**, pp. 1.21 – 1.22.

⁶⁰ This exclusion results in three entries being excluded.

⁶¹ IPCC, 2006, **2006 IPCC Guidelines for National Greenhouse Gas Inventories**, p. 1.6.



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on the assumption of median life cycle emissions of a combined cycle (CC) gas-fired power plant.

Coal mines

The GEM Coal Mine Tracker has estimated data on annual coal mine methane emissions in million cubic metres (mcm/yr) per mine, which is based on production, gas content at mining depth, and emissions factor coefficient. Coal mine methane refers to methane released from the coal and surrounding rock strata due to mining activities.⁶²

6% of coal mines did not have annual production data and therefore methane emissions data was also unavailable, in which case we did not include the asset in the calculation.⁶³

To convert CH₄ (mcm/yr) into Mt CO₂e, we used the following formula.

$$Annual\ Emissions_{Mt\ CH_4} = \frac{(Annual\ Emissions_{mcm\ CH_4} \times CH_4\ Density)}{1000}$$

$$Annual\ Emissions_{Mt\ CO_2e} = Annual\ Emissions_{Mt\ CH_4} \times GWP_{20}$$

We used 0.6666 (kg/m³) for CH₄ density⁶⁴ and 82.5 for the value of a 20-year GWP.⁶⁵

Oil and gas fields

Annual production

Rystad Energy's UCube provides a figure for "production" in a given year, which is the estimated number of million barrels of oil (mbl) that are likely to be extracted but not technically recoverable resources. For oil and gas fields whose status was categorised as "producing", we used the production data for 2024. For oil and gas fields with the status of "discovery" or "under development", we

⁶² GEM, 2023, **Estimating methane emissions from coal mines**

⁶³ 94% of coal mines in GEM's tracker were covered.

⁶⁴ The IPCC take the density of CH₄ at 20°C and 1 atmosphere pressure for their conversion factors when estimating the fugitive emissions from mining, IPCC, 2006, Vol. 2, **2006 IPCC Guidelines for National Greenhouse Gas Inventories**, pp. 4.12 – 4.13. The value of 0.6666 for CH₄ density was derived from IPCC, 1996, Vol. 3, **Revised 1996 IPCC Guidelines for National Greenhouse Gas Industries**, p. 1.124.

⁶⁵ IPCC, 2021, Ch. 7, **The Earth's Energy Budget, Climate Feedbacks and Climate Sensitivity**, p. 1017.



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divided the sum of an asset's total projected production data by the number of active years of an asset.⁶⁶

Emissions factors

The IEA provides emissions factors for oil and gas production per barrel (bbl) or barrel of oil equivalent (boe) based on the real production and greenhouse gas emissions data in 2022. In 2022, 105 kg CO₂e was emitted on average for each barrel of oil produced, based on the CO₂ emissions from extraction, processing, refining, transport, gas flaring, and fugitive and vented CH₄ emissions. The estimate for the average per barrel of oil equivalent (boe) for natural gas was 65 kg CO₂e, based on extraction, processing, transport, and fugitive and vented CH₄ emissions. These emissions do not include combustion stage and account for 20% and 15% of the full life cycle emissions intensity of oil and natural gas production.⁶⁷

These emissions factors were based on a 100-year global warming potential (GWP), whereas our analysis is based on a 20-year GWP. We adapted the IEA emissions factors using the data provided in their report by:

- > Using the IEA's total emissions for 2022.
- > Deducting the emissions from CH₄ from the total emissions.
- > Multiplying the emissions from CH₄ by 82.5 (20-year GWP).⁶⁸
- > Dividing the total GHG emissions for oil and gas based on a 20-year GWP by the total emissions based on a 100-year GWP to create a ratio.
- > Multiplying the IEA's emission factors by the ratio to arrive at an adapted emissions factor.

This process resulted in an emissions factor based on 20-year GWP of 175.77 kg CO₂e for each barrel of oil (bbl) produced and 139.62 kg CO₂e for each barrel of oil equivalent (boe) of natural gas.

Finally, to calculate the annual emissions of each oil and gas field, we multiplied the adjusted emissions factor by a million to reflect how Rystad Energy record

⁶⁶ "Active year" was defined as a production year greater than zero.

⁶⁷ IEA, June 2023, **Emissions from Oil and Gas Operations in Net Zero Transitions**, p. 9

⁶⁸ IPCC, 2021, **The Earth's Energy Budget, Climate Feedbacks and Climate Sensitivity**, in *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, ch. 7, p. 1017



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production data in million barrels of oil produced. Annual emissions were calculated by multiplying the adjusted emissions factor by the annual production of each field.



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ANNEX B

DEFAULT VALUES OF THE EFFECTIVE CO₂ EMISSIONS BY FUEL TYPE

The values in the table below are used in the calculation of emissions for oil and gas plants, based on the fuel types listed in the GEM database for each plant. See Annex A for the methodology.

Fuel type ⁶⁹	GEM abbreviation	Default values of the effective CO ₂ emissions (kg/TJ) ⁷⁰
Natural gas	NG	56,100
Liquified natural gas	LNG	62,400
Blast furnace gas	BFG	260,000
Coke oven gas	COG	44,400
Coal	C	94,600
Crude oil	CR	73,300
Diesel	D	74,100
Fuel oil	FO	74,100
Heavy fuel oil	HFO	74,100
Light fuel oil	LFO	74,100
Petroleum coke	COKE	97,500

⁶⁹ The fuel types listed are the fuel types for oil- and gas-powered power plants in **GEM's Global Oil & Gas Plant Tracker**. "Waste heat", "bioenergy – unknown", "refuse (municipal and industrial wastes)", "paper mill wastes", "refuse (landfill gas)", "agricultural waste (biogas)", "wood & other biomass (solids)", "coalbed methane", "gas (unknown)", and "other" were excluded from our analysis due to the lack of ISDS coverage, the lack of a corresponding fuel type in **2006 IPCC Guidelines for National Greenhouse Gas Inventories**, or the fuel type being a biogenic fuel source.

⁷⁰ Values taken from the **2006 IPCC Guidelines for National Greenhouse Gas Inventories**, pp. 1.23–1.24. If an exact match could not be made between the fuel types in GEM's GOGPT and the 2006 IPCC Guidelines, we chose the value of a near match.



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Fuel type ⁶⁹	GEM abbreviation	Default values of the effective CO ₂ emissions (kg/TJ) ⁷⁰
Jet fuel	J	71,500
Liquified petroleum gas	LPG	63,100
Naphtha	N	73,330
Gasoline	G	69,766
Waste/other oil	WO	73,300
Kerosene	KER	71,900
Gaseous propane	PG	56,100