

POLICY BRIEF

Winning the Climate Races:

Recommendations for U.S-EU Action

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The United States and the European Union (EU) have recently launched various initiatives to manage their competition and enhance their cooperation on trade and technology issues. The Transatlantic Leadership Network's Trade and Technology Working Group addresses these topics in its work, including recommendations for more effective action. On climate and clean tech issues, our work has profited from background papers by Jonathan Elkind and Richard Morningstar, and presentations by Ann Mettler and Christoph Meinel. I thank them all for their contributions, from which I have profited. The following policy brief and its companion pieces, however, are my responsibility alone. An introductory policy brief offers an overview of the climate crisis and how the United States and the EU are addressing it. This brief offers recommendations for U.S.-EU efforts going forward on this broad agenda. A third policy brief focuses more specifically on how the U.S.-EU Trade and Technology Council (TTC) might best fit as part of these broader efforts. All products from the TLN Working Group may be found at <https://www.transatlantic.org/transatlantic-technology-and-trade-working-group/>.

It is in the interest of the United States and the European Union to manage the competitive aspects of their respective approaches to climate and clean tech issues, while harnessing their tremendous synergies to mutual advantage. Both confront similar specific challenges as they decarbonize, including critical materials dependencies that the other can help to mitigate. Each is a leader in climate and clean tech innovation. That leadership is grounded in the deeply integrated transatlantic economy and the extensive ties that bind their political, environmental, scientific and security communities. When the two work with each other, they often bring global coalitions together. When they work against each other, global coalitions fall apart. This is particularly important when it comes to the climate crisis, which is global by its very nature.^[1]

What's Needed

Make sense of the alphabet soup of climate and clean tech initiatives. In recent years there has been a veritable explosion of regional and global initiatives to address climate change and accelerate clean tech development and deployment. The two parties should minimize duplicative initiatives and focus their energies on those lead groupings that hold greatest promise for their work.

Create a Climate Club to drive multilateral climate solutions. Start with the G7. The two parties have opportunity to be the core drivers of a broader “climate club” – a grouping of jurisdictions agreeing to uphold high standards for low-carbon goods and services, helping lower-income countries lift their standards, and imposing punitive measures on higher-income countries that do not. Such a club is unlikely to be created if all parties must agree to uniform standards; the key will be mutual recognition among the members that their inevitably diverse approaches to establishing such standards are essentially equivalent in effect. Germany’s August 2021 proposal for such a club does just that, saying that the “instruments used can differ from country to country. The objective of the climate club is above all to make the different rules comparable.”[2] While subsequent statements by German officials have muddied the message whether this remains Germany’s approach, it would be a good basis for broader discussion. Climate club membership would be based on adopting essentially equivalent standards for low-carbon goods and services. A U.S. Green Steel Deal and potential arrangements in other sectors, as outlined in the companion paper on the TTC, could be precursors to such arrangements. Such an approach would not exclude China *a priori*, but it would present Beijing with a choice: either ratchet up standards or face exclusion. In this way, the Climate Club would draw on, but go beyond, ongoing work in the Major Economies Forum, which is comprised of 20 countries, including China, representing 80% of global emissions. German Chancellor Olaf Scholz says he wants to use Germany’s 2022 G7 Presidency to be a “trailblazer” on climate action, and is touting the idea of a climate club.[3]

· ***Turbocharge the G7’s Industrial Decarbonization Agenda (IDA)***, which is intended to strengthen collaboration on market regulations, decarbonization standards development, investment flows, procurement strategies, and possible joint research. IDA should prioritize work with the private sector to mobilize capital and lower the risks of bringing clean technologies to market.[4]

Double down on Mission Innovation (MI): 23 governments responsible for 90% of global public investment in low-carbon energy innovations are part of Mission Innovation, a platform launched in 2015 to accelerate clean energy innovation. The United States and the EU should reinvigorate their MI commitment to underwrite the development of new, commercially viable technologies, and work to expand participation by other countries.

MI members made a promising course correction in 2021, turning from their failed goal of doubling RD&D investments over five years to a more specific set of collaborative missions likely to have more practical effect. A first set of missions, introduced in June 2021, include the integration of 100% variable renewable energy into reliable power grids, zero-emissions shipping, and low-cost clean hydrogen. An additional set of four missions was introduced at Glasgow in November 2021. The “urban transitions” mission, spearheaded by the European Commission and the Global Covenant of Mayors for Climate & Energy, and which seeks to reduce emissions from cities’ buildings, transport networks and resource consumption, aims to deliver at least 50 large-scale urban demonstration projects around the world by 2030. The net-zero industries mission, led by Austria and Australia, plans to help heavy industries like steel, cement and chemicals to install low-carbon technologies when they need to refurbish their equipment. An “integrated biorefineries mission,” led by India and the Netherlands, plans to reduce emissions from the transport and chemicals sectors by developing sustainable bio-based alternatives to fossil-fuel energies, chemicals and materials. And a CO2 removal mission, headed by Canada, the United States, and Saudi Arabia, plans to scale up carbon capture technologies in new arrays that can capture 100 million metric tons of CO2 by 2030.^[5]

These and other missions still to come can help the EU, the United States, and other MI members pool scarce research resources, encourage faster and broader roll out of new technologies, promote reliable and affordable energy supplies, and rapidly develop common clean-tech standards. MI’s impact would be further enhanced if more EU member states joined; MI includes the European Commission but currently only 8 EU member states.

Drive and expand the Breakthrough Agenda, announced at Glasgow, which brings together 42 countries representing more than 70% of the world’s economy, including China, the EU, India, the UK and the United States, to accelerate affordable clean tech adoption worldwide. At Glasgow the group targeted five key sectors, collectively responsible for more than half of global emissions: power, road transport, steel, hydrogen and agriculture. The “Glasgow Breakthroughs” include making electric vehicles the affordable norm, bringing down clean energy costs, scaling up hydrogen energy storage and getting steel production to near-zero emissions, all by 2030. In each sector the group has set targets and committed to review global progress every year in each sector via a “Global Checkpoint Process.”^[6]

This is an important initiative. Yet can be improved:

- ***Align efforts on key sectors.*** Thus far, the Agenda remains a high level statement of commitment. Work streams and a roadmap with identifiable benchmarks are needed for each sector.
- ***Expand the roster.*** Only 16 EU member states signed up. Key countries such as Argentina, Brazil, Colombia, Mexico, Russia, South Africa, and Ukraine are absent.

· ***Broaden the coalition*** beyond governments to leading companies, philanthropies and civil society organizations to ensure the initiatives are properly funded and grounded in approaches that can win societal acceptance.

Mobilize action to phase out fossil fuel subsidies. Reaching the Paris Agreement’s goal of keeping global warming to 1.5C will require governments to phase out the \$500 billion they currently spend to subsidize fossil-fuel production and consumption.^[7] While the United States and the EU are each pushing to phase out funding for fossil-fuel projects abroad, they have been growing their fossil-fuel subsidies at home. U.S. direct fossil fuel subsidies top \$20 billion annually, with tax subsidies totaling another \$11.5 billion.^[8] EU fossil-fuel subsidies grew to \$63 billion in pre-COVID year of 2019, and have since hovered near that level.^[9]

To accelerate the phase-out of fossil fuel subsidies, the United States and the EU can first make good on their own 2016 pledge, made with the other members of the G7, to end such subsidies by 2025. This is challenging for both parties, as fossil-fuel production subsidies are embedded in the U.S. tax code, and EU member states have refused any phase-out deadlines, despite the EU’s commitment. A G7 effort could set the stage for progress on a collective reform strategy within the G20, which has lacked commitment and strategies despite rhetoric at various summits about the importance of phased out subsidies.^[10] A similar sequencing of G7/G20 efforts was successful in achieving the global tax deal.

Those steps can be combined with parallel efforts to provide developing countries with the technical and financial assistance they will need to remove those subsidies while also promoting economic recovery and growth. The United States and EU member states can also integrate fossil-fuel subsidy reform in their own Nationally Determined Contributions as part of the Paris Agreement process, and redouble efforts to encourage others to do the same. Very few countries have done so.^[11]

Mobilize public and private finance for climate-smart economic growth and development. The International Energy Agency has estimated that \$4 trillion in annual investments in clean energy is required to decarbonize the global energy system. Best estimates are that the world appears to be mobilizing slightly more than \$600 billion annually, just 15% of what is needed.^[12] National development institutions and corporations provide roughly \$275 billion, multilateral and commercial banks offer about \$190 billion, and individual investors and state-owned enterprises each provide roughly \$55 billion. But three-quarters of these funds are spent domestically in developed countries, leaving little for the developing world, where the need is greatest.^[13] The Network of Central Banks and Supervisors for Greening the Financial System, a group of 80 central banks and supervisory authorities, has been passive, content to do little more than share best practices for strengthening the financial system’s resilience to climate-related risks.

Proactive engagement is needed. A start is being made by the Glasgow Financial Alliance for Net Zero (GFANZ), which has gathered 450 major financial institutions from 45 countries committed to managing assets totaling over \$130 trillion. Its aim, according to [Mark Carney](#), former governor of the Bank of England, is to “build a financial system in which every decision made takes climate change into account.”

^[14] GFANZ calls for the creation of “country platforms,” which would convene public officials, private sector executives, donors, and civil society stakeholders to agree on and co-ordinate priorities.”^[15]

The financial resources underpinning GFANZ are substantial. But delivery will take time. And ramping up climate finance will require progress in a series of discrete areas, where the United States, the EU, and their G7 counterparts could take the lead. These include development of transparent guidelines for defining green and clean investments; science-based transition plans for companies and financial institutions; and a hard look at the portfolios of some financial institutions encumbered with “stranded” fossil fuel assets, such as coal power plants that haven’t reached the end of their life spans but can no longer be used.^[16] They could also lead on the following fronts:

- ***Mobilize multilateral development banks (MDBs) to prioritize low-carbon energy projects.*** Most have failed to do so. Over the past six years, for instance, the World Bank is estimated to have funded more fossil-fuel than fossil-free projects; its fossil-free project funding has been lower than that of China alone. As of October 2021, the Green Climate Fund, the main financing vehicle under the Paris agreement, had cumulatively committed only \$10 billion.^[17]
- ***Lead the establishment of a new Clean Development Bank*** dedicated to financing sustainable low-carbon development via grants, loans, loan guarantees, and other types of investments. As of the end of 2021 there were 27 green banks in 12 countries around the world. Most are in developed countries. The need is in the developing world, however, and traditional MDBs lack the singular focus that a Clean Development Bank would offer.^[18]
- ***Design a regulatory framework for sustainable finance.*** The EU and the United States are the top two markets in the world for sustainable finance, yet their efforts have not been aligned, amidst growing signs of fragmentation across the globe when it comes to such areas as prudential regulation and supervision, market and conduct regulation, taxonomy and disclosure. The two parties should consider aligning their efforts to mobilize broader and more uniform mechanisms -- within the G7, the G20, the Financial Stability Board, the Central Banks and Supervisors Network for Greening the Financial System, and other global standard setters and networks, such as the Coalition of Finance Ministers for Climate Action, and the Sustainable Insurance Forum.^[19]
- ***Make progress on climate risk.*** Financial regulators in the United States and the EU can power multilateral efforts to establish global standards for financial disclosures related to climate risks. Currently, climate risk disclosures lack consistency, comparability and reliability. Standardized disclosure would improve capital market efficiencies, unlock sustainable, inclusive economic growth, and enable capital markets to become a powerful force driving improved climate outcomes. The United States and the EU should urge companies to report climate information in line with the recommendations of the Financial Stability Board’s Task Force on Climate-related Financial Disclosures and the Sustainability Accounting Standards Board.^[20]

Phase down hydrofluorocarbon use and innovate alternatives. Hydrofluorocarbons (HFCs, called F-gases in Europe) are a group of man-made chemicals used as refrigerants in air conditioning, refrigeration, building insulation, fire extinguishing systems, aerosols, and various other applications. They are thousands of times more potent than carbon dioxide at warming the planet. The volume of HFCs in the atmosphere is increasing rapidly, about [10-15% per year](#). As temperatures continue to rise, populations expand, millions

move to cities, and incomes grow in tropical regions, HFC use could be [ten times higher worldwide by 2050](#) and account for up to [19% of total CO2 emissions](#).^[21]

The primary response to this challenge has been a commitment to phase down HFC use via the Montreal Protocol's Kigali Amendment, which been signed by over 120 countries and the European Union, but not the United States. If the Amendment's commitments under the Kigali Amendment are met, the world will avoid 70 billion tons of CO2 equivalent by 2050, shaving off roughly 0.5C of warming by the end of this century. That's equal to knocking out humanity's entire carbon emissions for more than two years.^[22] John Kerry has [called it](#) "the biggest thing we can do in one giant swoop"[23] to fight climate change.

The EU and the United States have each taken steps to implement the Kigali Amendment's schedule for HFC phase-down. This has been done via successive iterations of the EU's F-gas regulation since 2014, and through the U.S. American Innovation and Manufacturing (AIM) Act, which became U.S. law with bipartisan support in late 2020. The EU's regulations aim to reduce HFC emissions by 79% by 2030; U.S. rules seek to cut out 85% of HFC production by 2036. The U.S. measures, if successful, promise to shrink U.S. annual emissions by the equivalent of 900 million tons of carbon dioxide over the next 15 years – about three years' worth of U.S. power sector emissions and more than Germany's total annual emissions.^[24]

Given HFCs' climate potency and current U.S.-EU alignment on how to address the challenge, the two parties should prioritize the following actions:

- ***Ratify the Kigali Amendment.*** President Biden has sent the Kigali Amendment on to the U.S. Senate, but it has not yet been ratified. Given bipartisan support, ratification looks achievable in 2022.^[25] And while the EU and most member states have ratified the Amendment, Italy and Malta have not. Both are considered hotspots for illegal HFC trade.^[26]
- ***Crack down on illegal HFC trade.*** The EU's F-gas phase-down and uneven oversight and enforcement by EU member states have inadvertently created a thriving black market within the EU, possibly accounting for a third of HFC products sold. Illegal smuggling of HFCs, both into the EU and from the EU into the United States, remains a substantial problem. Key EU entry points and hotspots for illegal trade are thought to be Bulgaria, Croatia, Denmark, Greece, Italy, Latvia, Malta and Poland. Washington and Brussels have each identified the need to strengthen enforcement actions to prevent such trade; their actions promise to be more effective through better coordination. Washington could learn from the EU's early missteps.^[27]
- ***Prioritize work together, and via the Climate and Clean Air Coalition's HFC Initiative, to generate awareness, innovate, commercialize and deploy climate-friendly HFC alternatives.*** The Kigali Amendment has pushed producers to ramp up production of climate-friendly HFC alternatives such as hydrofluoroolefins. U.S. and European companies stand to gain, as they are leaders in the field. Nonetheless, accelerating research and testing of HFC alternatives is urgent, especially since alternatives do not yet exist for roughly 15% of HFC products that remain critical for certain industries.^[28] Once developed, such alternatives will have even greater impact if there is U.S.-EU alignment on related codes and standards, methods of containment and governance, and infrastructure to support reclaim, recycle, and reuse programs. In the meantime, competition is likely to stiffen, especially from China, which has also ratified the Kigali Amendment and manufactures the vast majority of the world's air conditioners and their components.^[29] Proactive transatlantic coordination in the Climate and Clean Air Coalition's HFC Initiative, which includes over 70 states and hundreds of

businesses, scientific institutions and civil society organizations, could further facilitate innovation and anchor leading standards among a wide set of like-minded actors.^[30]

Combine forces to support a just transition around the globe, especially among those countries least able to take climate action on their own. This work should encompass coordinated financing strategies, energy literacy initiatives, adoption of appropriate technologies, and standardized metrics for quantifying a just transition. It should comprise coordinated Climate Action Pacts with key emitters; Strategic Partnerships with key producers of critical materials; and, as noted earlier, joint efforts to mobilize multilateral development banks, including creation of a new global green bank.

- ***Meet the \$100 billion pledge.*** Both parties will need to make significant contributions to the pledge by developed countries to jointly mobilize \$100 billion per year for climate action in the developing world.

- ***Agree Climate Action Pacts with key emitters.*** Global climate negotiations are indispensable but insufficient to solve the climate crisis. They need to be supplemented by efforts to provide major developing country emitters with the financing, technical and policy support they need to pursue low-carbon development strategies. The United States and the EU, together with G7 partners and other countries with the wherewithal to help, must mobilize and channel public and private resources to the most critical areas of need. This could be done by forging Climate Action Pacts with key countries. One template for such arrangements is offered by the recent \$8.5 billion agreement forged by South Africa with the United States, the EU, France, Germany, the UK and the EU to phase out Pretoria's coal-fired power plants and retrain its mine workers in exchange for renewable projects and low-interest financing. Another is the budding strategic partnership being hammered out by India with the United States, Norway, Sweden, France, Germany, the UK and the United Arab Emirates to create ready-to-go bankable deals that will deploy 450 gigawatts of renewables as fast as possible. Similar discussions are under way with Indonesia and Mexico about installing renewables and winding down fossil-fuel plants. While each arrangement must be tailored to the specific needs of an individual country, the basic approach should also be applicable to other major emitters such as Brazil, Nigeria, Pakistan, Tanzania, Thailand, Turkey, Ukraine, and Vietnam.^[31]

Secure the flow of critical raw materials. The IEA [projects](#) that global demand for critical materials generated by the widespread deployment of clean technologies will quadruple by 2040 and increase six-fold by 2050.^[32] EU demand is slated to increase 10-fold.^[33] The largest reserves of such materials are in developing countries already struggling to raise their populations from poverty even as they commit to low-carbon development. Many developed countries are likely to be as dependent on these critical-materials producers as they have dependent on fossil-fuel suppliers. The issue is particularly sensitive because the United States and the EU are each inordinately dependent on China for many critical materials, potentially opening them to economic coercion. China controls 50-90% of the world's clean energy minerals supply chains and is dominant in their processing and refining.^[34] When it comes to rare earths, China accounts for 98% of EU imports and 80% of US imports.^[35]

As outlined in more detail in the companion paper, “The United States and the EU in the Climate Races,” each party is slowly taking action to wean itself off its dependencies. Yet even if such efforts are successful, the world will remain dependent on critical-materials suppliers in a host of developing countries. Without reforms to the mining, processing and delivery of such materials, the human and environmental consequences could be devastating. Both EU and U.S. official strategies call for greater international cooperation, but each remains relatively vague, and neither has addressed the need for coordinated crisis-response mechanisms should critical supplies be disrupted. It is in the interest of the United States and the EU to work together, with other democratic market economies, and with key critical-materials suppliers, to forge secure and sustainable supply chains and low-carbon development of these critical materials, both at home and abroad.

U.S.-EU cooperation could focus on a number of discrete priorities.^[36]

- ***Bring investors, government and non-government financing mechanisms, and end-users of critical materials together with critical-material project proponents*** to share information on opportunities and to identify and leverage private and public investment into a pipeline of projects at various stages of the critical material value chain.

- ***Work together, and with industry and other stakeholders, to ramp up critical materials research, development and deployment***, including low-carbon extraction, processing delivery and recycling; use of digital tools for more effective geological mapping; and development of low-carbon alternatives.

- ***Advance sustainable sourcing certification mechanisms and world-class environmental, social and governance (ESG) norms and practices***, both across the Atlantic and around the world. Integrate these elements into the Strategic Partnerships outlined in the next section. This would boost indigenous capacity, help resource-rich countries pursue low-carbon development, and would push China to be more transparent about its own supply-chain sources and to include ESG considerations in its exports. The EU has already agreed to do this with Canada in what both parties have called an “integrated critical raw material value chain”; U.S. participation would lend significant weight to this effort.

- ***Develop a coordinated crisis-management framework should critical supplies be disrupted***, either through intentional efforts at economic coercion, for instance by China, or through weather-related events or domestic circumstances in supplier countries. This framework should set out effective ways to create strategic reserves of critical materials, keeping in mind that most EU member states are also NATO allies.

- ***Share information tracking foreign investment and acquisitions of mineral rights, property, and development.***

- ***Align U.S.-EU cooperation with collaborative efforts involving other interested partners***, beginning with Australia, Canada, Greenland, Japan, Norway, South Korea and the United Kingdom. Expanded cooperation can build on existing mechanisms. For example, the Conference on Critical Materials and Minerals began in 2011 as an annual EU-Japan-U.S. forum for information sharing on rare earths and other critical materials. In 2021 Australia and Canada joined the group, which is moving beyond information sharing to considering ways to enhance R&D and strengthen cooperation on international standards for critical materials. In 2021 the EU and Canada forged a new strategic partnership around critical mineral supply chains centered on efforts to integrate Canada-EU raw materials value chains, promote mutual scientific, technological and digital collaboration, and advance

environmental, social and governance (ESG) criteria, and standards, for critical materials. Canada-U.S. and Australia-U.S. Joint Action Plans offer additional templates.

An evolving framework could also take other forms. The European Raw Materials Alliance (ERMA), for instance, which already includes U.S. companies and Greenland, could be further opened to the United States and other partners. Failing that, synergies could be developed between ERMA and other emerging coalitions, such as a Five-Eyes Critical Materials Alliance.

- ***Develop Strategic Partnerships with key producers of critical materials.*** Similar to the Climate Action Pacts with key developing-country emitters discussed earlier, the United States, European countries and other stakeholders, including private investors, could forge agreements with key critical-materials suppliers to develop and finance sustainable supplies of critical materials, providing host countries with adequate funding, technical and policy support while introducing sustainable sourcing certification mechanisms, mineral supply chain disclosure requirements, and ESG norms and practices.

Expanded cooperation can build on existing mechanisms. The European Commission's action plan already calls for such efforts; pilot partnerships have begun with Ukraine and interested countries in Africa and Latin America. Another template is the U.S.-led [Energy Resources Governance Initiative \(ERGI\)](#), which already also includes Canada and Australia, as well as Botswana, Peru, Argentina, Brazil, Democratic Republic of the Congo, Namibia, Philippines and Zambia.^[37]

Step up coordination on low-carbon development and humanitarian assistance. Each of these priority areas can be enhanced by more effective U.S.-EU cooperation on low-carbon development and humanitarian assistance. The United States and the EU together are by far the world's leading providers of both categories of support, and account for the bulk of philanthropic and investment flows with the developing world. Past efforts to improve cooperation and effectiveness have met with uneven success. Yet the coronavirus crisis and attendant global slowdown have squeezed aid commitments and humanitarian resources. The two parties have a shared interest not only in cooperating and maximizing our capacities, but in widening the donor base and 'globalizing' the development assistance and humanitarian enterprises, while integrating climate considerations.

Use the TTC to address ongoing and upcoming issues, and to make the Green Technology Alliance real. The companion policy brief on the TTC offers further details on these recommendations.

- ***Address ongoing and upcoming issues.***
 - o resolve challenges posed by carbon border adjustment mechanisms;
 - o advance bilateral negotiations on a Green Steel Deal, and consider additional sectoral arrangements;
 - o explore ways to reconcile trade and climate issues at the WTO.
- ***Make the Transatlantic Green Technology Alliance real.***
 - o tap digital technologies to generate less-carbon-intensive economic activity.
 - o build open-source energy datasets.
 - o scale up clean technologies.
 - o channel capital to sectors and technologies with untapped impact on climate
 - o prioritize key innovation sectors

- o drive the commercialization of new clean technologies
- o prioritize innovations that reduce reliance on critical technologies
- o address the climate and energy consequences of digitalization.
- o improve information-sharing and establish an early warning system on standards developments; bolster participation in international standards-setting bodies; vote together where possible;
- o launch a green hydrogen initiative.

Notes

[1] For more, see Jonathan Elkind's discussion note prepared for this initiative: "Clean Energy Technology – An Opportunity for Trans-Atlantic Leadership," https://www.transatlantic.org/wp-content/uploads/2021/12/10-27-2021-Elkind_Opportunity-for-Trans-Atlantic-Leadership-oct-2021-rev-1.pdf; also Richard Morningstar, "Prospects for Transatlantic Climate and Energy Cooperation," Transatlantic Leadership Network/Woodrow Wilson Center, February 9, 2021, <https://www.wilsoncenter.org/article/prospects-transatlantic-climate-and-energy-cooperation>.

[2] German Federal Ministry of Finance, "The German government wants to establish an international climate club," August 21, 2021, <https://www.bundesfinanzministerium.de/Content/EN/Pressemitteilungen/2021/20210825-german-government-wants-to-establish-an-international-climate-club.html>

[3] See his new year's address: <https://www.bundestkanzler.de/resource/blob/1833748/1994348/a5aabd0ef1d4b5321f862664b862cbfb/download-pdf-data.pdf?download=1>.

[4] 2021 UK G7 Presidency, "G7 Industrial Decarbonisation Agenda," Jun 7, 2021, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/996388/EPD3_G7_Industrial_Decarbonisation_Agenda.pdf.

[5] Mission Innovation, "2021 Joint Launch Statement," and "Missions," both at <http://www.mission-innovation.net>; "Mission critical," *The Economist*, March 21, 2021; Chad A. Smith and David M. Hart, "The 2021 Global Energy Innovation Index: National Contributions to the Global Clean Energy Innovation System," International Information Technology and Innovation Foundation (ITIF), October 2021, <https://itif.org/sites/default/files/2021-global-energy-innovation-index.pdf>.

[6] UK Government, "World leaders join UK's Glasgow Breakthroughs to speed up affordable clean tech worldwide," November 2, 2021, <https://www.gov.uk/government/news/world-leaders-join-uks-glasgow-breakthroughs-to-speed-up-affordable-clean-tech-worldwide>; Race to Zero, "Glasgow Breakthroughs," <https://racetozero.unfccc.int/system/glasgow-breakthroughs/>.

[7] International Institute for Sustainable Development, "Doubling Back and Doubling Down: G20 scorecard on fossil fuel funding," 2020, <https://www.iisd.org/system/files/2020-11/g20-scorecard-report.pdf>.

[8] Environmental and Energy Study Institute, "Fact Sheet | Fossil Fuel Subsidies: A Closer Look at Tax Breaks and Societal Costs," July 29, 2019, <https://www.eesi.org/papers/view/fact-sheet-fossil-fuel-subsidies-a-closer-look-at-tax-breaks-and-societal-costs>.

[9] European Commission, "Energy Prices and Costs in Europe," <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=COM:2019:1:FIN&from=EN>; European Commission, "Annex to the State of the Energy Union Report on energy subsidies in the EU," October 26, 2021, https://ec.europa.eu/energy/sites/default/files/annex_to_the_state_of_the_energy_union_report_on_energy_subsidies_in_the_eu.pdf.

[10] Elena Sanchez Nicolas, "EU 'missed chance' to set fossil-fuel subsidies deadline," *EU Observer*, December 3, 2021.

[11] Urpelainen

[12] Kelly Sims Gallagher, “The Coming Carbon Tsunami: Developing Countries Need a New Growth Model—Before It’s Too Late,” *Foreign Affairs*, January/February 2022, <https://www.foreignaffairs.com/articles/world/2021-12-14/coming-carbon-tsunami>.

[13] Gallagher notes that Sub-Saharan Africa benefits from only roughly \$20 billion in climate finance per year, for example, compared with East Asia’s \$292 billion. *Ibid.*

[14] Martin Wolf, “Dangling on the edge of climate disaster,” *Financial Times*, November 23, 2021.

[15] Mark Carney, “Country Platforms Action Plan,” November 3, 2021, <https://assets.bbhub.io/company/sites/63/2021/11/Country-Platforms-Action-Plan.pdf>.

[16] Gallagher. Also Jason Bordoff and Meghan O’Sullivan, “Green Upheaval: The New Geopolitics of Energy,” *Foreign Affairs*, Jan/Feb 2022, <https://www.foreignaffairs.com/articles/world/2021-11-30/geopolitics-energy-green-upheaval>.

[17] *Ibid.*

[18] *Ibid.*; National Resources Defense Council, “Growing Green Bank Movement Playing Key Role in Financing Clean Energy, Climate Solutions and Resilience,” November 3, 2021, <https://www.nrdc.org/media/2021/211102-1>.

[19] See Climate-Related Market Risk Subcommittee, “Managing Climate Risk in the U.S. Financial System,” U.S. Commodity Futures Trading Commission, Market Risk Advisory Committee, 2020; Andres Portilla, Sonja Gibbs, Katie Rismanchi, “Sustainable Finance Policy & Regulation: The Case for Greater International Alignment,” Institute of International Finance, March 2020.

[20] Laura Tyson, “Joe Biden must take a global lead on climate risk disclosure,” *Financial Times*, January 6, 2021; “Recommendations of the Task Force on Climate-related Financial Disclosures,” June 2017, <https://assets.bbhub.io/company/sites/60/2020/10/FINAL-2017-TCFD-Report-11052018.pdf>; SASB Industry Standards, Sustainability Accounting Standards Board, <https://www.sasb.org/standards-overview/download-current-standards/>.

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