ANALYSIS

CLIMATE CHANGE, ENERGY AND ENVIRONMENT

BEYOND THE CLIMATE TECH ARMS RACE

US-EU Cooperation in the Net-Zero Transition

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The passage of the Inflation Reduction Act (IRA) in 2022 marked the beginning of a new era in US industrial policy. More importantly, the law can also be interpreted as America's most significant contribution to the global fight against climate change.

However, the IRA also caused anxiety across the Atlantic. Fearing a global subsidy race to the bottom, EU partners expressed alarm around a potential zero-sum competition.

While the transatlantic partners must each chart their own green industrial strategies, the potential and necessity for expanded cooperation on net-zero technology and industry is substantive and should be pursued proactively.

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INTRODUCTION

For decades, policymakers across Europe called on the United States to enact a substantive climate law to enable the country to meet its global greenhouse gas reduction commitments. Yet the passage of America's landmark climate law in August of 2022 was not the triumphal moment that many European leaders expected.

While the Inflation Reduction Act (IRA) was widely greeted as a welcome surprise, concerns about local content requirements and other provisions soon led policymakers in Brussels to criticize the statute for producing market distortions, violating WTO treaty commitments, and creating a "global subsidy race to the bottom."[1]

Today, just shy of two years into IRA implementation, tensions across the Atlantic persist. Still, there is evidence of an opening. A US-EU Task Force on the Inflation Reduction Act has coordinated negotiations that have resulted in some concessions to Europe, including allowing some EU-made battery components to count toward domestic production requirements for IRA tax credits. As the EU deliberates over its own future green industrial strategy, the US and European allies have expanded collaboration on a series of research initiatives and technology standards.[2]

In March of 2023, US President Joe Biden and European Commission President Ursula von der Leyen issued a joint declaration that: "We are working against zero-sum competition so that our incentives maximize clean energy deployment and jobs – and do not lead to windfalls for private interests."[3]

Still, the question remains: is it possible for the US and Europe to truly get beyond "zero-sum competition" on clean innovation and industry?

This policy brief will examine the state of transatlantic relations in the age of the IRA and explore new pathways for the US and Europe to expand cooperation, repair relations, and advance global climate technology innovation on a joint basis. Building on a series of interviews with policymakers and expert observers on both sides of the Atlantic, the report will make the case that there is growing necessity – and opportunity – for allies to build a substantial partnership on net-zero technology and industry.

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1 Charles Wessner and Srishti Khemka, "Getting Real on the Inflation Reduction Act," *Www.csis.org*, March 7, 2023, https://www.csis.org/analysis/getting-real-inflation-reduction-act.
Christian Scheinert, "EU's Response to the US Inflation Reduction Act (IRA)," European Parliament, June 2023, https://www.europarl.europa.eu/RegData/etudes/IDAN/2023/740087/IPOL_IDA(2023)740087_EN.pdf.
Jorge Valero, "EU Warns US of Potential Retaliation in Green Subsidies Dispute," *Bloomberg.com*, November 5, 2022, https://www.bloomberg.com/news/articles/2022-11-05/eu-warns-us-of-potential-retaliation-in-green-subsidies-dispute?leadSource=uverify%20wall.

2 "Launch of the US-EU Task Force on the Inflation Reduction Act," European Commission , October 26, 2022, https://ec.europa.eu/commission/presscorner/detail/en/STATEMENT_22_6402.
"U.S.-EU Trade and Technology Council (TTC)," United States Department of State, n. d., https://www.state.gov/u-s-eu-trade-and-technology-council-ttc/.

3 "Joint Statement by President Biden and President von Der Leyen," The White House, March 10, 2023, https://www.whitehouse.gov/briefing-room/statements-releases/2023/03/10/joint-statement-by-president-biden-and-president-von-der-leyen-2/#:~:text=Both%20sides%20will%20take%20steps.

1

A NEW AGE OF INDUSTRIAL POLICY

When Joe Biden won the presidency in November 2020, the prospects for passage of a major climate bill seemed bleak. Yet Democratic victories in the Georgia senate runoffs in January 2021 created a narrow majority for the party in the upper chamber – opening a window for the development and passage of a legislative package focused on decarbonization. Still, with only the bare minimum majority, any law would have to meet the requirements of moderate senators including Joe Manchin (D-WV) and Kirsten Sinema (I-AZ) and comply with a complex set of "reconciliation" rules to avoid the risk of a filibuster. These facts largely precluded possibilities like placing a meaningful price on carbon or enforcing other standards on high-carbon emitters across sectors. The eventual legislative package therefore had to rely primarily on tax incentives – "carrots" rather than "sticks" – as well as to focus on meeting the demands of domestic politics to boost priorities like national manufacturing competitiveness. While President Biden promised a break from the policies of the Trump Administration in most areas, his realistic policy options for advancing climate and economic priorities centered on industrial policy – including elements of the economic nationalism that his predecessor championed.

After more than a year of negotiations and a series of false starts, the eventual legislative package, called the Inflation Reduction Act, was signed into law on August 16, 2022, directing new federal spending toward reducing carbon emissions, along with other provisions focused on lowering healthcare costs, funding the Internal Revenue Service, and improving taxpayer compliance. The law includes several key elements with relevance to climate policy:[4]

- **Clean Energy and Carbon Emission Reduction:** The IRA directs nearly $400 billion to clean energy, aiming to substantially lower the nation's carbon emissions by the end of the decade. This funding is delivered through a combination of tax incentives, grants, and loan guarantees, focusing on clean electricity, transmission, and clean transportation, including electric vehicle (EV) incentives.
- **Domestic Manufacturing and Technology:** The IRA encourages investment in US domestic manufacturing, procurement of critical supplies from domestic or free-trade partners, and R&D in technologies like carbon capture and storage and clean hydrogen. The law also focuses on environmental justice funding, incentivizes unions and apprenticeships, and requires equity impacts for many funding recipients.
- **Energy Infrastructure:** Approximately $12 billion in new funding is allocated to the U.S. Department of Energy's Loan Program Office to expand its loan authority and launch a new program for upgrading, repurposing, or replacing energy infrastructure.
- **Private Investment Incentives:** Most of the energy and climate funding in the IRA, totaling more than $394 billion, is provided as tax credits to stimulate private investment in clean energy, transport, and manufacturing.
- **Consumer Incentives:** The IRA provides about $43 billion in tax credits to make EVs, energy-efficient appliances, and renewable energy technologies more affordable for consumers. This includes tax credits for new and used EVs, as well as for home improvements including solar panels and heat pumps.

4 "Building a Clean Energy Economy: A Guidebook to the Inflation Reduction Act's Investments in Clean Energy and Climate Action," The White House, January 2023, https://www.whitehouse.gov/wp-content/uploads/2022/12/Inflation-Reduction-Act-Guidebook.pdf.

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EUROPEAN CONCERNS AND ANXIETIES ON COMPETITIVENESS

The announcement of the package – and Senator Manchin's support – was such a surprise to most observers that the news overshadowed any initial reporting on concerns from US allies. Yet, in the weeks that followed, European partners began expressing frustration. The EU listed at least nine points in the US Inflation Reduction Act that could be in breach of international trade rules and pose potential threats to the future of the transatlantic partnership.

The concerns centered primarily on Local Content Requirements (LCRs). For example, the IRA text stipulates that EVs must have a minimum percentage of critical minerals by value from US or its free trade agreement partners in North America or elsewhere to be eligible for tax credits.[5] Because the US and EU have not signed a full free trade agreement, there are potential negative consequences for the European economy. Analysis from a team at the think tank Bruegel concluded that the IRA's tax credit on electric cars "could reduce the cost of an eligible vehicle of average price by about one fifth, to the detriment of electric vehicles presently excluded from the credits." This, the analysts concluded, could have a major impact on the capacity of foreign automotive producers to remain competitive in the US market. For the EU, the result could be large losses of exports to the United States.

European policymakers pointed to other potential effects, too. For example, analysts warned that, if US producers could make full use of all subsidies within the legislation, batteries would likely become up to 30 percent cheaper in the US than in the EU, production costs for solar panels could fall by two-thirds relative to the EU, and prices for producing renewable hydrogen could fall to zero by 2030.

In essence, European governments have been concerned about the IRA enabling multinational corporations that make products including batteries to "country shop" – finding the most financially advantageous jurisdiction in which to locate. For example, some point to the example of Freyr Battery, a European firm that develops lithium-ion batteries for EVs and maritime vessels, that was well underway in building a manufacturing facility in Norway when its leadership learned about the likely impacts of the IRA and decided to move manufacturing to Georgia.[6]

Overall, the passage of the IRA compounded European anxieties around manufacturing competitiveness at a time of high relative energy prices in Europe, owing primarily to the war in Ukraine. And there have been timing issues beyond just the war. In recent years, European manufacturers have been grappling with a massive influx of Chinese products that has thrown the existence of entire European industries into question. After the US banned importation of a variety of Chinese products based on forced labor rules and other measures, China diverted trade flows in many of these products to the EU. This has resulted in a flooding of European markets. European policymakers have been hotly debating their response. Yet there are widespread concerns that measures to protect against Chinese imports could slow the expansion of the solar industry on the continent – and, in turn, undermine the net-zero transition. All this is to say that the timing of the IRA was inopportune for Europe. As Fredrik Persson, the president of Business Europe, a trade group, told the New York Times, many European companies had "a very strong reaction" to the Inflation Reduction Act primarily due to the timing of the development with respect to geopolitics. "We fully support the underlying direction with the green transition, but it came at a sensitive moment," he added.[7]

Europe's concerns about the IRA have also been a function of the EU's inability to directly respond to the US law with similar measures.[8] As a national government rather than a supernational organization, the US is able to deliver incentives to manufacturers more quickly and predictably than the EU can. The majority of EU-level incentive programs require long notification and application processes that are

5 "Treasury Department Releases Guidance to Boost American Clean Energy Manufacturing," U.S. Department of the Treasury, May 10, 2023, https://home.treasury.gov/news/press-releases/jy1477.

6 A Battery Company CEO on the 'Massive' Effect of the IRA (Inside Climate News), February 15, 2024, https://insideclimatenews.org/news/15022024/inside-clean-energy-battery-company-ceo-on-the-massive-effect-of-inflation-reduction-act/.

7 Ana Swanson et al. "U.S. Spending on Clean Energy and Tech Spurs Allies to Compete." *New York Times,* December 7, 2023.

8 Sam Fleming, Alice Hancock, and Javier Espinoza, "Can the EU Keep up with the US on Green Subsidies?," *Financial Times*, February 1, 2023, https://www.ft.com/content/85b55126-e1e6-4b2c-8bb2-753d3cafcbe5.

especially burdensome for small and medium enterprises. EU programs can often help with initial capital expenditures and research capacity but not with operation expenditures that push down the costs of production over time. In many sectors, the US can, through the tax code, provide direct production subsidies rather than just support for capital investments, making it more attractive for companies to scale production of advanced technologies. The EU's state aid rules limit the capacities of national governments to apply IRA-style incentives because of a concern that such policies might provoke a "race to the bottom" in terms of taxation and regulation.[9]

Not all observers have been so pessimistic about the impacts of the IRA on Europe. A Hertie School analysis found that: "EU exports of EVs to the US are small in quantity. Many European manufacturers already have or are building up production facilities in the US and can benefit from the handouts. Moreover, most EU EV exports are in the upper price segment, making them ineligible for the IRA subsidies in the first place."[10] Further, Emily Benson of the Center for Strategic and International Studies has argued that the scale of total spending from the US and EU has not been significantly different – it's just that European spending has been spread out over time.[11]

And many EU observers recognize that both the EU governments and European firms may also benefit in some respects from the IRA. Companies that had already located some production operations to the United States can generally access the new subsidies and compete on a level playing field with US firms. Overall, they can benefit the net-zero transition in Europe by lowering the overall costs of new technologies and driving substitution away from Chinese products. By forcing a reorganization of clean tech supply chains, the IRA – through its local content requirements and other measures – could boost the overall competitiveness of transatlantic allies relative to China.

Still, even though the overall impacts of the IRA on Europe are uncertain, the passage of the law has provoked a kind of "soul searching" in Brussels and across the continent. The past 20 months have brought on sharpened focus to a diverse range of strategic questions, including: whether Europe should seek leadership in production in all clean tech areas or whether the continent should focus on cutting-edge technology in sectors where there is evidence of supplier diversification and thus less dependence on China. Further, policymakers have been contemplating how to coordinate better between member states and how to pursue priorities like reducing bureaucratization, accelerating approval processes, and ensuring greater accessibility of risk capital.

The IRA brought one strategic challenge into sharp focus: the US subsidizes the production of climate-friendly products, whereas the EU largely focuses on researching and developing new innovative products. If this is maintained, it could give the US a permanent advantage in the establishment of industries and production sites, in addition to already lower energy costs. This is a long-term challenge with which EU policymakers need to reckon.

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9 "Trade Disrupted" (International Monetary Fund, June 2023), https://www.imf.org/en/Publications/fandd/issues/2023/06.

10 Jannik Jansen, Philipp Jager, and Nils Redeker, "For Climate, Profits, or Resilience? Why, Where and How the EU Should Respond to the Inflation Reduction Act" (Hertie School - Jaques Delors Center, May 5, 2023), https://www.delorscentre.eu/fileadmin/2_Research/1_About_our_research/2_Research_centres/6_Jacques_Delors_Centre/Publications/20230505_JDC_IRA.pdf.

11 Ana Swanson et al. "U.S. Spending on Clean Energy and Tech Spurs Allies to Compete." *New York Times,* December 7, 2023.

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EUROPE'S INDUSTRIAL POLICY ANSWER TO THE IRA

All this European "soul searching" has yielded at least a few substantial policy developments. In particular, the EU is moving forward with two major pieces of legislation is response to the IRA:

- **The Net-Zero Industry Act (NZIA)**, proposed by the European Commission in March 2023 and supported by a position vote in the EU Parliament in November that year, is the latest key element of the European Green Deal Industrial Plan, focusing on bolstering the European manufacturing of net-zero technologies. It aims to enhance the EU's competitiveness and energy resilience by scaling up production capacities for decarbonization technologies. The Act categorizes technologies into 'net-zero' and 'strategic net-zero', with the latter receiving additional benefits for their significant contribution to the attainment of continent-wide decarbonization goals. Key technologies include solar, renewable, battery/storage, heat pumps, electrolyzers, and carbon capture. The NZIA sets a manufacturing benchmark for strategic technologies, streamlines administrative processes, boosts relevant innovation activities, and enhances skills through Net-Zero Academies. Further, it establishes a Net-Zero Europe Platform for stakeholder collaboration, aiming to reduce Europe's reliance on imports and bolster clean energy supply chain resilience.[12]

- **The Critical Raw Materials Act (CRMA)** is an EU law – after winning final approval on March 18, 2024 – aimed at securing and diversifying the supply of critical raw materials essential for key sectors including renewable energy, digital technologies, space, and defense. Recognizing the increasing demand and heavy reliance on imports, often from single countries, the Act contains measures to strengthen the entire value chain of critical raw materials within the EU. It includes setting benchmarks for domestic capacities in extraction, processing, and recycling, and reducing dependency on imports from a single non-EU country. The Act focuses on streamlining administrative processes, enhancing supply chain resilience through monitoring, stress-testing, and building strategic stocks. It emphasizes sustainability and circularity, mandating improved collection and recycling of critical material-rich waste and establishing rules for the environmental footprint of these materials. The Act also greenlights the forming a Critical Raw Materials Board for coordination and advises on international partnerships and trade agreements to diversify imports. Another part of the EU's Green Deal Industrial Plan, the CRM Act complements the Net Zero Industry Act, focusing on creating secure, sustainable, and competitive supply chains for clean energy technologies that can enable the continent to meet its decarbonization targets.

Some US policymakers explicitly view the new European legislative actions as evidence of the success of the IRA as a global climate policy. John Podesta, a senior US official who served as White House Chief of Staff and is the incoming US special climate envoy, told an audience at the Brookings Institution that overseas governments had been doing "a certain amount of bitching" about the IRA. Yet, pointing to recent action from the EU, he concluded: "with the bitching comes a little bit more shoulder to the wheel, so that's a good thing."

Still, it remains unclear how substantial impacts of the NZIA and CRMA will be with respect to Europe's net zero transition and future industry. While the laws represent an impressive degree of vision and common political commitment relative to the US, there is a persistent lack of funding for long-term implementation as well as a range of regulatory hurdles – related to the EU's structure as described above.

Beyond any specific policy reforms and their impacts, the passage of the IRA has crystallized a shift in ideology on both sides of the Atlantic. While many officials continue to be skeptical of direct state intervention to promote national economic competitiveness, there's now widespread agreement that the neoliberal consensus of the post-1970s period is over. Industrial policy is back in vogue.[13] In both

12 "The Net-Zero Industry Act," European Commission, n.d., https://single-market-economy.ec.europa.eu/industry/sustainability/net-zero-industry-act_en.

13 Andrew Spannaus, "The Inflation Reduction Act and the Rebirth of US Industrial Policy," Aspenia Online, May 3, 2023, https://aspenia-online.it/the-inflation-reduction-act-and-the-rebirth-of-us-industrial-policy/.

the US and Europe, there are varying reasons for the increasing openness to state involvement on matters of competitiveness, ranging from decarbonization to labor interests to rivalry with China. While interviewed EU policymakers note the increasing openness to industrial policy on the continent, they were virtually unanimous in a view that Europe's shifting approach is built on a careful respect for World Trade Organization (WTO) commitments, whereas the US approach is not.

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THE TRANSATLANTIC DIALOGUE ON ENERGY TRANSITION

In 2020, European Trade Commissioner Phil Hogan proposed to the Trump Administration an idea for resetting the EU-US relationship through a focus on trade and technology. Despite initial resistance from the Republican administration, the EU persisted in its efforts, and Commission President von der Leyen committed to launching a transatlantic trade and technology agenda regardless of the 2020 US election outcome.[14] The June 2021 EU-US Summit marked the official launch of the Trade and Technology Council (TTC), a new diplomatic forum to align policies and strategies across the Atlantic. It is today structured around ten working groups, with each dedicated to specific policy areas including technology, strategic industry sectors, market access, trade, democratic values, supply chain resilience, and the global trade order.

With leadership from five co-chairs – European Commission Executive Vice-Presidents Margrethe Vestager and Valdis Dombrovskis, US Secretary of State Antony Blinken, US Secretary of Commerce Gina Raimondo, and US Trade Representative Katherine Tai – it has been charged with developing joint responses to common challenges like data protection, online safety, and supply chain vulnerabilities.

As of 2023, the TTC is working on several elements of the transatlantic relationship with respect to climate and the energy transition – including a particular focus in the areas of e-mobility, sustainable trade, and clean energy incentives.[15] On EV infrastructure, the council recently drove publication of US-EU joint technical recommendations for government-funded charging systems.[16] The recommendations aim to streamline the rollout of charging infrastructure, enhance power grids, and boost industry competitiveness globally. They focus on developing joint standards, implementing cost-effective smart charging infrastructure, and addressing pre-normative research and development challenges. The TTC launched the Transatlantic Initiative on Sustainable Trade to leverage trade policy in transitioning towards a net-zero economy, to accelerate transatlantic trade and investment in goods and services essential for circular and net-zero economies, to strengthen supply chain resilience and sustainability, and to promote just transition policies on a global basis.[17] In the realm of energy, the US and EU initiated the Clean Energy Incentives Dialogue to coordinate future incentive programs, aiming to foster mutual reinforcement and avoid disruptions in transatlantic trade and investment. This dialogue seeks to address systemic issues in incentive program design and effects, and coordinating responses to non-market policies of third parties like China.[18]

While both parties agreed to a dialogue on the specific issues raised by the IRA, the Biden administration insisted on keeping the new working group separate from the TTC to avoid negatively impacting other areas of collaboration. The EU-US Task Force on the Inflation Reduction Act has so far facilitated negotiations for an EU-US Critical Minerals Agreement (CMA), which aims to allow access to parts of the tax credit for battery critical minerals extracted or processed in the EU. In October 2023, the US and Europe surfaced disagreements over US proposals around labor inspections at mines and other processing facilities producing minerals outside the North America and Europe. Still, the US signed a similar agreement with Japan in March 2023 that allows Japanese producers to supply critical minerals for EVs eligible US tax incentives, and most parties remain optimistic that a US-EU deal will be reached.[19]

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14 "Joint Statement of the United States and the European Union on a Tariff Agreement," European Commission, August 21, 2020, https://ec.europa.eu/commission/presscorner/detail/en/statement_20_1512.

15 Marek S. Szczepański and Anna Śliz, "EU-US Trade and Technology Council ," *Studia Socjologiczne*, November 6, 2023, https://doi.org/10.24425/sts.2021.137286.

16 Keith Hardy and Harald Scholz, "Transatlantic Technical Recommendations for Government Funded Implementation of Electric Vehicle Charging Infrastructure" (European Comission and US Department of Energy, May 2023), https://www.energy.gov/sites/default/files/2023-05/TTC4_WG2_Joint-Recommendations-EV-Charging-Infrastructure_vFINAL-2.pdf.

17 "Annex I: Transatlantic Initiative on Sustainable Trade - Work Programme," European Comission, accessed December 6, 2023, https://futurium.ec.europa.eu/en/EU-US-TTC/pages/annex-i-transatlantic-initiative-sustainable-trade-work-programme.

18 "U.S. Secretary of the Treasury Janet L. Yellen Meeting with European Commission Executive Vice President Margrethe Vestager," U.S. Department of the Treasury, March 31, 2023, https://home.treasury.gov/news/press-releases/jy1382#:~:text=The%20Dialogue%20aims%20to%20facilitate.

19 "EU Moves Forward with Critical Minerals Agreement Negotiations with the US," European Commission, June 14, 2023, https://ec.europa.eu/commission/presscorner/detail/en/IP_23_3214. And "Proposed U.S.-EU Critical Minerals Agreement ", CRS Report, April 2, 2024, https://crsreports.congress.gov/product/pdf/IN/IN12145.

In addition to serving as a platform for formal negotiations, the Task Force has also created a space for EU diplomats to make their case to the Biden Administration for favorable interpretations of elements of the law. The TTC and the Task Force have exceeded some, admittedly modest, expectations – the former for transforming the transatlantic relationships after the traumatic experience of the Trump years, and the latter for creating a robust mechanism for sharing views around a contentious area of policymaking. Still, stakeholders in government, business, and civil society, have called for more concrete deliverables from the TTC – including, for example, on conformity assessment and standards on decarbonization and digitalization as well as green finance and public procurement. The Transatlantic Initiative on Sustainable Trade (TIST) promises the launch of a "Transatlantic Circular Economy" initiative and "Green Public Procurement Policies;" yet, to date, there's been only limited information about what these will entail – such as a catalogue of best practices on green public procurement.[20] Business stakeholders, in particular, have emphasized that they seek greater engagement in the TTC process in order to ensure its work translates to commercially meaningful outcomes.

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20 Annex 2 – Joint EU-US Catalogue of Best Practices on Green Public Procurement, April 5, 2024, https://circabc.europa.eu/ui/group/09242a36-a438-40fd-a7af-fe32e36cbd0e/library/4ed7eb8e-690a-4347-975f-6e48e851365a/details?download=true.

5

THE CASE FOR EXPANDING CLIMATE TECH COLLABORATION

At a time when the world needs massive new investments in climate tech – and when the US and Europe need to diversify supply chains and deploy new technologies – the transatlantic allies need to find further ways from competition to cooperation.

What does this mean in practice? Maximizing efficiency to meet the challenges of climate change might ideally mean some kind of division of labor in building new industries based on comparative advantages and existing industrial capacities. Yet this would require an extraordinary degree of industrial policy coordination and a solid basis of trust over the long term. While such an outcome isn't likely, it's nonetheless possible to pursue or deepen cooperation over a range of different areas – including trade and finance, research, and technology deployment – that could collectively amount to a new strategic partnership.

But first, consider the need for such a new partnership.

Start with the necessity for new investment. In early 2023, a prominent media narrative emerged that new government incentives and a wave of VC funding would make climate tech "recession proof" – and perhaps give the world a meaningful chance to avoid the most serious warming projections.[21] Analysts now expect that the IRA's approximately $400 billion in climate investments will result in $1.7 trillion of public and private spending.[22] Still, the current government incentives and private financing are only just a fraction of what is needed for meeting the technology requirements of achieving the Paris climate goals.[23] In the US and Europe, there's a major financing gap for climate-focused companies, particularly with respect to the "valley" that runs from early-stage to profitability. The Bloomberg New Economy Climate Technology Coalition estimates that investment in climate technologies needs to triple from 2021 levels by 2025 – and then double yet again by 2030.[24]

Of course, the biggest financial requirements are in deploying new technologies – including building new infrastructure and products, training workers, and remaking energy, food, and transportation systems. The Glasgow Financial Alliance for Net Zero, a coalition of major financial institutions, estimates that reaching net-zero emissions will require at least $125 trillion in investments by 2050, amounting to approximately $5 trillion a year.[25] Yet other projections find that it will cost up to double that amount. To prepare developing countries for climate-related extreme weather and other related changes, the cost could top $300 billion a year by 2030, according to the UN.[26] There is widespread consensus that current spending is far short of what is necessary, especially for low-income countries on the front lines of the crisis. For example, climate-related impacts can amount to a fifth of GDP of low-lying smaller island nations that make only minimal contributions to global greenhouse gas emissions. By working together, the US and EU can leverage economies of scale in clean tech R&D as well as other areas of finance. By pooling investments, allies can reduce overall costs, making technologies in energy, storage, and carbon capture more financially viable, scalable, and accessible. Collaboration in science and technology research can accelerate the development of new climate technologies, overcoming barriers more efficiently and driving quicker commercialization and implementation. And there are opportunities for sharing best practices that help advance the work of deployment.

Beyond the need for collaboration on climate innovation investment and broader finance, the US and Europe need to

21 Akshat Rathi, "This Climate Tech Boom Is Recession-Proof," *Bloomberg.com*, September 27, 2022, https://www.bloomberg.com/news/articles/2022-09-27/this-climate-tech-boom-is-recession-proof.

22 "US Inflation Reduction Act: A Catalyst for Climate Action," Credit Suisse, November 30, 2022, https://www.credit-suisse.com/about-us-news/en/articles/news-and-expertise/us-inflation-reduction-act-a-catalyst-for-climate-action-202211.html.

23 "Bloomberg New Economy Climate Technology Coalition Launched Today in Singapore," Bloomberg New Economy, November 16, 2022, https://www.bloombergneweconomy.com/news/climate-technology-coalition-launch/#:~:text=Elevating%20planetary%20technology%20from%20level.

24 "Bloomberg New Economy Climate Technology Coalition Launched Today in Singapore," Bloomberg New Economy, November 16, 2022, https://www.bloombergneweconomy.com/news/climate-technology-coalition-launch/#:~:text=Elevating%20planetary%20technology%20from%20level.

25 "Glasgow Financial Alliance for Net Zero," Glasgow Financial Alliance for Net Zero, n. d., https://www.gfanzero.com/.

26 "Climate Adaptation," United Nations, accessed December 7, 2023, https://www.un.org/en/climatechange/climate-adaptation#:~:text=Priority%20must%20go%20to%20the%20most%20vulnerable&text=Estimated%20adaptation%20costs%20in%20developing.

collaborate to secure supply chains as wells. Challenges including the pandemic – with its ensuing supply-chain crisis – and Russia's attack on Ukraine underscore the necessity for new industrial partnerships that build resilience in the face of shocks. There's a pressing need to develop alternative sources for critical materials and components, ensuring access to needed goods even during diplomatic or military tensions, including trade wars and embargoes.[27] Complementarities including Europe's advances in renewable energy technologies and the US's capabilities in software and hardware development, can accelerate the net-zero transition while also contributing to priorities in defense, telecommunications, and critical infrastructure.

The US and Europe also need to deepen their partnership to guard against looming challenges to the transatlantic relationship. Europe recently inaugurated a first-of-its-kind Carbon Border Adjustment Mechanism (CBAM) – a tax on specific imported products based on the carbon emissions associated with their production. The Biden administration has proposed a different model – a "green steel club" of countries that levy tariffs on high-emission imports of industrial materials.[28] While either strategy will have important emissions-reduction benefits, the US and EU need to coordinate their approaches – or else risk more serious trade tensions that could ultimately benefit higher-emissions industrial producers in China and elsewhere.[29]

TRADE AND FINANCIAL MARKETS

In the view of many policymakers, the most direct way to boost long-term EU-US collaboration on climate tech is to create a common market through a free trade agreement. Issues like the local content requirements are largely irrelevant if there's a binding treaty for full market access. This is unlikely in the current context, however: a major new free trade agreement is likely a nonstarter in today's politics, especially in the US. Still, it's possible to create key elements of a common market without going the full distance.

There are various places where the US and Europe could commit to reduce tariffs around green industries. This isn't only in the most apparent areas of clean energy products. Allies could be valuable, for example, to find ways to eliminate trade barriers for recycled materials and to create a market for secondary raw materials. Trade policy should be oriented toward maximizing the cost-effective production of goods and services that contribute to decarbonization and other ecological goals – whether that's low-carbon technology or repairable, reusable, or recyclable products.

One solution is to focus on 'friendshoring' – rerouting supply chains to encompass countries with common values and interests. The concept centers on shifting US supply chains from rivals and towards trusted partners. The initiative, first articulated by Treasury Secretary Janet Yellen, aims to counter the influence of China and other countries in critical materials and advanced technologies and products, while deepening partnership with countries on which the US can rely amidst geopolitical shocks.[30] There are challenges in identifying which countries can qualify – depending on considerations around values and geoeconomic interests. There are also challenges around domestic politics: namely that friendshoring, by definition, means *not* producing a product or resource domestically.

Still, there are ongoing dialogues between the US and Europe as well as other partners on how to expand friendshoring. There will likely be greater necessities to expand friendshoring in the coming years as the energy transition requires more and more critical minerals and other resources and product components – and as geopolitical contingencies demand more resilient supply chains for everyday products. Willy Shih, a professor at Harvard Business School and expert on supply chains, puts the necessity for friendshoring simply: It is "a recognition that we can't do everything ourselves."[31] While this recognition may seem obvious, there is still often an implicit assumption in American political rhetoric that the US will soon be able to produce virtually everything domestically. The fact remains that, if the US wants to achieve its goals with respect to manufacturing and the net zero transition, it will be necessary to build supply chains among friends and strengthen trade linkages.

To expand friendshoring, countries need to take a series of steps, including: (1) Systematically identifying which critical minerals, materials, and technology products are needed for the energy transition and other purposes. This requires rigorous analysis and tracking of global supply chains to determine which allies can provide these resources. (2) Building on these lists, the US, Europe, and other partners need to focus on aligning interests, values, and capabilities to facilitate the rerouting of supply chains. (3) Also building on the analysis of supply chains, countries – particularly the post-IRA United States – can selectively extend eligibility for subsidies and incentives to partners. These incentives would drive the development of more resilient supply chains that support strategic and climate goals. (4) As

27 Marianne Schneider-Petsinger, "US and European Strategies for Resilient Supply Chains Balancing Globalization and Sovereignty" (Chatham House, September 2021), https://www.chathamhouse.org/sites/default/files/2021-09/2021-09-10-us-european-supply-chains-schneider-petsinger.pdf.

28 Ana Swanson, "U.S. Proposes Green Steel Club That Would Levy Tariffs on Outliers," *The New York Times*, December 7, 2022, sec. Business, https://www.nytimes.com/2022/12/07/business/economy/steel-tariffs-climate-change.html.

29 Chris Bataille et al., "As US-EU Trade Tensions Rise, Conflicting Carbon Tariffs Could Undermine Climate Efforts," The Conversation, January 23, 2023, https://theconversation.com/as-us-eu-trade-tensions-rise-conflicting-carbon-tariffs-could-undermine-climate-efforts-198072.

30 "Remarks by Secretary of the Treasury Janet L. Yellen on Way Forward for the Global Economy," U.S. Department of the Treasury, April 13, 2022, https://home.treasury.gov/news/press-releases/jy0714#:~:text=We%20cannot%20allow%20countries%20to.

31 Sarah Kessler, "What Is 'Friendshoring'?," *The New York Times*, November 18, 2022, sec. Business, https://www.nytimes.com/2022/11/18/business/friendshoring-jargon-business.html.

friendshoring moves forward, the program would need to continually adapt and evolve to meet changing global market dynamics. Partners would need to work together to be responsive to changes in demand, supply disruptions, and geopolitics without risking overall relations. Taken to completion, this work would not only accelerate the energy transition by ensuring a reliable supply of key resources but also deepen alliances.

There are other ways that the US and Europe can further use finance to advance climate innovation and technology deployment. For example, the US and EU can establish joint funding mechanisms for climate action, like green bonds, that pool resources from both public and private sectors, increasing the availability of capital for projects. Working in tandem, the US and EU can create new mechanisms to mitigate investment risks in net zero technologies that may include guarantees, insurance, or blended finance arrangements that de-risk private sector projects. For example, in October 2023, the European Council adopted a regulation which created a common European green bond standard. The regulation creates uniform requirements for issuers of bond that wish to be certified as a European green bond or EuGB.[32] The US and Europe may consider possibilities of combining such certifications in order to attract larger pools of investment. Working together – with support from multiple governments – the movement for decarbonization can better harness economies of scale.

COMMON STANDARDS

Standards might sound like a peripheral part of the energy transition – but there is a reason why they have been a prime area of focus for the TTC to date. They are essential for scaling technologies across borders and creating a transatlantic marketplace for green technology. Common standards are required for moving resources and products across jurisdictions quickly and seamlessly.

One prominent example is hydrogen. The energy industry increasingly uses color codes to indicate the production method of hydrogen. Whereas 'green' hydrogen is produced via electrolysis – with electricity, optimally from renewable sources, splitting water into hydrogen and oxygen – 'blue' hydrogen is taken from natural gas through steam methane reforming, resulting in hydrogen and carbon monoxide.[33] If carbon emissions from this process can be captured and stored, the hydrogen is then deemed 'blue'. Other categories include 'grey' hydrogen, made from natural gas without any efforts to capture carbon byproducts.

In late 2021, the European Commission published its legislative package of hydrogen and decarbonization, proposing a series of new rules and definitions – including legal clarity of the concepts of 'green' versus 'blue' hydrogen in EU energy regulation. Yet there is currently little standardization with respect to hydrogen between jurisdictions including the US and EU.[34]

Clear regulations and certification systems focusing on the emissions intensity of hydrogen production could enhance transparency and encourage investments in both production and infrastructure – as well as the trade of hydrogen between markets. While the color scheme offers a basic idea of production methods, one critique is that it lacks quantification of emission impacts. A common system for determining the greenhouse gas intensity of hydrogen would simplify certification processes and allow for more accurate comparison of emissions across various production methods.[35] Europe's work on standardization could serve as a model for global hydrogen market standards, perhaps starting with the transatlantic allies.

EV charging standards are another key area for future work on standards. While many of the same electric vehicle models are sold across different markets, different countries – and even subnational jurisdictions – have different standards for charging.[36] For example, the main standard in the US is the SAE J1772, often referred to as the J-Plug. This is used for Level 1 and Level 2 AC charging. For DC fast charging, the common standards are the Combined Charging System and CHAdeMO. In Europe, the Type 2 connector, also known as the Mennekes connector, is widely used for AC charging. The CCS is also used in Europe for DC fast charging. The benefits of harmonizing standards include easier cross-border travel for EV drivers, a reduction in manufacturing complexity for EV and charging infrastructure manufacturers, and ultimately faster uptake in charging technologies. The challenge is that existing infrastructure and EVs are already equipped with current standards, and transitioning to a new unified standard would require an overhaul of existing vehicles and facilities. It would also require coordination between different regulatory bodies and manufacturers across countries – including consensus on technical specifications, safety standards, and other protocols. Still, given the scale of the EV transition challenge, many market observers believe these are important steps to facilitate the success of a historic undertaking.

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32 "European Green Bonds: Council Adopts New Regulation to Promote Sustainable Finance," European Council, October 24, 2023, https://www.consilium.europa.eu/en/press/press-releases/2023/10/24/european-green-bonds-council-adopts-new-regulation-to-promote-sustainable-finance/.

33 "The Hydrogen Colour Spectrum| National Grid Group," National Grid, February 23, 2023, https://www.nationalgrid.com/stories/energy-explained/hydrogen-colour-spectrum#:~:text=Blue%20hydrogen%20is%20produced%20mainly.

34 "The Emerging Hydrogen Economy: Regulation, Policy & Industry Update," Akin, October 29, 2020, https://www.akingump.com/en/insights/blogs/speaking-energy/the-emerging-hydrogen-economy-regulation-policy-and-industry-update.

35 "Towards Hydrogen Definitions Based on Their Emissions Intensity" (International Energy Agency, April 2023), https://iea.blob.core.windows.net/assets/acc7a642-e42b-4972-8893-2f03bf0bfa03/Towardshydrogendefinitionsbasedontheiremissionsintensity.pdf.

36 Akshat Rathi, "This Climate Tech Boom Is Recession-Proof," *Bloomberg.com*, September 27, 2022, https://www.bloomberg.com/news/articles/2022-09-27/this-climate-tech-boom-is-recession-proof.

Beyond the strict focus on decarbonization, the US and Europe should also consider common standards around the circular economy – including how to recycle products like photovoltaics and lithium-ion batteries. This is one area where the US and Europe should not only coordinate in terms of regulation but also research into universal best practices. Aligning policies and regulations related to climate technology and investment can streamline processes, reduce bureaucratic hurdles, and create a more conducive environment for climate finance. This harmonization includes carbon pricing, subsidies for clean technologies, and standards for green investments.

JOINT RESEARCH

While the EU-US Trade and Technology Council is working to expand some shared climate technology research between the continents, policymakers can go further to explore the establishment of more direct research ties.[37] There is a long history of using technology research as a basis for deepening ties across countries. Several examples have produced not only technical advances but also, at times, diplomatic advancements between countries. These include:

- *International Thermonuclear Experimental Reactor (ITER):* This international nuclear fusion research and engineering megaproject is currently under construction in France. ITER is a collaboration of 35 countries including the EU (representing 27 member states), the UK, Switzerland, the United States, Russia, China, India, Japan, and South Korea. Goal: The goal is to demonstrate the feasibility of fusion as a major source of carbon-free energy. The project demonstrates how diverse countries can come together to address a technical challenge so large that no individual country could manage alone.

- *CERN (European Council for Nuclear Research):* Established in 1954, CERN is the world's largest particle physics laboratory. With support from 23 member states as well as several observer status states, the laboratory has been key to many advancements, including the discovery of the Higgs boson and the World Wide Web.

- *International Space Station (ISS):* This is a joint project between NASA (United States), Roscosmos (Russia), JAXA (Japan), ESA (Europe), and CSA (Canada). Its purpose is to leverage complementary assets of multiple space programs to advance understanding of astrobiology, astronomy, meteorology, physics, and other fields. It has been a high-profile collaboration that has required a high degree of technical coordination, even among states that have often faced serious diplomatic tensions.

- *The Human Genome Project*: Drawing on both public and private resources, this international research project was created to achieve the goal of determining the base pairs that make up human DNA, and of identifying and mapping all of the genes that comprise the human genome. With participation of scientists from the US, Britain, Japan, France, Germany, China, and other partners, it completed its mission in 2003 and has led to major advances in biotechnology and genomics.

Drawing on these successes, the US and Europe should consider establishing joint research laboratories to address the major technological challenges for the net-zero transition. For example, the transatlantic allies could create new "joint centers of excellence" focused on solving the grand challenges in climate tech, including green hydrogen, battery storage, grid flexibility, carbon utilization, climate modelling, and others. These new centers can leverage countries' diverse tools and expertise to advance research and de-risk private investment.

One potential avenue for partnership would be between Horizon Europe and the US National Laboratories. Horizon Europe – the EU's key funding program for research and innovation – has a budget of approximately €95.5 billion in the period from 2021 to 2027.[38] Its mission is to strengthen the EU's scientific and technological base to address global challenges and promote Europe's industrial competitiveness. Horizon Europe offers grants for research and innovation projects through both open and competitive calls for proposals – including for joint research projects, infrastructure, and talent development, including in clusters relevant to climate and energy, such as 'Climate, Energy and Mobility.' On the other side of the Atlantic, the US National Laboratories are a network of federally funded R&D centers, overseen by the US Department of Energy, and focused on various scientific disciplines. The labs could provide facilities, expertise, and resources necessary for work in net-zero technologies. A collaborative funding model can be established where Horizon Europe and the US National Labs jointly finance these research centers.

A key lesson from decades of international collaboration on science and technology is the need for clear vision and objectives between parties. For example, despite geopolitical tensions, various countries came together to realize the International Space Station and achieve a specific set of goals for the expansion of space research. The US and Russia, in particular, had to overcome deep post-Cold War distrust to make the ISS succeed – while all parties had to manage significant differences in priorities and uncertainties over how research budgets would benefit respective domestic economic interests. Yet the ISS succeeded as a platform for thousands of research experiments in fields including biology, medicine, physics, astronomy, and mete-

37 "EU-US Trade and Technology Council," European Commission, n. d., https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/stronger-europe-world/eu-us-trade-and-technology-council_en.

38 "Horizon Europe," European Commission, December 5, 2023, https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe_en#:~:text=What%20is%20Horizon%20Europe%3F.

orology, yielding progress in technologies including water purification, medical devices, Earth observation, and climate monitoring.

The US and Europe should identify a range of clear objectives in climate tech and deploy combined resources – and political will – to achieve them. For example, to catalyze action on climate change, the US-Europe collaboration on Centers of Excellence can set ambitious, specific goals across various key areas. Some illustrative examples of ambitious goals and targets for joint research could include:

- *Battery Storage:* For example, the transatlantic allies could set a goal to develop a new generation of solid-state batteries with at least 50 percent more energy density and 30 percent lower manufacturing costs than current lithium-ion batteries by 2030. If successful, this would potentially transform the electric vehicle market and renewable energy storage.

- *Green Hydrogen:* Achieve a breakthrough in electrolysis technology to reduce the cost of green hydrogen production by 50 percent within a decade. This would make green hydrogen cost-competitive with fossil fuel-derived hydrogen fuels, enabling a range of applications from industrial to fuel cells for transport.

- *Carbon Monitoring:* Prototype a satellite-based global carbon monitoring system that could pinpoint sources of emissions with a high degree precision by 2026.

- *Grid Flexibility and Renewable Integration:* Develop an advanced grid management technology that could enable 80 percent penetration of intermittent clean energy sources into the grids of participating partner countries by 2030, while ensuring stability and reliability.

- *Sustainable Urban Transit:* Create and demonstrate carbon-neutral urban mobility systems in two to four major cities in the US and Europe by 2035. These systems would incorporate electrified public transit, smart traffic management, and infrastructure for cycling.

- *Climate-Smart Agriculture:* Demonstrate and deploy agricultural technologies and practices that boost crop yields and resource efficiency without expanding farmland, while reducing greenhouse gas emissions by 30 percent by 2030.

- *Circular Economy Innovation:* Advance technologies and logistics to achieve 90 percent recycling and reuse rates for plastics in the US and Europe by 2030, substantially reducing plastic waste.

- *Adaptation Technologies:* Create and deploy technologies and new infrastructure designs by 2030 that boost the resilience of coastal areas to sea-level rise.

Given the urgency of the need for climate solutions, there is a necessity to invest in not only basic science, but also the design, engineering and manufacturing effort that can turn a promising idea into useful solutions. In general, Europe has done a better job than the United States with respect to translational research – owing to a longstanding fear among US policymakers of national science and tech agencies interfering with the free market and "picking winners and losers." An estimated 50 countries, including multiple in Europe, now have government-supported innovation agencies devoted to turning discoveries and inventions into new commercially-viable and socially-beneficial products and processes.[39] Of course, a major challenge with this kind of research is to develop clear guidelines on intellectual property rights and data sharing to prevent conflicts and facilitate cooperation. However, the US and EU members should recognize that focused development of new and practical climate technologies can promote job creation across multiple economies, help avoid the costs of climate impacts, and reduce dependencies on adversaries. The overall logic of this approach is simple: cooperation is more sensible than competition when it comes to technology research with respect to climate. The transatlantic allies – and the world as a whole – will benefit if countries set ambitious technology goals and deploy all their combined resources in a coordinated way toward meeting them.

SHARING BEST PRACTICES

Partnership on innovation can be an entry point for broader collaboration. As described above, the EU-US Trade and Technology Council is beginning work on how to create common standards for green government procurement and expanding electric vehicle charging. But, once again, governments can go further. The US and Europe can learn from each other on timely questions of how to deploy clean technologies – including workforce development strategies like apprenticeships, financing strategies like green banks, and other issues like permitting, utility regulation, and economic redevelopment for regions transitioning away from the fossil fuel economy. Beyond new centers of excellence on addressing grand challenges in climate tech, the US and Europe can create new platforms for sharing best practices in public policy and offering mutual technical assistance – including at the local and regional levels of government.

US and EU countries hold various pieces of the puzzle with respect to climate technology deployment – and there should be a concerted effort, both at national and subnational levels, to share what is working with other parties and offer technical assistance of improving climate tech deployment.

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39 Stephen Ezell, Frank Spring, and Katarzyna Bitka, "The Global Flourishing of National Innovation Foundations" (Information Technology and Innovation Technology, April 2015), https://www2.itif.org/2015-flourishing-national-innovation.pdf?_ga=1.143057781.15409546.1441141197.

Finance is one area for deepened exchange of best practices. One lesser-known element of the Inflation Reduction Act is the establishment of $27 billion in funding for the creation of "green banks" across the United States.[40] These institutions generally create portfolios of loans to individuals and businesses for projects to reduce carbon emissions, restore environmental quality, and accelerate economic development.[41] Unlike traditional banks, they don't take deposits. They use relatively small amounts of public financing to attract much larger private sector funding for investments in sustainability. Green banks typically use financing rather than grants – meaning that capital is expected to be repaid and reinvested. Yet these are mission-driven organizations, meaning the purpose isn't to make a profit but rather to address climate goals as well as, in many cases, to serve low-income communities.

In more than 20 US states, green banks are working with other financial institutions to offer low-interest loans for efficiency, energy-related home upgrades, and solar for affordable housing developments as well as larger projects like wind developments, community solar, geothermal, and fleets of electrified buses. In many cases, they work with investors, developers, state governments, and others to design energy transition projects across a state or region.

Europe has several net-zero finance mechanisms in place or in development. The European Investment Bank (EIB), for example, provides financing and expertise for sustainable investment projects in various areas, including renewable energy, energy efficiency, and sustainable transport. The bank has committed to increasing its support for climate action and environmental sustainability to more than 50 percent of its total financing by 2025.[42] The German KfW Bankengruppe, the government-owned development bank, plays a substantial role in financing environmental and energy-efficient projects within Germany and internationally, and the French Green Investment Fund (Fonds Vert) has implemented a green investment fund aimed at supporting sustainable development projects.[43] Some US policymakers originally sought to create a national green bank, akin to the EIB, as one centralized funding authority. Indeed, the concept of "green banks" grew out of an amendment to the Obama-era Waxman-Markey climate legislation to authorize such a federal institution[44]. Yet the decentralized US approach has important advantages, and it's now taking hold as a model for other countries to pursue. Europe can potentially learn from the proliferation of smaller-scale green development institutions that are leveraging private capital across the United States.

One area in which the IRA presents both opportunities and challenges is the set of expanded tax credits for projects that meet standards for wages, benefits and apprenticeships. For example, the IRA's investment tax credit – available to many types of renewable energy projects – offers up to 30 percent of the cost of a project that meets labor standards including a union workforce.[45] That credit falls to only 6 percent if the project does not meet the standards. Similarly, the IRA requires 12.5 percent of project labor hours to be performed by qualified registered apprentices for construction beginning in 2023 and 15 percent for those starting in 2024 or later – in order to incentivize training of more skilled construction workers.

These conditional tax incentives have been an important lever for the Biden administration to pursue policy goals around unionization and workforce training – as well as addressing economic inequality generally. While some critics contend that these measures seek to do too much and may hinder the uptake of the law and the speed of the energy transition, proponents counter that it's folly to think about economic and climate goals in separate siloes. In the marathon effort of remaking energy, transportation, agriculture, and other systems to address the climate crisis, it's essential to address affordability issues and present long-term benefits to low-income communities – not only as a matter of fairness but also to sustain political will. Still, there are practical hurdles to achieve all these priorities. The US Treasury Department recently announced a "good faith" exception from using registered apprenticeship programs if there is not such a program available in the project's location. Many project developers have raised concerns about the specter of labor shortages and a lack of apprenticeship or workforce training programs in key areas.[46]

This is one area where the US can learn a substantial amount from Europe. For example, the German model of workforce and apprenticeship training, known as the "du-

40 Timothy Gardner, "U.S. Launches $20 Billion in 'Green Bank' Programs to Curb Climate Change," Reuters, July 14, 2023, https://www.reuters.com/sustainability/us-launches-20-bln-green-bank-programs-curb-climate-change-2023-07-14/#:~:text=The%20%2427%20billion%20fund%20was,pumps%20and%20electric%20vehicle%20chargers.

41 December 12 and 2022 Jeff Turrentine, "How Green Banks Are Financing the Fight against Climate Change," NRDC, December 12, 2022, https://www.nrdc.org/stories/how-green-banks-are-financing-fight-against-climate-change.

42 Bruno Hoyer, "COP28: New Solutions for Clean Technologies and a Just Transition Worldwide," European Investment Bank, November 30, 2023, https://www.eib.org/en/press/all/2023-476-cop28-new-solutions-for-clean-technologies-and-a-just-transition-worldwide.

43 "Green Transition Facility: EUR 100 Million for 'Green Innovations' | KfW," KFW, June 7, 2023, https://www.kfw.de/About-KfW/Newsroom/Latest-News/Pressemitteilungen-Details_765952.html.

44 Dan Reicher, "The U.S. Clean Energy Deployment Administration: A Business-Driven Approach to Leveraging Private Sector Investment in Clean Energy Innovation and Commercialization the AEIC Scaling Innovation Project" (American Energy Innovation Council, June 2020), https://bipartisanpolicy.org/download/?file=/wp-content/uploads/2020/06/Looking-Forward-with-a-Clean-Energy-Deployment-Administration.pdf.

45 "FACT SHEET: How the Inflation Reduction Act's Tax Incentives Are Ensuring All Americans Benefit from the Growth of the Clean Energy Economy," U.S. Department of the Treasury, October 23, 2023, https://home.treasury.gov/news/press-releases/jy1830#:~:text=The%20Inflation%20Reduction%20Act%20modifies.

46 Nichola Groom and Valerie Volcovici, "Biden's Climate Agenda Has a Problem: Not Enough Workers," *Reuters*, January 11, 2023, sec. Energy, https://www.reuters.com/business/energy/bidens-climate-agenda-has-problem-not-enough-workers-2023-01-11/.

al system," is highly regarded globally.[47] One of its strengths is collaboration between government, industry, and educational institutions. Under the dual system, companies offer on-the-job training and practical experience, while vocational schools offer supplementary classroom education. Industry and unions ensure that the training is directly relevant to practical needs. These German apprenticeships are highly standardized, with rigorous, nationally recognized exams and certifications. Crucially, in Germany, vocational training and apprenticeships are valued and considered a respectable career path, comparable to university education. The system is integrated with the broader primary and secondary education system, offering various pathways for students to enter apprenticeships. Adopting a German-style apprenticeship program in the US would require more than a simple legislative package. It would require a cultural shift away from the primacy of university education as well as a set of coordinated investments and reforms from business and labor. While this is a major undertaking, the US has a substantial need for new labor and mean of workforce development to meet the requirements of the net-zero transition.

There are other areas where the US and EU can work together to develop strategies for economic redevelopment, offering technical assistance and sharing best practices. "Just transition" is an idea in climate policy that emphasizes that equity needs to be a central consideration in the development of a net-zero economy. Just Transition seeks to ensure that the mobilization – including the restructuring of regional economies that had been dependent on fossil fuels – addresses the needs of the most vulnerable and most heavily-impacted people.

The US has several governmental and nongovernmental initiatives aimed at supporting communities affected by the transition away from fossil fuels. For example, the Partnerships for Opportunity and Workforce and Economic Revitalization (POWER) Initiative aims to assist communities impacted by changes in the coal industry and the Coal Community Workforce Response grant helps coal miners and coal power plant workers transition to new employment. US policymakers are working toward options for diversifying local economies away from fossil fuel dependency – though success to date has been limited. In some respects, Europe is more advanced in terms of policy for a Just Transition.[48]

The European Union has established a Just Transition Mechanism,[49] part of the European Green Deal, with a focus on regions most affected by the transition towards a clean economy. European approaches have emphasized the importance of social dialogue and active community participation in planning and implementing transition strategies. EU countries with heavy reliance on coal (including Poland and Germany) are actively working on transitioning their energy sectors, with a focus on supporting affected workers and communities.[50]

Both the US and Europe can learn from each other's experiences in retraining workers and creating job opportunities in new sectors. Europe's generally larger social safety nets and training programs can offer models for the US, while the US can share its experiences in decentralized innovation. The key is for allies to recognize that success in addressing the global challenge of climate change requires all nations to succeed in not only meeting decarbonization targets but also sustaining the political will to maintain those targets over time.

These are a few illustrative ideas of how the US and Europe can exchange best practices in deploying technology and managing the political economy of the energy transition. The US and EU can also establish networks for local and regional authorities to share experiences in grid management, utility regulation, net-zero city planning, local energy solutions, and community-led environmental initiatives. A key to success will be for parties to exchange ideas at multiple levels of government.

NAVIGATING DIPLOMATIC RISKS

While the premise of this paper is that the US and EU can move beyond the tensions that emerged with the passage of the IRA by pursuing positive new opportunities on climate technology innovation and deployment, it is important to acknowledge that new diplomatic and economic challenges are subject to further threaten the transatlantic alliance.

In 2005, the EU established its Emissions Trading System (ETS) – the first major global carbon market. Built on a cap-and-trade system, the ETS is an open market for trading carbon emissions allowances. To leverage this system toward the global reduction of emissions, the EU later designed a "Carbon Border Adjustment Mechanism" (CBAM). As described earlier in this paper, CBAM is essentially a tax on imports of key products and resources from nations that do not have an equivalent carbon price, which aims to prevent EU-based companies from moving production to other jurisdictions with less stringent climate policies. Pilot implementation began in late 2023, when importers in areas including iron and steel, cement, aluminum, fertilizers, electricity, and hydrogen were required to start reporting information on embedded emissions to EU regulators. Starting in 2026, importers will have to buy permits to cover their products' carbon at the ETS market price. The European CBAM is still a work-in-progress. Products and scope will

47 Auswärtiges Amt, "The German Vocational Training System: An Overview," German Missions in the United States, n. d., https://www.germany.info/us-en/welcome/wirtschaft/03-Wirtschaft/-/1048296.

48 "POWER Initiative | U.S. Economic Development Administration," US Economic Development Administration, n. d., https://www.eda.gov/archives/2016/power/.

49 EU Commission, "The Just Transition Mechanism: making sure no one is left behind", April 22, 2024, https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/finance-and-green-deal/just-transition-mechanism_en.

50 Szymon Kardaś, "From Coal to Consensus: Poland's Energy Transition and Its European Future," ECFR, September 27, 2023, https://ecfr.eu/publication/from-coal-to-consensus-polands-energy-transition-and-its-european-future/.

continue to be refined and reviewed until 2034 – yet the impacts of implementation, including on overseas relations – will begin to be felt in the coming years.[51]

Because the US does not yet have a mechanism to price carbon like the ETS – and because there is no clear pathway to establishing one in the near term – Europe's CBAM will very likely begin to apply to American exports including airliners, medical instruments, pharmaceuticals, and agricultural products. Many US policymakers are still unaware of the planned impacts of CBAM. Once the implications are fully understood, some US policymakers are likely to seek to respond with tariffs on EU imports, irrespective of carbon intensity.

This would be a perilous situation – not only for US-EU diplomatic relations. US exporters would pay the tariff, potentially increasing inflation in the US. The European CBAM tariff on US exports would likely stimulate the EU development of low-carbon technologies – but the overall trade war would likely provide advantage to China and other adversaries while slowing the global energy transition.

Several US senators – including some Republicans – have proposed legislation laying out various CBAM proposals, combining some version of domestic carbon pricing with tariffs on imports including steel and aluminum.[52] But proposals for CBAM without carbon requirements on domestic producers would face opposition from the EU. The Biden administration is proposing a Global Arrangement on Sustainable Steel and Aluminum (GASSA) for international cooperation on emissions reduction, including tariffs on emissions-intensive imports – although some important details of this proposal would be contingent on US lawmakers.

The most straightforward solution is for US policymakers to recognize that Europe is already creating a climate club – and that the best course of action, not only for the climate but also for US industrial producers, is to move forward with a carbon-pricing mechanism and receive an exemption from the EU. The Nobel laureate economist William D. Nordhaus has argued that "a climate club," with small trade penalties for countries that fail to comply, "can induce a large stable coalition with high levels of abatement."[53] While this might seem like an unlikely outcome, given the state of US politics, US industry could drive US politicians toward such a solution.

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51 Philip Blenkinsop, Kate Abnett, and Kate Abnett, "EU Launches First Phase of World's First Carbon Border Tariff," *Reuters*, October 2, 2023, sec. Environment, https://www.reuters.com/business/environment/eu-launches-first-phase-worlds-first-carbon-border-tariff-2023-09-30/#:~:text=Importers%20will%20from%202026%20need.

52 Emma Dumain, "Bipartisan Bill Would Lay Groundwork for U.S. Carbon Tariffs," E&E News by POLITICO, June 8, 2023, https://www.eenews.net/articles/bipartisan-bill-would-lay-groundwork-for-u-s-carbon-tariffs/.

53 William Nordhaus, "Climate Clubs: Overcoming Free-riding in International Climate Policy", *American Economic Review 2015*, 105(4): 1339–1370, April 22, 2024, https://ycsg.yale.edu/sites/default/files/files/nordhaus-climate-clubs.pdf.

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THE ART OF THE POSSIBLE

Across virtually all the issues described in this paper, domestic politics will continue to be the elephant in the living room.

In interviews, various European policymakers and political observers emphasized that – despite tensions that emerged with the IRA – the Biden administration has demonstrated understanding and sympathy to the EU's concerns, and a general willingness to pursue remedies like the critical minerals agreement to improve relations. For many European policymakers focused on the issue of climate, the events of the Trump era were not just discouraging but – in the words of one diplomat – "traumatic," given that working groups and investment flows were suspended or even abandoned, creating a sense of powerlessness in addressing the crisis of a warming world. The possibility of a new Republican administration in the US could close the door to many of the pathways for climate coordination described in the paper. Likewise, a Republican administration, with a supportive Congress, could also potentially cancel many of the incentives launched with the IRA, including not only through a repeal of legislation but also delays of rulemaking at the Treasury Department or implementation at the Internal Revenue Service. In spite of any potential economic benefits this would present to Europe, many current EU policymakers would regard this as a substantial loss.[54]

While the risks of European retrenchment from climate action are lower – given a higher degree of consensus in Europe – the rise of several rightwing parties in Europe threatens to slow the pace of climate action and could narrow the window for cooperation with the United States.

Still, despite all of these risks, the politics of climate change and industrial policy are not as straightforward as they appear.

While most Republican members of Congress continue to state their strong objections to the IRA, there is a growing recognition, particularly among Republican officials in rural districts, of the benefits presented by the bill's clean energy incentives. Although Donald Trump and other prominent Republicans continue to attack the electric vehicle transition, there is a growing acceptance on the right of many low-carbon technologies like solar, wind, and EVs, whether owing to local economic interests or even cultural sensitivities like the controversial conservative political positions of Tesla founder and CEO Elon Musk.[55]

More broadly, some prominent Republicans, including Senator Marco Rubio of Florida have been pushing against the GOP's traditional stance on free markets, advocating for a more proactive industrial policy. This change is driven by the objectives of countering China's influence and advancing new technologies in the United States. Rubio has recently introduced five pieces of legislation aimed at bolstering American industrial commons and technology development, focusing on areas like critical minerals, medicines, and technology.[56] His legislation includes initiatives to rebuild key supply chains, repatriate medical device and pharmaceutical production, support small manufacturers, assist in reshoring energy electrical grid component manufacturing, expand rare earth metallurgy manufacturing, and diversify biopharmaceutical manufacturing capacities. The approach shows growing bipartisan priority for reducing dependency on China and Russia.[57]

The "Foreign Pollution Fee Act of 2023," one of America's current CBAM proposals, marks a milestone. Introduced by Senator Bill Cassidy of Louisiana, it represents the first Republican-led legislation to impose fees on carbon-intensive industries – albeit exclusively those overseas.[58] The stated focus of the bill is to hold China and other competitors ac-

54 Christian Shwagerl, "Shifting Political Winds Threaten Progress on Europe's Green Goals," Yale Environment 360, November 16, 2023, https://e360.yale.edu/features/europe-environment-backlash.

55 Andres Picon, "Despite Rhetoric, GOP-Led States Start to Embrace EVs," E&E News by POLITICO, November 2, 2022, https://www.eenews.net/articles/despite-rhetoric-gop-led-states-start-to-embrace-evs/.

56 Joanner Pena, "Rubio Releases Pro-American Industrial Policy Agenda for the 118th Congress," Marco Rubio, January 24, 2023, https://www.rubio.senate.gov/rubio-releases-pro-american-industrial-policy-agenda-for-the-118th-congress/.

57 Cameron Kerry, Mary Lovely, and Pavneet Singh, "Is US Security Dependent on Limiting China's Economic Growth?," Brookings, October 3, 2023, https://www.brookings.edu/articles/is-us-security-dependent-on-limiting-chinas-economic-growth/.

58 William Alan Reinsch and Thibault Denamiel, "Insights into the Foreign Pollution Fee Act," *Center for Strategic and International Studies*, November 13, 2023, https://www.csis.org/analysis/insights-foreign-pollution-fee-act.

countable for their lax environmental standards while also promoting domestic production. Cassidy's proposal, along with Rubio's industrial policies, reflects a significant move among Republicans to embrace elements of industrial policy and mission-driven state invention that were once anathema to the US right. While Donald Trump continues to attack decarbonization policies, his legacy of opposing Republican economic orthodoxy on trade and the role of the government in markets may unintentionally contribute to Republican openness to new climate policies over the longer term.

All of this has implications for the US-EU climate relationship. As the issue of competition with China becomes more prominent, there is an opening not only for US-focused industrial policy but also new forms of friendshoring to strengthen supply chains and overall resilience. While it remains unlikely that Republicans will support new funding for US-EU joint research and innovation projects, there could be sufficient support for the general goals of a such a collaboration – including new low-carbon technologies, water efficiency, and reduced reliance on adversaries – that Republicans could support the use of existing funds for such purposes. In terms of the general exchange of ideas and best practices across the Atlantic, subnational governments could continue to work together, perhaps with greater intensity, in the event of a major shift in power.

In short, political change could present a serious challenge to the future of US-EU climate collaboration – yet many of the ideas and proposals described in this paper could nonetheless survive.

This is an age in which competition is inevitable. The US and Europe will almost certainly continue to vie for investment, and multinationals will keep pushing for incentives. Matters like carbon border adjustment will continue to present challenges as long as the US has not put a price on carbon as Europe has. Nonetheless, an expanded transatlantic partnership on technology and industry could go a long way toward achieving needed investment in innovation, solving the major technological and implementation challenges, and building a sense of trust and shared mission for the work of the net-zero transition.

Is it possible – as Presidents Biden and von der Leyen imply – for the US and Europe to get beyond "zero-sum competition" on climate innovation and industry?

The answer can be yes – if the US and EU are creative and ambitious in building new partnerships across a range of relevant areas.

The transatlantic allies have more in common than they often recognize. Still, in the age of the global environmental crisis, the same can ultimately be said of all nations. The climate emergency demands global emissions reductions. The challenge will ultimately require all countries – including adversaries – to work together. While competition with China and others remains a potential motiving factor for US-EU cooperation on climate tech – particularly with respect to domestic political considerations – competition should not stand in the way of decarbonization goals.

Many of the ideas presented in this paper – including friendshoring, joint research laboratories, policy exchanges, and others – can extend well beyond the North Atlantic. In particular, there are opportunities for similar collaboration not only with traditional industrialized allies including Japan but also with major emerging economic powers including India, Mexico, and Brazil. Building on a longstanding relationship and deep complementarities in research and finance, the transatlantic alliance is a vital place to start.

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BEYOND THE CLIMATE TECH ARMS RACE

US-EU Cooperation in the Net-Zero Transition

For decades, policymakers across Europe called on the United States to enact a substantive climate law. Yet the passage of America's landmark climate IRA legislation in 2022 was not a triumphal moment in the eyes of European leaders. Instead EU partners criticized the law for producing market distortions, violating WTO treaty commitments, and creating a "global subsidy race to the bottom." The passage of the IRA compounded European anxieties around manufacturing competitiveness at a time of high relative energy prices in Europe and its concerns about the IRA have also been a function of the EU's inability to directly respond to the US law with similar measures.

On the upside, European firms may also benefit in some respects from the IRA. Companies that had already located production operations to the US can generally access the new subsidies and compete on a level playing field. Overall, they can benefit the net-zero transition in Europe by lowering the overall costs of new technologies and driving substitution away from Chinese products. By forcing a reorganization of clean tech supply chains, the IRA could boost the competitiveness of transatlantic allies relative to China. And the US has done its part to ease tensions: a US-EU Task Force on the IRA is coordinating negotiations that have already resulted in some concessions to Europe.

Still, the question remains: is it possible for the US and Europe to truly get beyond "zero-sum competition" on clean innovation and industry? This policy brief will examine the state of transatlantic relations in the age of the IRA and explore new pathways for the US and Europe to expand cooperation, repair relations, and advance global climate technology innovation on a joint basis. Building on a series of interviews with policymakers and expert observers on both sides of the Atlantic, the report will make the case that there is growing necessity—and opportunity—for allies to build a substantial partnership on net-zero technology and industry.

Further information on the topic can be found here:
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