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TESS Forum on Trade, Environment, & the SDGs

E3G

Energy Transition

Trade, Climate, and Net Zero Pathways: Scenarios and Implications for Developing Countries and Climate-Resilient Development

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TESS Forum on Trade, Environment, & the SDGs

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About This Series of Sectoral Briefing Notes

This briefing note is part of a series of sectoral notes commissioned by TESS intended to inform a final report on *Trade and climate scenarios on the road to 2050: Implications for developing countries and climate-resilient development.*

The series and the report aim to provide an overview of current and anticipated transformations in trade on the road to 2050 in the context of the unfolding climate crisis and the international community's climate action agenda and to discuss potential scenarios and implications for developing countries.

A wider objective of the series is to contribute to a better understanding of emerging trade and trade policy trends and dynamics and their implications within the various sectors, with a focus on supporting developing countries in identifying and advancing their climate change trade-related interests and priorities in international discussions.

The sectors covered in the series include agriculture, carbon markets, critical minerals, digital trade, fisheries, fossil fuels, heavy industries, renewable energy, textiles, tourism, and transport, each authored by experts in these respective fields.

Abbreviations

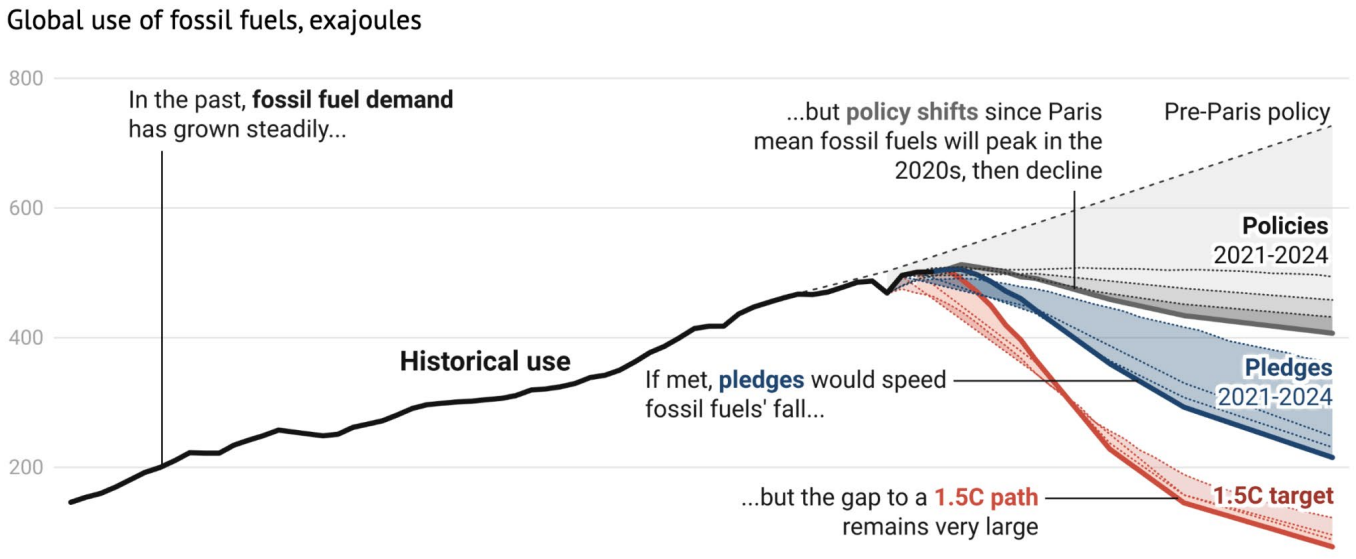
ACCTS	Agreement on Climate Change, Trade and Sustainability
BCA	Border Carbon Adjustment
CBAM	Carbon Border Adjustment Mechanism
CETP	Clean Energy Transition Partnership
COP	United Nations Climate Change Conference
ECT	Energy Charter Treaty
EU	European Union
EV	Electric Vehicle
GDP	Gross Domestic Product
IEA	International Energy Agency
IMF	International Monetary Fund
ISDS	Investor-State Dispute Settlement
OECD	Organisation for Economic Co-operation and Development
NZE	Net Zero Emissions by 2050 (Scenario)
UK	United Kingdom
US	United States
WTO	World Trade Organization

1. Energy Transition and the Trade, Climate, and Sustainable Development Nexus

Preventing climate change requires a radical phase down of the production and use of oil, gas, and coal. Fossil fuels contribute over 90% of global carbon emissions through their extraction, processing, and burning—fuelling warmer temperatures and more frequent extreme weather events globally (Global Carbon Project, n.d.; UNEP, 2023a). Meeting the Paris Agreement goal of limiting global warming to 1.5°C requires the world to halve global greenhouse gas emissions by 2030 and reach net zero emissions by 2050. To achieve this, fossil fuels must drop from 80% to 16% of the global energy supply, according to the International Energy Agency's (IEA) Net Zero Emissions by 2050 Scenario (NZE Scenario).[1]

The energy transition is happening faster than expected, driven by a mixture of economic, energy security, and climate concerns. This is marked by record growth in renewable energy and the electrification of transport and heating sectors. Energy efficiency improvements in key sectors such as artificial intelligence (AI) chips are also rapidly transforming global energy demand. Major economies, such as the European Union (EU) and China, are reducing demand faster than planned.[2] However, current efforts are insufficient to avoid severe climate impacts. Global carbon emissions from the energy sector are still on the rise and the effects are on full display in proliferating heatwaves, forest fires, and floods. Without faster reductions in fossil fuel use, global temperatures are on track to rise by 2.4°C by the end of the century. Governments must implement stronger policies to accelerate the decline in fossil fuel use.

Figure 1. The IEA predicts demand for all fossil fuels will peak by 2030 under current policies—but stronger action is needed to reduce oil and gas use after that



Source: Carbon Brief (2024) using IEA (2024c) data.

1. Around one-third of the remaining fossil fuel demand in the NZE Scenario is fully abated, around half is used as a feedstock or in other non-energy use, and the remainder is offset by direct air capture, negative emissions from bioenergy, or other forms of carbon removal (IEA, 2023b).
2. EU demand for oil and gas is set to fall 80% by 2050, depriving many of their key suppliers with government revenue and foreign exchange (Walker et al., 2024).

This shift will reshape geopolitics and transform global trade and finance flows. International power dynamics will change as fossil fuel exporters lose market and political leverage. The growth in renewable energy supply chains and critical minerals will shift trade flows and countries' competitive advantages in the energy sector. Global trading practices will also transform, given fossil fuels are currently used in 99% of international shipping and form 40% of maritime cargo (by volume) (IEA, n.d.; Barnard, 2023). And trade is likely to become more regionalized, affecting the structure and resilience of international supply chains.

These changes are likely to have a disproportionate impact on emerging markets and developing economies. While advanced economies are rapidly progressing in the clean energy transition, many emerging markets and developing countries still face significant barriers, including high capital costs, project risks, and high levels of debt. Meeting global goals will require the massive scale up of finance and support to developing countries with growing energy demands and countries dependent on fossil fuel rents for their development.

Trade policy has a vital role to play in delivering the energy transition in developing countries. This includes reducing the cost of clean technologies, driving private capital into green industries, and addressing market distortions which hinder decarbonization efforts. International coordination is essential to reduce trade-related tensions and ensure developing country interests are supported. Initiatives such as the EU's Carbon Border Adjustment Mechanism, methane regulations, and the United States (US) Inflation Reduction Act highlight the potential for trade policies to accelerate change—but they will also create new legal challenges and provoke wider tensions if they are not carefully designed and coordinated.

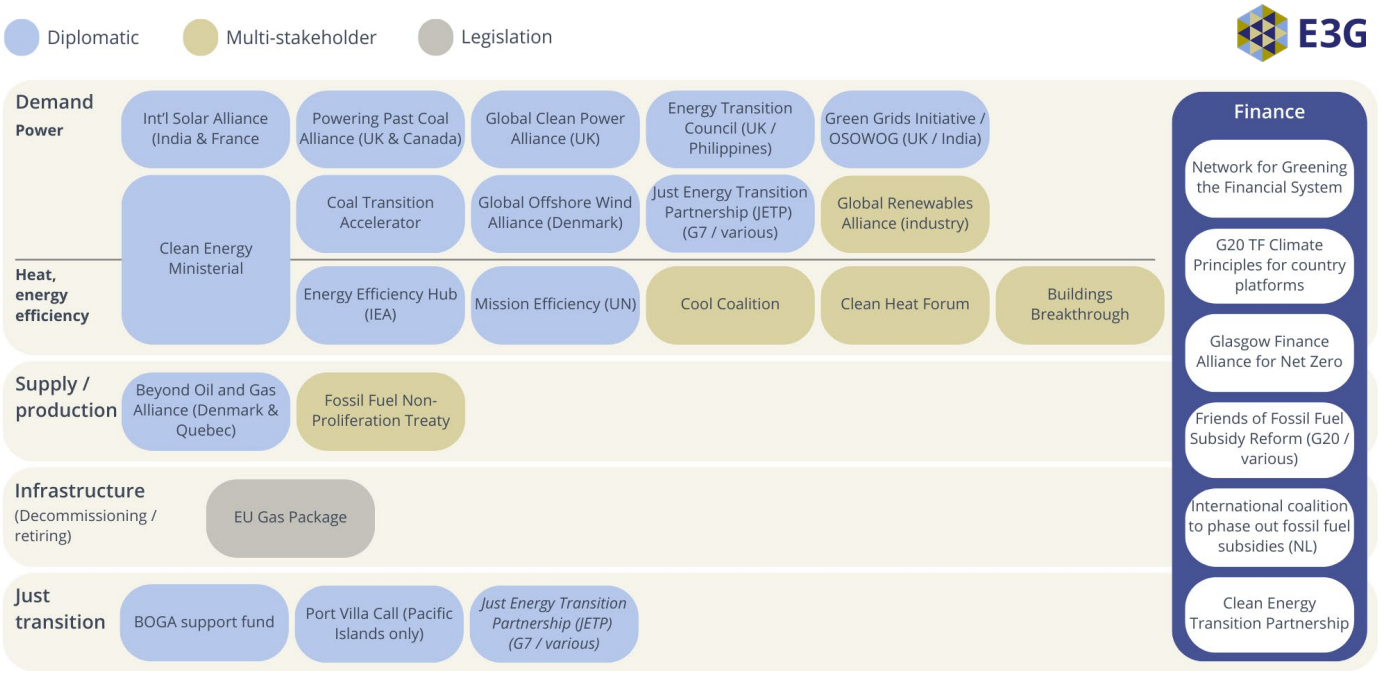
2. Climate Action and Impact Scenarios in the Energy Transition

Global agreements and multilateral action have played a role in driving the transition. For decades, climate policies and international agreements have focused on reducing demand for fossil fuels through energy efficiency and building out renewable energy capacity. The 2023 United Nations Climate Change Conference (COP28) marked a turning point, when almost 200 governments committed to transition away from fossil fuels in energy systems "in an orderly, just and equitable manner" as part of the first Global Stocktake (known as the "UAE Consensus"). This agreement also includes commitments to triple renewables capacity and double energy efficiency by 2030, phase down unabated coal power, and phase out inefficient fossil fuel subsidies. However, challenges remain. Failure to agree how to take these commitments forward at COP29 in 2024 demonstrates the challenges of driving progress amid growing geopolitical tensions.

While diplomatic coalitions, such as the Powering Past Coal Alliance and Energy Transition Council, champion coal phase-out in key geographies, global action on gas and oil demand reduction is yet to emerge. The Danish-led Beyond Oil & Gas Alliance (BOGA) is mobilizing national and subnational champions to lead the phase out of production but is yet to recruit a major producer. The Fossil Fuel Non-Proliferation Treaty Initiative is calling for a binding global treaty to end the use and production of fossil fuels to complement the Paris Agreement.[3] Major producing countries still fail to acknowledge that the transition away from fossil fuels is about reducing production as much as reducing demand.

3. The group spearheaded by Tuvalu and Vanuatu have the support of 14 governments and over 100 sub-government level constituencies and institutions such as the European Parliament and World Health Organization (Fossil Fuel Non-Proliferation Treaty Initiative, n.d.).

Figure 2. Existing diplomatic initiatives to deliver the transition away from fossil fuels



Source: Adapted from Walker and Pastukhova (2024).

The G7 and G20 countries, as the group of the world's largest economies, should take a leadership role on stronger commitments to the wider transition away from fossil fuels, including ending public finance and fossil fuel subsidies.

The G7 have mainly focused on phasing out coal power generation and decarbonizing power systems. In April 2023, the G7 climate, energy, and environment ministers agreed to "accelerate the phase-out of unabated fossil fuels" so as to achieve net zero in energy systems by 2050 at the latest.[4] While countries have made progress on decarbonizing power, delivery risks remain, particularly in reducing reliance on gas. The G20 failed to mention the transition away from fossil fuels at the G20 Leaders' Summit in Brazil in 2024. The job now falls to the G7 Canada Presidency and G20 South Africa presidency to drive progress in 2025.

International public finance for fossil fuels is declining but is still far greater than support for clean energy.[5] Commitments to end new direct public finance support for overseas fossil fuel projects, such as export finance, have successfully cut finance up to two-thirds (by up to $15bn/year).[6] The challenge is now to repeat this with all international and domestic financing for fossil fuels, and ensure the finance goes to scaling up clean power, rather than being displaced into gas expansion as is happening at present. Meanwhile, fossil fuel subsidies remain at record levels, with public support from G20 countries almost doubling between 2019 and 2022 (Laan et al., 2023).

While the world now invests almost twice as much in clean energy as it does in fossil fuels, emerging market and developing economies outside China account for only around 15% of global clean energy

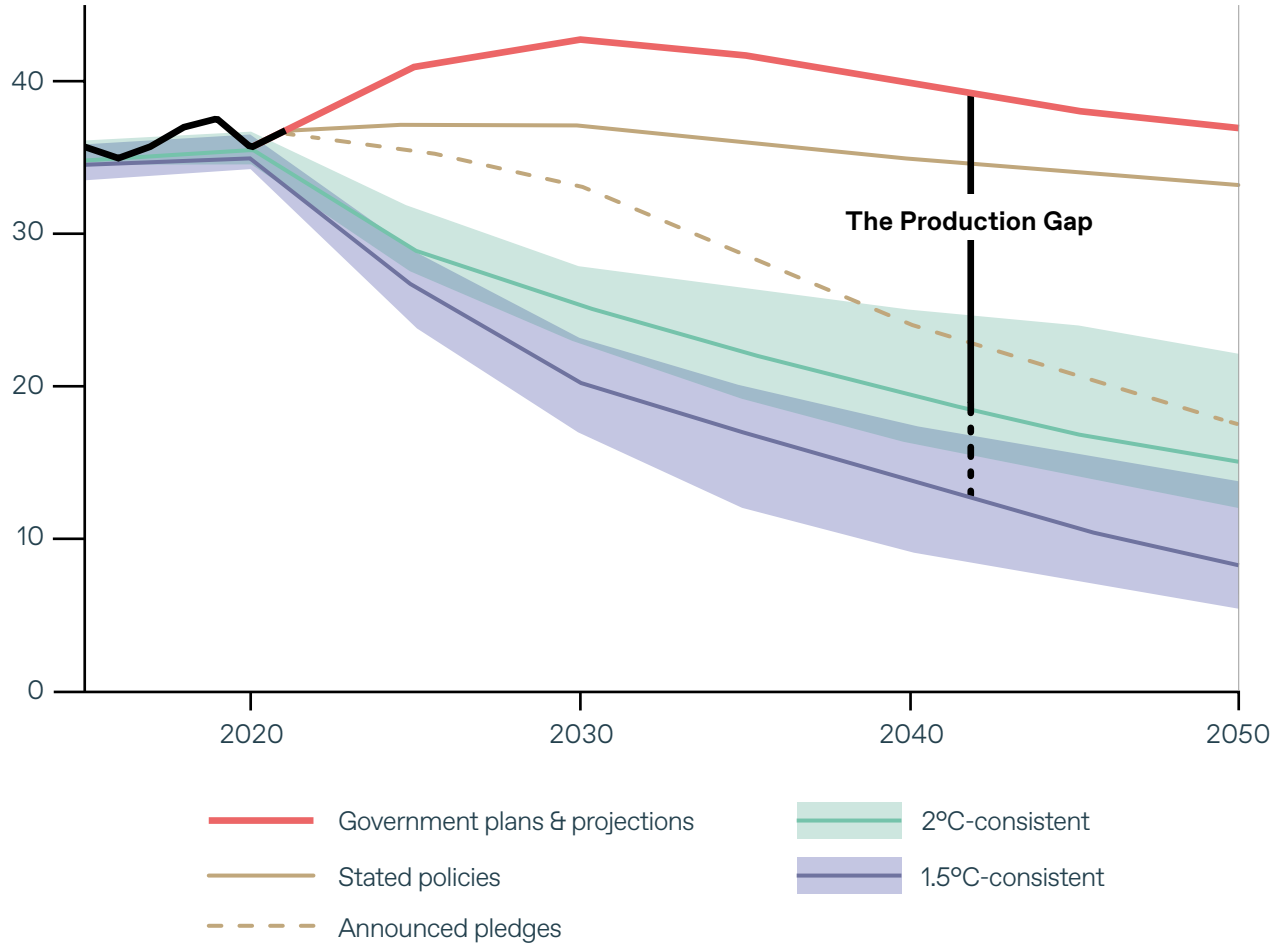
4. In 2024, G7 countries went further to reaffirm COP28 agreements and committed to "operationalizing our contribution to the global transition away from fossil fuels in energy systems, through the development and implementation of domestic plans, policies and actions [...] and call on others, particularly other major economies, to act likewise" (G7, 2024).
5. G20 and multilateral development bank public finance fell from $96 billion in 2013 to $43 billion in 2022 (Public Finance for Energy Database, n.d.).
6. In 2021, 34 countries and five institutions committed to end public international fossil fuel financing including Canada, Germany, Italy, the US, United Kingdom (UK), and France (CETP, n.d.). A similar pledge was then adopted by G7 leaders in 2022 (Harvey, 2022). If countries uphold the set of commitments made as part of the Clean Energy Transition Partnership (CETP) and the G7, fossil fuel finance will fall by a further 71% by the end of 2050 (Oil Change International, 2024).

spending. Upstream oil and gas investment is expected to increase by 7% in 2024 to reach $570 billion, following a 9% rise in 2023. This is being led by Middle East and Asian national oil companies (IEA, 2024b). According to the IEA, meeting COP28 energy goals requires a doubling of global clean energy investment by 2030 and a quadrupling in the developing world outside China.

Despite growing momentum, the world is not on track to limit warming to 1.5°C. While demand is set to peak in this decade, fossil fuel production plans far exceed the limits of a net-zero pathway, with countries like the US, Norway, and Gulf states leading oil and gas expansion. To meet global climate goals, governments must urgently scale up actions to phase out production as well as demand.

Figure 3. Governments plan to produce around 110% more fossil fuels in 2030 than the 1.5°C temperature limit allows

Global fossil fuel production, gigatonnes CO2 equivalent per year



Source: UNEP (2023c).

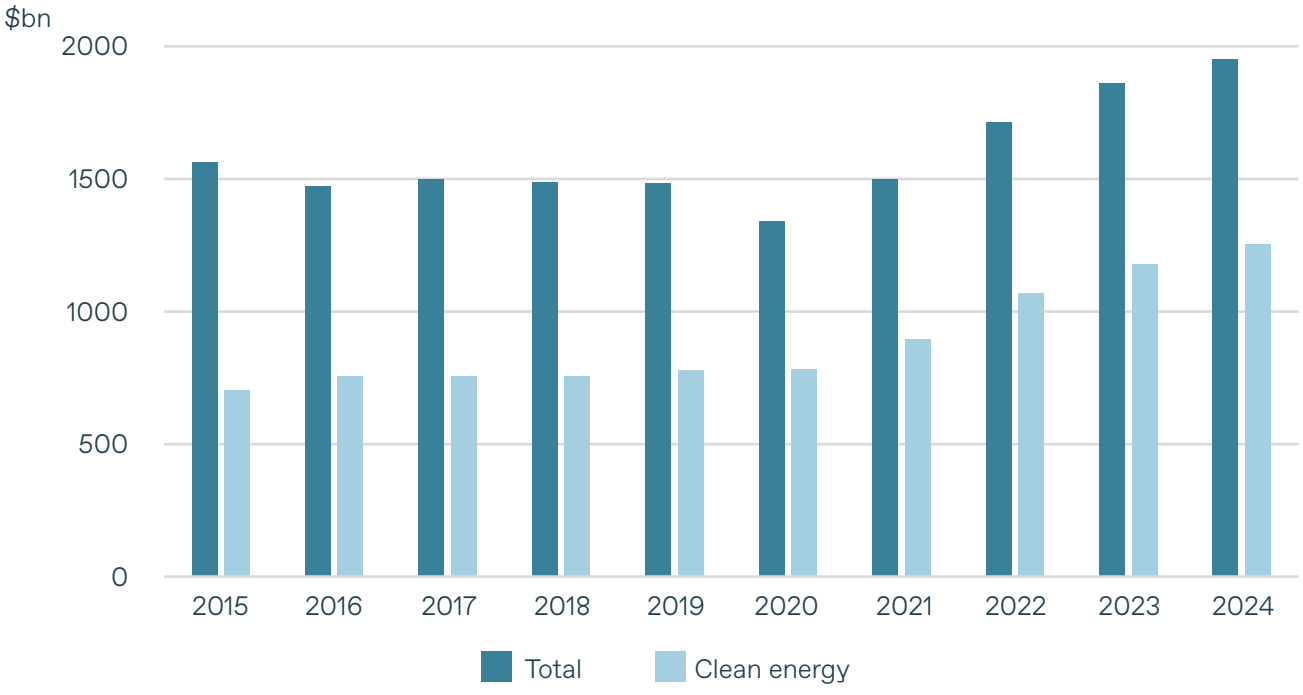
3. Trade Dynamics and Policy Solutions for the Energy Transition

Global trade has a vital role to play in driving action on climate change and transitioning the energy sector, and this is particularly true for heavily traded commodities that will be required to accelerate the global transition away from fossil fuels. As a result, evolving international trade dynamics will be a driving force behind both the pace and direction of the global energy transition over the coming decades. This means that trade policies can and should be used proactively as a tool to drive better outcomes in the energy sector, including for developing countries who face the greatest transition risk.

The Impact of Climate Change and the Energy Transition on Global Trade in Fossil Fuels

The global energy transition is already disrupting international trade patterns. As countries implement policies to transition their economies away from fossil fuel production and towards sources of renewable energy, the comparative advantage of trading partners will shift in response. Mitigation policies focused on reducing greenhouse gas emissions will also directly impact demand for fossil fuels globally, with international commitments to phase out fossil fuels expected to further decrease demand over the coming decades. Under the IEA's NZE Scenario, the share of global energy demand provided by fossil fuel imports could decrease from approximately 25% today to less than 10% in 2050 (IEA, 2024a). This would have significant implications for developing countries, many of which are currently heavily dependent on fossil fuel exports. As the transition accelerates, they will be forced to diversify their economies in order to seek alternative sources of income and will face tough competition from advanced economies who are already taking advantage of the growing renewable energy market globally.

Figure 4. Global investment in clean energy is rapidly growing and constitutes an increasing share of total global energy investment



Source: IEA (2024b).

As global demand for renewable energy continues to grow, countries that are already leading in the production of clean power technologies will benefit. The IEA (2023e) estimates that more than 90% of the increase in clean energy investment since 2021 has taken place in advanced economies and China, and that China will deploy almost four times more renewable energy than the EU (the second largest growth market) in the period from 2023–2028 (IEA, 2023c). This increasing capacity is also restructuring cross-border supply chains, as China continues to dominate the global market by exporting clean energy technologies to its trading partners at low cost. In the first half of 2023, exports of solar panels from China grew by 34% compared to the same period in 2022, with over half of these solar modules exported to Europe (Ember, 2023). This is also true for the production and processing of critical raw materials, which are key inputs used to manufacture renewable energy technologies. China currently accounts for approximately 60% of global production and 85% of global processing capacity of the minerals needed for the energy transition, including lithium, cobalt, and graphite (Logan, 2024). Building local refining and manufacturing capacities in these commodities will be essential for other developing economies to foster industrial growth opportunities and ensure equitable participation in global supply chains as the energy transition accelerates.

While the energy transition can create new trading opportunities for developing economies who are rich in renewable energy potential, many of these countries will struggle to capitalize on those opportunities due to significant investment barriers. Developing and emerging economies currently account for around two-thirds of the world's population but only one-fifth of global clean energy investment, which makes it difficult for those with higher fossil fuel dependencies to transition their economies and take advantage of changing global trade patterns (IEA, 2021). To take Africa as an example, it is estimated that the continent could have reserves of hydro, wind, and solar energy accounting for 13%, 18%, and 30% respectively of the world's total supply (GEIDCO, 2024). But despite having such significant potential for clean energy development, Africa only attracts around 2% of global renewable energy investment (IEA, 2023a). Building local value addition and driving capital investment into developing countries in Africa and around the world will therefore be crucial to help diversify clean energy supply chains and support the resilience of the global trading system going forward.

Evolving Global Trade Trends and Geopolitical Dynamics

The regionalization of global trade flows is also being accelerated by the transition to clean energy. Renewable energy sources are typically locally produced and consumed, which means that the demand for long-distance transportation of energy is likely to decrease over time. For example, approximately 85% of the global production of hydrogen gas is currently consumed on-site, largely due to the cost and logistical difficulty of transporting it over large distances (IRENA, 2022). As the clean energy transition accelerates, the IEA (2024a) estimates that the share of electricity in the global energy mix will increase from 20% in 2023 to over 40% in 2050, of which nearly 80% will be generated by domestic renewable sources like solar, wind, and hydropower. This shift will reduce the demand for fleets of oil tanks and LNG (liquefied natural gas) vessels, and instead require greater investment into energy infrastructure for the transportation of renewables, such as electricity grids that are equipped to handle variable energy supply. It is also likely to encourage countries to build industrial value in domestically or regionally sourced renewable energy sources, further reducing their reliance on international trade in the energy sector. These changes will significantly impact low-income and lower-middle-income countries, the vast majority of which are currently net importers of wind and solar components (Bridle, 2021). These economies often lack the necessary resources to rapidly diversify

their export base or develop alternative growth opportunities, meaning that they will also struggle to benefit from new global trade opportunities in higher-value clean technologies.

Rising protectionism globally is likely to increase the cost of the global energy transition and create an unequal playing field for developing economies. For example, in the electric vehicle (EV) industry, the use of industrial subsidies and other non-market practices in China has allowed Chinese EV manufacturers to produce vehicles at a 30–40% cost advantage versus European carmakers (Bailey, 2024). This has led to the EU, US and other G7 economies implementing tariffs of up to 100% on Chinese EVs in order to protect domestic industries from unfair competition (Aylett, 2024). As countries increasingly seek to leverage trade policy for economic security purposes, these additional tariff fees will increase the cost of manufacturing low-carbon technologies and could eventually result in higher prices for consumers. Further tariffs expected under the new US administration could exacerbate this problem, particularly if they are met with retaliatory tariffs from third countries.[7] The green industrial subsidies provided under the US Inflation Reduction Act also demonstrate the impact of protectionist policies in boosting domestic production in developed economies, with US solar module manufacturing capacity quadrupling between 2022–2024 (Wood Mackenzie, 2024). These interventions could not only increase the cost of the global energy transition, but the increased competition will also make it even more difficult for developing economies to transition their economies away from fossil fuels.

This growing tension is already starting to disrupt international cooperation on climate action and the wider energy transition, with developing countries expressing concern across multilateral venues that trade policy measures place an unequal burden on their economies, and therefore on their domestic energy transitions. At COP29, the BASIC group of countries (Brazil, India, China, and South Africa) tabled a proposal to discuss "climate-change related unilateral restrictive trade measures," citing concerns over disproportionate adverse effects on developing countries and increasing the cost of worldwide climate action (UNFCCC, 2024). Better international diplomacy and cooperative action is urgently needed to ensure fairer outcomes in this space, including calls for countries introducing carbon border adjustment mechanisms, such as the EU and UK, to provide increased support for developing countries to implement the required regulation. As the global energy transition accelerates, greater care must be taken to ensure that the production of clean technologies does not become a race to the bottom, and that developing countries receive adequate provisions to adjust and grow their green economies.

Trade Policy Solutions to Drive the Energy Transition

Given the role of trade in the energy transition, trade policy solutions should play an important part in addressing the challenges set out above. The following section evaluates a number of areas in which trade policy is being used to help drive the clean energy transition.

1. Market Access to Boost Clean Energy Competition
Rebalancing tariffs in line with climate ambition can help to make renewable energy solutions more accessible, affordable, and competitive in the global market. This is particularly important for developing countries, where tariff rates are typically much higher (UK Board of Trade, 2021). When assessing an illustrative list of environmental goods, the World Trade Organization (WTO) found that tariffs range from around 1.4% in high-income countries to 7.3% in low-income countries, with non-tariff measures following a similar pattern (WTO, 2022). Reducing these tariffs on renewable energy products could help to make them more affordable and therefore increase their uptake in developing economies, particularly if used alongside other taxation or subsidy policies to make fossil fuel alternatives more expensive in comparison.

7. Research from the London School of Economics suggests that initial tariff proposals by President Trump could reduce gross domestic product (GDP) in both the US and China by approximately 0.6% (Saussay, 2024).

Recent efforts to liberalize tariffs on environmental goods at the multilateral level have struggled, with the collapse of WTO negotiations on the Environmental Goods Agreement in 2016 (Benson, 2023). This was partly due to the difficulty in defining what constitutes an environmental good, with trade rules failing to properly distinguish between fossil fuel and renewable energy products. However, some progress has been achieved at the plurilateral level, with the recently signed Agreement on Climate Change, Trade and Sustainability (ACCTS) between New Zealand, Costa Rica, Iceland, and Switzerland committing to eliminate tariffs on over 300 environmental goods, including products required in the energy transition, such as wind turbine structures and raw materials used to manufacture solar panels (ACCTS, 2024).

However, trade liberalization alone will not necessarily generate environmental benefit without the accompanying support of other policies targeted at increasing the competitiveness of local economies. This could include introducing measures to reduce investment costs, providing servicing of renewable energy production technologies, and stimulating the creation of new markets both at the national and global level (UNCTAD, 2022). Increasing market access through reducing tariff barriers is therefore just one part of a wider solution.

2. Alignment of Technical Standards

Non-tariff measures such as emissions-based standards and product requirements are becoming an increasingly important factor in the market access conditions for renewable energy products. Between 2000–2017, energy efficiency regulations reduced energy-related emissions by 12% annually, with over 1,180 energy efficiency regulations notified to the WTO by over 70 members since 2009 (WTO, 2023). These notifications include developing countries, such as Indonesia's Minimum Energy Performance Standard for energy-utilizing household products (2021) and the Draft East Africa Standard (2022), which aims to harmonize energy performance requirements for lighting products across East African economies.

However, the divergence of standards across different jurisdictions can create trade barriers for exporters of clean energy products, particularly in developing countries where resources for regulatory compliance are often limited. Analysis by the Organisation for Economic Co-operation and Development (OECD) finds that divergent national standards constitute the main technical restriction for foreign investors in the wind energy sector—for example, South Africa has strict grid connection regulations which diverge from international norms, Brazil faces different environmental rules across different regions, and China requires all producers to meet strict test certifications (OECD, 2015).

Full harmonization of these standards is unlikely, due to the high level of economic integration that would be required. But closer alignment of technical standards could still help to streamline market entry and foster innovation in clean technologies, helping countries attract foreign investment and develop economies of scale. The WTO Agreement on Technical Barriers to Trade aims to ensure that standards and regulations do not create unnecessary obstacles to trade, including through transparency provisions and offering a space for members to discuss different approaches (Asmelash, 2023). Other international bodies such as the International Organization for Standardization (ISO) are taking action to improve harmonization and interoperability across clean energy value chains, such as the new technical specification for hydrogen technologies unveiled at COP28 in 2023 European Hydrogen Observatory, 2023).

Going forward, greater international cooperation should be prioritized to coordinate standard-setting efforts globally, promote mutual recognition of conformity assessment procedures, and adopt common methodologies for calculating emissions intensity. This will help to grow clean energy markets globally by providing greater certainty for investors.

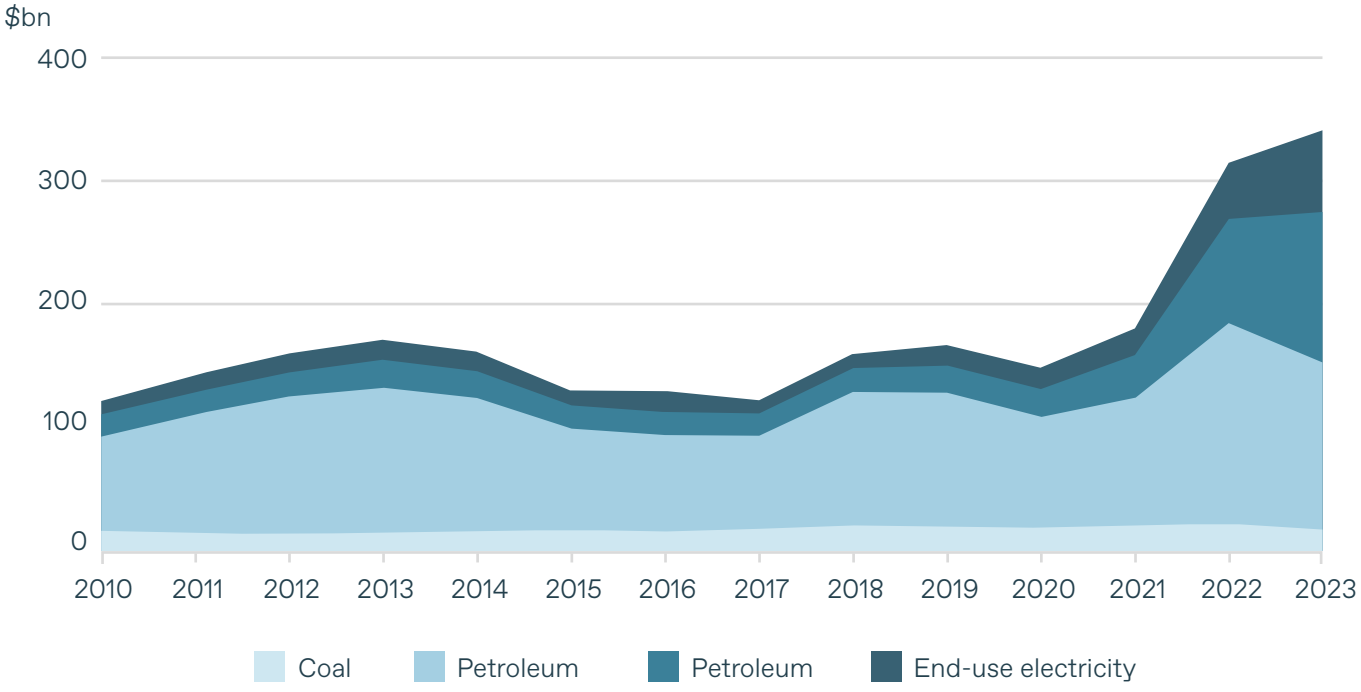
3. Fossil Fuel Subsidy Reform

Subsidies are one of the most controversial areas at the intersection of trade policy and the energy transition. Despite increasing commitments to phase out fossil fuels, national governments continue to subsidize their production, leading to counterintuitive outcomes. In 2022, public financial flows to fossil fuel production in G20 countries reached a record $1.4 trillion, more than double the amount in 2019 (Laan et al., 2023). When accounting for implicit as well as explicit subsidies, total subsidization of fossil fuels at the global level surges to $7 trillion, equivalent to 7.1% of global GDP (IMF, 2023). Fossil fuel consumption subsidies also increased following the recent energy crisis and are mainly concentrated in emerging markets and developing economies, with more than half of these in fossil fuel exporting economies (IEA, 2022).

The subsidization of fossil fuels runs counter to the energy transition, and while global investment into clean energy is also rising, greater subsidization of renewables is needed to accelerate the transition. Well-designed subsidies can counterbalance market failures by accounting for the positive externalities associated with renewable energy production and consumption, as well as levelling the playing field which has historically favoured fossil fuels.

One challenge here is that subsidies are currently assessed under the WTO's Agreement on Subsidies and Countervailing Measures based on their trade-distorting impact, rather than on their environmental consequences. And since renewable energy subsidies tend to have greater adverse effects on international trade flows than fossil fuel subsidies, this makes renewable energy subsidies more vulnerable to legal

Figure 5. Government spending on fossil fuels continues to rise globally



Notes: Data records government spending that provides a benefit or preference for the production or consumption of fossil fuels over alternatives, including budgetary transfers and tax expenditures.

Source: OECD (n.d.) Companion to the Inventory of Support Measures for Fossil Fuels (data updated November 2024).

challenges (Asmelash, 2015). Proposals to address this include introducing a "green box" to categorize subsidies that are sustainability-enhancing and would therefore be deemed permissible under WTO rules (Cima & Esty, 2024), but these ideas are yet to receive political buy-in and would require the consensus of all WTO members.

Another challenge for climate-resilient development is that even if renewable energy subsidies were to be legitimized under trade law, many developing countries would still have limited financial capacity to use them—either due to a lack of public funding or high debt burdens. Solving the legal dilemma would therefore mainly stand to benefit richer countries who can already afford to subsidize their domestic green industries and could therefore exacerbate the inequality created by the global subsidies race.

Despite these challenges, some progress is being made to level the playing field at the bilateral, plurilateral, and multilateral level. The WTO's Fossil Fuel Subsidy Reform initiative encourages members to share information to advance discussions on phasing out fossil fuel subsidies, and some novel trade agreements such as the EU-New Zealand Free Trade Agreement and the ACCTS (see below) include dedicated provisions committing to fossil fuel subsidies reform (European Commission). The Glasgow Climate Pact, signed at COP26, called for the first time for nations to phase down inefficient subsidies for fossil fuels as part of the commitment to reduce coal power (UNFCCC, 2021). And a new coalition formed at COP28 to tackle fossil fuel subsidy reform also commits to greater transparency, evaluation of international agreements, and developing national strategies to phase out fossil fuel subsidization (IISD, 2023).

These initiatives could set a precedent for future international agreements to tackle barriers to fossil fuel subsidy reform and serve as an important step towards redesigning global subsidy rules to align with the goals of the energy transition.

Box 1. Plurilateral Progress: Fossil Fuel Subsidy Reform in ACCTS

The Agreement on Climate Change, Trade and Sustainability, signed by Costa Rica, Iceland, New Zealand, and Switzerland in 2024, is the first legally binding trade agreement to regulate the use of fossil fuel subsidies by its members.
The agreement recognizes that "fossil fuel subsidies constitute a major obstacle to tackling climate change and undermine sustainable development," with Article 1.1. setting a clear objective of "disciplining and eliminating harmful fossil fuel subsidies in order to mitigate their adverse impact on the environment."
ACCTS sets out a broad definition of what constitutes a subsidy for fossil fuels—including tax exemptions—and prohibits all types of coal subsidies. Members are also required to make public disclosures of their use of fossil fuel subsidies going forward to help improve transparency and monitoring.
However, the agreement still contains some carve-outs, including exemptions for certain subsidies for oil and gas production, as well as those protected by other international agreements (including aviation, maritime, and fishing).
Overall, ACCTS serves as a positive signal of progress in this space, but there remains further room for improvement—demonstrating the complexity of reforming the global subsidies landscape, even among the most ambitious countries.

4. Border Carbon Adjustments

Border carbon adjustments (BCAs) are trade policy measures designed to address the risk of carbon leakage by imposing a charge on goods imported from jurisdictions with lower environmental standards. The EU's Carbon Border Adjustment Mechanism (CBAM) is currently in a pilot phase and includes some energy-related products (hydrogen and electricity) within its scope. While the initial goal of CBAM is to avoid carbon leakage, the EU hopes that this measure will also incentivize the decarbonization of carbon-intensive goods in other jurisdictions (European Commission, 2025).

A problem with BCAs is that they are likely to have a disproportionate impact on developing economies due to the regulatory burden and associated costs of complying with the reporting requirements. Studies also suggest that developing economies, particularly countries in Africa, will face the greatest GDP impact from an EU CBAM, due to the emissions-intensity of their exports and because the EU is often a major export destination (African Climate Foundation & London School of Economics and Political Science, 2023). These increased costs will have ramifications for the wider energy transition in developing countries, particularly if those countries have limited opportunities to diversify their export base. This could be exacerbated as additional jurisdictions implement BCAs over the coming years.

One solution to this could be to recycle revenues collected under BCA schemes to support the energy transition in developing economies. But these revenues alone would not be anywhere near sufficient to cover the significant costs of decarbonizing the energy sector.

5. Investment Treaties and Investor-State Dispute Settlement

Investment treaties and the dispute settlement mechanisms within them pose significant barriers to climate action by protecting overseas fossil fuel investments. There are more than 2,500 investment treaties in force globally, most of which protect fossil fuel investments via investor-State dispute settlement (ISDS) provisions, and middle- and low-income countries are currently vulnerable to approximately 60% of ISDS claims (Lee & Dilworth, 2024). ISDS provisions allow investors to bring claims against governments if their business interests are undermined by government policy, including climate measures which might harm fossil fuel projects—meaning that they are directly at odds with global efforts to achieve the energy transition.

There has been a growing trend away from ISDS in recent years, with several countries deciding to withdraw from the Energy Charter Treaty (ECT) since 2022, denouncing its incompatibility with climate ambition.[8] Countries including New Zealand and Australia hold a principled position against the inclusion of ISDS in their new free trade agreements, and the United States and Canada have removed ISDS in the United States-Mexico-Canada Agreement (USMCA). There are also multilateral discussions underway at the OECD to better align investment treaties with climate goals, which could include carve-outs of fossil fuel related investments from the coverage of treaties or excluding climate mitigation policies from ISDS claims.

However, there remains a lack of shared understanding around the need to reform investment treaties in relation to climate action, and there is not yet a consensus on which solution to pursue. Without further reform, these provisions risk delaying the global energy transition by increasing the cost of climate action and encouraging investment in fossil fuels.

8. The ECT is the investment treaty which protects the largest amount of greenhouse gas emissions—over 300 million tonnes in CO2 equivalent annually (Dilworth & Lee, 2024).

4. Opportunities and Challenges for Developing Countries

The energy transition could present new trading opportunities for developing countries, but significant barriers exist which will make it challenging to capitalize on them. Due to their reserves of key raw materials like critical minerals, and their abundant supply of renewable energy resources for solar and wind power, many developing countries should have a natural comparative advantage in the low-carbon economy. But difficulty in attracting international investment, particularly when competing with heavily subsidized green industries globally, mean that many of these benefits may not be realized without intervention and support from advanced economies.

For fossil fuel dependent economies, their source of export revenue will narrow as the global energy transition accelerates. Developing countries that are dependent on fossil fuel rents (which can constitute up to 80–90% of government revenue in extreme cases) face the risk of economic, social, and political instability if they do not diversify their economies as global demand for fossil fuels declines. While wealthier producers have the financial and institutional capacity to respond to these risks, vulnerable producers will need additional support from international partners. As the transition takes hold, high-cost, high-emissions producers will face a revenue squeeze and are likely to drop out of the market first (IEA, 2023d; Walker et al., 2024c).

Emerging energy producers will need to explore alternative development pathways as carbon-intensive growth proves a less viable and increasingly risky option. While many developing countries still regard oil and gas expansion as the only viable development pathway, the overwhelming evidence from countries such as Mozambique demonstrates that this is not the case. A decade after gas was discovered, the promised economic growth never materialized, with international oil and gas companies securing early returns and the Mozambique government left with all the risk and growing debt (Gaventa, 2021).[9] Countries that are just beginning to develop fossil fuel reserves, will be left with stranded assets and heavy debts as the market for their exports dries up. Some countries like Kenya are trying to industrialize through green growth, but for many developing countries the financial and structural barriers are currently insurmountable.

If developing countries dependent on fossil fuel imports fail to reduce their demand quickly enough, they will also face price spikes and market volatility. High fossil fuel price volatility is most damaging to low- and middle-income countries (with a total population of 6.7 million, or 85% of the world's population) who have limited hard currency reserves, are exposed to global interest rates, and cannot invest quickly in low-carbon technology. This volatility could have wide-ranging macroeconomic consequences for developing economies, further diminishing their ability to capitalize on the energy transition.

Developing countries with reserves of critical raw materials will also require support to integrate into higher-value components of the energy supply chain. Africa holds approximately 19% of the global mineral reserves needed for the EV industry, but African economies will miss out on economic opportunities from these assets unless they are able to develop domestic capacity to carry out the processing of the minerals that they are mining (UNCTAD, 2023). Poor mining practices, resulting from improper infrastructure in the extraction of critical minerals, must also be managed to avoid long-term environmental damages from the manufacturing of clean energy technologies.

9. External debt as a proportion of GDP trebled following the initial gas discovery, reaching 93% in 2021.70% of the population still lack access to energy and Mozambicans are now on average poorer than they were a decade ago. In contrast to International Monetary Fund (IMF) projections in 2016 for 34% GDP growth in 2021, actual economic growth in Mozambique was around 2.5%.

Developed economies will need to provide technical and financial support to developing countries at scale so they can benefit from the global energy transition. While the goal to mobilize $300 billion a year for developing countries agreed at COP29 is woefully inadequate, countries also committed to developing a "roadmap" to scale up finance to reach $1.3 trillion by COP30 in 2025, including through reform of institutions like the World Bank and IMF. Regular monitoring and stocktakes of the scale, quality, and regional distribution of public and private climate financing will provide a new motor for change over the next decade (Mabey, 2024). Aid for Trade can also be leveraged to help reduce trade barriers and encourage private sector participation in the energy transition. Approximately 30% of all aid for trade commitments with climate objectives were related to the energy sector between 2011–2021, totalling $60 billion—but this level of support remains insufficient in the context of total climate finance flows (WTO, 2024).

5. Priorities for an Equitable Energy Transition

The energy transition offers unprecedented opportunities for global development, but greater international coordination on proactive and inclusive policy solutions will be required to ensure that the benefits of the transition are fairly distributed. Developing countries must play a central role in shaping the future of clean energy trade, in order to achieve global climate resilience and sustainable growth.

Diplomatic coalitions are starting to emerge to drive the energy transition forward. But these alliances must improve cooperation and focus on delivery in developing countries, particularly in neglected areas such as production phase-out and support for affected communities and workers. Through these alliances, developed and developing countries should foster long-term strategic partnerships. International governance and careful long-term planning will also be essential to managing the macroeconomic effects of the energy transition and ensure that the benefits reach beyond major economies in an equitable way.

Developed countries must demonstrate leadership by:

1. *Phasing out fossil fuels*: International efforts must accelerate the transition away from the use and production of fossil fuels, while mitigating the negative impacts on fossil fuel dependent economies. Developed countries must take decisive action at home to end consumption and production of fossil fuels as part of their national transition plans. Greater dialogue and cooperation between consumer and producer countries will also help to minimize the impacts of price shocks and market volatility on developing countries as the global energy transition accelerates.

2. *Building renewable energy value chains*: The energy transition will require the restructuring of global supply chains, creating new opportunities to capture economic value at all stages of production, from mining through to manufacturing. Investment into local mineral refining and processing practices in developing countries will be critical to ensuring equitable participating in these value chains. Developed countries should also seek to build new clean energy partnerships with developing countries to capture mutual benefits, helping to increase their green industrial capacity and open up new export opportunities in growing global demand centres.

3. *Reforming trade policies*: Global trade rules must be updated to drive renewable energy adoption, provide new export opportunities for developing economies, and address trade distortions which create harmful incentives. Reforming fossil fuel

subsidy rules will be a key step in modernizing WTO law, but developed economies must also address the unequal impact of unilateral trade measures (such as BCAs) by reducing the compliance burden on developing economies. Channelling BCA revenues into climate finance could also support global decarbonization objectives.

4. *Providing technical and financial support for developing economies*: Developed countries must foster stronger cooperation with developing countries to provide technical and financial support at scale. This includes injecting fresh political capital into the existing toolbox, including Just Energy Transition Partnerships and country platforms. Governments should also explore new ways to mobilize public-private support to finance the energy transition, including new economy-wide partnerships and progress on global tax and debt reform. Climate finance, including aid for trade tools, must prioritize capacity building, infrastructure development, and economic diversification to enable developing economies to take advantage of the transition.

The global energy transition will fundamentally alter trade flows and reshape the geopolitical power dynamics of the future. The success of this transition in driving transformational outcomes will hinge on the inclusion of developing countries in clean energy supply chains, proactive reform of global trade rules to maximize positive externalities, and a significant increase in international investment for clean energy infrastructure and technologies.

References

African Climate Foundation & London School of Economics and Political Science. (2023). *Implications for African countries of a Carbon Border Adjustment Mechanism in the EU*. https://africanclimatefoundation.org/research-article/implications-for-african-countries-of-a-carbon-border-adjustment-mechanism-in-the-eu/

Agreement on Climate Change, Trade and Sustainability (ACCTS). (2024). Annex II: List of Environmental Goods. https://www.mfat.govt.nz/assets/Trade-agreements/ACCTS/ACCTS-Annex-II-List-of-Environmental-Goods-List.pdf

Asmelash, H. (2015). Energy subsidies and WTO dispute settlement: Why only renewable energy subsidies are challenged. *Journal of International Economic Law*, 18 (2), pp 261-285- https://doi.org/10.1093/jiel/jgv024

Asmelash, H. (2023). The role on international trade in the energy transition. *The Journal of World Investment & Trade*, 24(6), pp 847-878. https://doi.org/10.1163/22119000-12340312

Aylett, C. (2024, June 13). *Imposing tariffs on Chinese electric vehicles will make the EU's transition slower and more expensive*. Chatham House. https://www.chathamhouse.org/2024/06/imposing-tariffs-chinese-electric-vehicles-will-make-eus-transition-slower-and-more

Bailey, D. (2024). *Shifting gear? The EU's tariffs on Chinese battery electric vehicles*. UK in a Changing Europe. https://ukandeu.ac.uk/shifting-gear-the-eus-tariffs-on-chinese-battery-electric-vehicles/

Barnard, M. (2023, December 05). How will climate action change the face of global shipping? *Forbes*. https://www.forbes.com/sites/michaelbarnard/2023/12/05/how-will-climate-action-change-the-face-of-global-shipping/

Benson, E. (2023). Beyond bicycles: A new momentum behind environmental goods negotiations? Center for Strategic & International Studies (CSIS). https://www.csis.org/analysis/beyond-bicycles-new-momentum-behind-environmental-goods-negotiations

Bridle, R. (2021). How Can Trade Policy Maximize Benefits From Clean Energy Investment? International Institute for Sustainable Development (IISD). https://www.iisd.org/publications/trade-clean-energy-investment

Carbon Brief. (2024, October 18). *Solar surge will send coal power tumbling by 2030, IEA data reveals.* https://www.carbonbrief.org/analysis-solar-surge-will-send-coal-power-tumbling-by-2030-iea-data-reveals/

Cima, E. & Esty, D. C. (2024). *Making international trade work for sustainable development: Toward a new WTO framework for subsidies*. Journal of International Economic Law 27(1), pp 1-17. https://doi.org/10.1093/jiel/jgae008

Clean Energy Transition Partnership (CETP). (n.d.). *The Clean Energy Transition Partnership*. https://cleanenergytransitionpartnership.org/

Dilworth, J. & Lee, E. (2024e). *The Energy Charter Treaty remains the most dangerous investment treaty to the energy transition.* E3G. https://www.e3g.org/news/the-energy-charter-treaty-remains-the-most-dangerous-to-the-energy-transition/

Ember. (2023). *Solar exports from China increase by a third*. https://ember-energy.org/latest-insights/china-solar-exports/

European Commission. (2022, June 30). *EU – New Zealand Trade Agreement: Unlocking sustainable economic growth* [Press release]. https://ec.europa.eu/commission/presscorner/detail/en/ip_22_4158

European Commission. (2025). *Carbon Border Adjustment Mechanism*. https://taxation-customs.ec.europa.eu/carbon-border-adjustment-mechanism_en

European Hydrogen Observatory. (2023, December 08). *New ISO standard on hydrogen unveiled at COP28.* https://observatory.clean-hydrogen.europa.eu/media/news/new-iso-standard-hydrogen-unveiled-cop28

Fossil Fuel Non-Proliferation Treaty Initiative. (n.d.). *Who has joined the call for a Fossil Fuel Non-Proliferation Treaty?* https://fossilfueltreaty.org/endorsements

G7. (2024, April 29-30). *Climate, Energy and Environment Ministers' Meeting Communiqué*. https://www.g7italy.it/wp-content/uploads/G7-Climate-Energy-Environment-Ministerial-Communique_Final.pdf

Gaventa, J. (2021). *The failure of 'gas for development' – Mozambique case study*. E3G. https://www.e3g.org/publications/the-failure-of-gas-for-development-mozambique-case-study/

Global Carbon Project. (n.d.). *Global carbon budget*. https://globalcarbonbudget.org/

Global Energy Interconnection Development and Cooperation Organization (GEIDCO). 2024. *Developing Africa energy interconnection to promote the co-development of electricity, mining, metallurgy, manufacturing and trade* [Presentation]. https://www.wto.org/library/events/event_resources/envir_0506202410/499_1564.pdf

Harvey, F. (2022, May 30). G7 countries to stop funding fossil fuel development overseas. *The Guardian*. https://www.theguardian.com/environment/2022/may/30/g7-countries-to-stop-funding-fossil-fuel-development-overseas

International Energy Agency (IEA). (n.d.). *International shipping*. https://www.iea.org/energy-system/transport/international-shipping

International Energy Agency (IEA). (2021). *Financing clean energy transitions in emerging and developing economies*. https://www.iea.org/reports/financing-clean-energy-transitions-in-emerging-and-developing-economies

International Energy Agency (IEA). (2022). *Fossil Fuels Consumption Subsidies 2022*. https://www.iea.org/reports/fossil-fuels-consumption-subsidies-2022

International Energy Agency (IEA). (2023a). *Financing clean energy in Africa*. https://www.iea.org/reports/financing-clean-energy-in-africa

International Energy Agency (IEA). (2023b). *Net zero roadmap: A global pathway to keep the 1.5oC Goal in reach.* https://www.iea.org/reports/net-zero-roadmap-a-global-pathway-to-keep-the-15-0c-goal-in-reach

International Energy Agency (IEA). (2023c). *Renewables 2023*. https://www.iea.org/reports/renewables-2023

International Energy Agency (IEA). (2023d). *The oil and gas industry in net zero transitions*. https://www.iea.org/reports/the-oil-and-gas-industry-in-net-zero-transitions

International Energy Agency (IEA). (2023e). *World Energy Investment 2023*. https://www.iea.org/reports/world-energy-investment-2023

International Energy Agency (IEA). (2024a). *Energy Technology Perspectives 2024*. https://www.iea.org/reports/energy-technology-perspectives-2024

International Energy Agency (IEA). (2024b). *World Energy Investment 2024*. https://www.iea.org/reports/world-energy-investment-2024

International Energy Agency (IEA). (2024c). *World Energy Outlook 2024*. https://www.iea.org/reports/world-energy-outlook-2024

International Institute for Sustainable Development (IISD). (2023). *New coalition formed at COP 28 to tackle fossil fuel subsidy reform a promising sign*. https://www.iisd.org/articles/statement/cop-28-new-coalition-fossil-fuel-subsidy-reform-promising-sign

International Monetary Fund (IMF). (2023). IMF fossil fuel subsidies data: 2023 update. *Working Paper* No. 2023/169. https://www.imf.org/en/Publications/WP/Issues/2023/08/22/IMF-Fossil-Fuel-Subsidies-Data-2023-Update-537281

International Renewable Energy Agency (IRENA). (2022). *Geopolitics of the energy transformation: The hydrogen factor*. https://www.irena.org/publications/2022/Jan/Geopolitics-of-the-Energy-Transformation-Hydrogen

Laan, T., Geddes, A., Jones, N. et al. (2023). *Fanning the Flames: G20 provides record financial support for fossil fuels*. International Institute for Sustainable Development (IISD). https://www.iisd.org/publications/report/fanning-flames-g20-support-of-fossil-fuels

Lee, E. & Dilworth, J. (2024). *Investment treaties are undermining the global energy transition*. E3G. https://www.e3g.org/publications/investment-treaties-are-undermining-the-global-energy-transition/

Logan, S. (2024). *Material world: How Europe can compete with China in the race for Africa's critical minerals. European Council om Foreign Relations.* https://ecfr.eu/publication/material-world-how-europe-can-compete-with-china-in-the-race-for-africas-critical-minerals/

Mabey, N. (2024). *Baku showed us a glimpse of the new multipolar world – five lessons from COP29*. E3G. https://www.e3g.org/news/baku-showed-us-a-glimpse-of-the-new-multipolar-world-five-lessons-from-cop29/

Oil Change International. (2024, April 09). *Handful of governments block clean energy transition with billions in international finance for fossil fuels* [Press release]. https://oilchange.org/news/handful-of-governments-block-clean-energy-transition-with-billions-in-international-finance-for-fossil-fuels/

Organisation for Economic Co-operation and Development (OECD). (n.d.). *OECD data explorer – Fossil fuel support – Detailed indicators*. https://data-explorer.oecd.org/

Organisation for Economic Co-operation and Development (OECD). (2015). *Overcoming barriers to international investment in clean energy*. https://www.oecd.org/en/publications/overcoming-barriers-to-international-investment-in-clean-energy_9789264227064-en.html

Organisation for Economic Co-operation and Development (OECD). (2024). *OECD Inventory of Support Measures for Fossil Fuels 2024*. https://www.oecd.org/en/publications/oecd-inventory-of-support-measures-for-fossil-fuels-2024_a2f063fe-en.html

Public Finance for Energy Database. (n.d.). *Public Finance for Energy Database*. https://energyfinance.org/

Saussay, A. (2024). *The economic impacts of Trump's tariff proposals on Europe*. Grantham Research Institute on Climate Change and the Environment. https://www.lse.ac.uk/granthaminstitute/publication/the-economic-impacts-of-trumps-tariff-proposals-on-europe/

UK Board of Trade. (2021). *Green trade*. A Board of Trade Report. https://www.gov.uk/government/publications/board-of-trade-report-green-trade

United Nations Climate Change (UNFCCC). (2021). *The Glasgow Climate Pact – Key Outcomes from COP26*. https://unfccc.int/process-and-meetings/the-paris-agreement/the-glasgow-climate-pact-key-outcomes-from-cop26

United Nations Climate Change (UNFCCC). (2024, November 05). *Submission by CHINA on behalf of the BASIC Group*. https://unfccc.int/sites/default/files/resource/Submission%20by%20CHINA%20on%20behalf%20of%20the%20BASIC%20Group.pdf

United Nations Environment Programme (UNEP). (2023a). *Emissions Gap Report 2023*. https://www.unep.org/resources/emissions-gap-report-2023

United Nations Environment Programme (UNEP). (2023b). *Production Gap Report 2023*. https://www.unep.org/resources/production-gap-report-2023

United Nations Trade and Development (UNCTAD). (2022). *The role of trade in a development-led global energy transition*. Note by the Secretariat, UN Doc. TD/B7C.I/53 (September 23). https://unctad.org/system/files/official-document/cid53_en_0.pdf

United Nations Trade and Development (UNCTAD). (2023). *Clean energy minerals: Developing countries must add value to capitalize on demand*. https://unctad.org/news/clean-energy-minerals-developing-countries-must-add-value-capitalize-demand

Walker, B. & Pastukhova, M. (2024). *An orderly and equitable global transition away from fossil fuels*. E3G. https://www.e3g.org/publications/an-orderly-and-equitable-global-transition-away-from-fossil-fuels/

Walker, B., Pastukhova, M., Smith, R. & Liebrecht, C. (2024). *Future of EU oil and gas suppliers in a low-carbon world: Risks of an unmanaged transition.* E3G https://www.e3g.org/publications/future-of-eu-oil-and-gas-suppliers-in-a-low-carbon-world-risks-of-an-unmanaged-transition/

Wood Mackenzie. (2024, October 23). *Increased protectionist measures in US solar market could expand domestic manufacturing, but increase overall costs* [Press release]. https://www.woodmac.com/press-releases/2024-press-releases/increased-protectionist-measures-in-us-solar-market-could-expand-domestic-manufacturing-but-increase-overall-costs/

World Trade Organization (WTO). (2022). *Leveraging trade in environmental goods and services to tackle climate change.* https://www.wto.org/english/tratop_e/envir_e/policy_brief_environmental_goods_e.pdf

World Trade Organization (WTO). (2023). *Trade policy tools for climate action*. https://www.wto.org/english/res_e/publications_e/tptforclimataction_e.htm

World Trade Organization (WTO). (2024). *Aid for Trade in Action: Supporting the transition to clean energy.* https://www.wto.org/english/res_e/publications_e/a4t_in_action_e.htm

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