PROJECT REPORT

Race to the Top for Climate

Building a cooperative US-EU agenda for a globally interoperable clean economy transition

RE:FORM

CLIMATE Strategies

About the Project

This report is part of the project **"Race to the top for climate: building a cooperative US-EU agenda for a globally inter-operable clean economy transition"**, which is made possible through the funding and support of the Environmental Defense Fund (EDF). The project explores how US and EU industrial decarbonization policy can be designed to optimize interoperability and enable an international race to the top for the greening of the heavy industry.

Through a co-creative exercise, "Race to the top" seeks to provide actionable knowledge and help establish the foundations for longer-term EU-US stakeholder dialogue on industrial decarbonization policy.

Find out more about the project and our latest events and publications at https://climatestrategies.org/projects/race-to-the-top/

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List of abbreviations and acronyms

ARPA-E	Advanced Research Projects Agency – Energy
BIL	Bipartisan Infrastructure Law
C&T	California's cap-and-trade scheme
CAP	Common Agricultural Policy
CBAM	Carbon Border Adjustment Mechanism
CCfD	Carbon contract for difference
CCS	Carbon capture and storage
CCU	Carbon capture and utilization
CEAP 2.0	Circular Economy Action Plan 2.0
CEM CCUS	Clean Energy Ministerial CCUS Initiative
CEM IDDI	Clean Energy Ministerial Deep Decarbonization Initiative
CHP	Combined heat and power
CMA	Critical Minerals Agreement
COP	UNFCCC Conference of the Parties
CRCF	Carbon Removal Certification Framework
DG ENER	Directorate-General for Energy
DOE	Department of Energy
DOT	Department of Transportation
EBRD	European Bank for Reconstruction and Development
EPA	Environmental Protection Agency
EPBD	Energy Performance of Buildings Directive
EU ETS	EU's Emissions Trading System
EV	Electric vehicle
EVI	Electric Vehicles Initiative
FECM	Office of Fossil Energy and Carbon Management
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FiT	Feed-in tariff
FOAK	First of a Kind
FSR	Foreign Subsidies Regulation
GASSA	Global Arrangement on Sustainable Steel and Aluminum
GGI	Greening Government Initiative
GHG	Greenhouse gas
GHGRP	Greenhouse Gas Reporting Program
GMP	Global Methane Pledge
GPP	Green public procurement
GSA	General Services Administration
HFCs	Hydrofluorocarbons
HUD	Department of Housing and Urban Development
ICE	Internal combustion engine
IDA	G7 Industrial Decarbonization Agenda
IEA	International Energy Agency
IEA WPID	IEA Working Party on Industrial Decarbonization
IF	Innovation Fund
IPCEIs	Important Projects of Common Interest
IPHE	International Partnership for Hydrogen and Fuel Cells in the Economy
IRA	Inflation Reduction Act
IRENA	International Renewable Energy Agency
ITC	Investment Tax Credit
JPI	Joint Programming Initiative
JTF	Just Transition Fund
JTM	Just Transition Mechanism
JTS	Just Transition Scheme
LCA	Life cycle assessment
LeadIT	Leadership Group for Industry Transition
LULUCF	Land Use, Land Use Change and Forestry

List of abbreviations and acronyms

MACRS	Modified Accelerated Cost-Recovery System
MESC	Office of Manufacturing and Energy Supply Chains
MFF	Multiannual Financial Framework
MI	Mission Innovation
Mtoe	Million tonnes of oil equivalent
Mtpa	Million tonnes per annum
NZIA	Net-Zero Industry Act
OCED	Office of Clean Energy Demonstrations
OECD	Organization for Economic Co-operation and Development
OTT	Office of Technology Transitions
PCI	Projects of Common interest
PCRs	Product carbon requirements
PFCs	Perfluorocarbons
POWER	Partnerships for Opportunity and Workforce and Economic Revitalization
PSLF	Public Sector Loan Facility
PTC	Production Tax Credit
R&D	Research and development
RCHH	Regional Clean Hydrogen Hubs
REAP	Rural Energy for America Program
RED	Renewable Energy Directive
RES	Renewable energy sources
RPS	Renewable Portfolio Standards
SCF	Social Climate Fund
SSI	Strategic Standardization Information mechanism
STEP	Strategic Technologies for Europe Platform
TTC	Trade and Technology Council
UNFCCC	United Nations Framework Convention on Climate Change
UNIDO	United Nations Industrial Development Organization
USDA	Department of Agriculture
USMCA	United States-Mexico-Canada Agreement
VCS	Voluntary consensus standards
WTO	World Trade Organization
ZEV	Zero Emission Vehicle

Credit: Unsplash / Peter Werkman

1 Introduction

Recent years have seen a push for industrial decarbonization on both sides of the Atlantic. In the US, the Inflation Reduction Act (IRA) introduced a big shift by launching significant subsidies and tax credits for the green transition. Responding to the IRA, the EU announced its own Green Deal Industrial Plan, and Ursula von der Leyen, recently appointed for a second term as European Commission President, has promised to accelerate efforts in this field. The Commission President pledged a new Clean Industrial Deal within the first 100 days of her second mandate, and aims to put forward an Industrial Decarbonization Accelerator Act which would channel investment to support lead markets for cleantech industries.

This is not only happening in the US and the EU. Industrial policy has seen a revival across the world. The *laissez-faire* views of the Washington Consensus are being replaced with a more interventionist approach to industrial policy, especially when it comes to achieving big missions such as the green transition. However, while greater climate ambition is welcome and industrial policy has proven to be a politically viable strategy to enhance climate action in many contexts, it does create some risks. These are associated with merging the industrial decarbonization agenda with policies focused on capturing emerging cleantech markets. This compounding is true of the IRA, which includes local content requirements in its tax incentives and favors companies with production processes in the US (or in a country with a trade agreement with the US). Such provisions risk creating a system focusing on narrowly defined national interests, concentrating investment in regions with the highest state subsidies, and doubling down on zero-sum politics – *a race to the bottom*. This focus also prevents developing countries, which do not have the capacity to compete on state subsidies, to leapfrog into a clean industrialization.

In contrast, a system designed to prioritize the successful delivery of global industrial decarbonization would take an international perspective, developing markets in locations with the most relevant capabilities and conditions,

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and leveraging efficiencies and collaboration – creating a *race to the top*. Such a vision will naturally need to leverage national and regional politics, as well as address the priorities of the workers and consumers in different countries, but would do so in a way that stimulates healthy competition. A truly global transition requires a more open approach that allows new actors to integrate into the global cleantech supply chains rather than supporting the parallel development of unsustainable, low-carbon industrial enclaves.

In US and EU politics, the goal of greening industry is also often combined with the goal of diminishing China's influence on the world markets. A recent illustration of this attitude was seen in the negotiations for a Global Arrangement on Sustainable Steel and Aluminum (GASSA), where the US and the EU attempted to reach a common approach to tariffs (this is discussed in greater detail in section 3.1). The agreement was intended both to address steel oversupply from China's non-market economy and to differentiate relatively clean EU and US steel from imports from other countries. However, talks stalled.

The debate faced a few specific challenges. First, it combined protectionism against China with green measures, which complicated the discussion on industrial decarbonization and will likely create further issues in the near future, as China is decarbonizing its own production. Second, the negotiations attempted to reach a deal on carbon pricing, one of the most difficult environmental policy measures for US-EU cooperation. Talks risked unravelling the painstakingly negotiated compromises of the EU's Emissions Trading System (EU ETS) and Carbon Border Adjustment Mechanism (CBAM), which the US was not willing to adapt to.

The stalling of the GASSA negotiations raises questions about the future of EU-US cooperation on the decarbonization of the heavy industry, and the US elections in the autumn only add further uncertainty.

This study aims to chart a way forward in this rapidly shifting landscape and explores the productive space to enhance US-EU collaboration on industrial decarbonization solutions for hard-to-abate sectors. The study finds that efforts to expand relevant transatlantic links might benefit from sidelining attempts to reconcile hard, contentious issues, such as carbon pricing. A softer path to alignment could be pursued, which would be consistent with the existing ecosystem of transatlantic links. This path would be more focused on cooperation on short-term "carrots", such as the push and pull for industrial cleantech, and long-term "sticks", such as the harmonization of standards that could become the basis for carbon requirements. It could also benefit from switching the focus from specific technologies, such as hydrogen or carbon capture and storage (CCS) and carbon capture and utilization (CCU), to systemic technological shifts, such as circular economy solutions and electrification.

This soft policy alignment is consistent with the existing ecosystem of transatlantic links, which can withstand the evolving political landscape in the US and the EU. Efforts could be directed toward strengthening current initiatives, rather than reinventing the system. In addition, many of these initiatives include actors beyond the US and the EU, and show that transatlantic cooperation can positively affect industrial decarbonization worldwide.

2 Objectives and methods

The objective of this study is to explore, taking an analytical approach, the potential for enhanced EU-US cooperation in the decarbonization of hard-to-abate industry sectors. The work offers a comparison of current and expected policies in both geographies, which aims to uncover interactions – synergies, overlaps, conflicting incentives, and gaps – between different frameworks. The study focuses on public sector initiatives and associated dialogue formats (which may also involve stakeholders from the business community, academia, or civil society), rather than transatlantic exchanges which occur exclusively within the private sector.

The analysis is supported by considerations which emerged during workshops and interviews with stakeholders and experts, whose insights allowed to broaden the perspective on the issue. It is also complemented by case studies of transatlantic policy coordination and divergence, used to extract best practices and lessons learned. The material collected in these formats enabled the development of a set of policy recommendations on how to build US-EU collaboration for a globally interoperable clean energy transition in the industrial sector, one that is:

- **Compatible with domestic efforts to deliver a clean economy:** any policy proposed needs to serve the domestic interest where it is enacted.
- **Mutually beneficial:** while serving the domestic interests, the policies are also interoperable and benefit transitions taking place elsewhere.
- **Effective in decarbonizing the industrial sector:** although developing a manufacturing base for cleantech is often a primary focus for domestic politics, a broader green industrial policy should also lead to the transition within the industrial sector itself.
- **A good foundation for a global transition:** ensuring that the transitions in the Global North also aim to build the fabric for an inclusive global clean economy.

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The comparison of US and EU industrial decarbonization policy instruments covered overarching as well as technology-specific policies. The overarching policy assessment was further organized according to the dynamic policy mix approach. That means that the policy tools are categorized according to the stage of development of the clean technologies they target. This construction of the research helps unveil key differences in the approach to scaling up clean solutions and phasing out emissions-intensive processes. The existing policy measures were classified as:

1. Supporting supply **(supply push)**, thus stimulating the initial phase of development of new clean solutions.
2. Creating a **cross-cutting price signal**, which could be used to promote and scale up their deployment.
3. Building up the demand for green goods **(demand pull)**, to create the market for new technologies.
4. Ensuring **systemic enablers** are in place, to help the technology achieve scale.

The assessment of technology-specific policies covers measures in the areas of the circular economy, clean hydrogen and derivatives, CCS and CCU, electrification and bioenergy, all crucial solutions for decarbonizing the industry.

Policy instrument classification applied in this study

Increasing market share and decreasing marginal costs of clean solutions →

Instrument type		R&D, pilots	Lead markets for cleantech	Cleantech scale-up	Phase-out of polluting tech
Supply push	R&D support	✓			
	First of a Kind (FOAK) subsidies (e.g., EU Innovation Fund)	✓	✓		
	Sectoral subsidies (e.g., CCfD, FiT)		✓	✓	
Cross-cutting price signal	Comprehensive tax credits (e.g., IRA)		✓	✓	
	Carbon price (e.g., EU ETS)		✓	✓	✓
Demand pull	Green public procurement		✓	✓	✓
	Obligations for private sector buyers		✓	✓	✓
	Information tools (e.g., LCA)		✓	✓	✓
	Standards (carbon requirements)				✓
Systemic enablers	Sustainable finance		✓	✓	✓
	Just transition policies			✓	✓

✓ stronger role ✓ weaker role white: no role

Source: Reform Institute

The report is structured as follows. Chapter 3 sets out the landscape of existing transatlantic initiatives, outlining which market functions they focus on. Chapter 4 and 5 methodically analyze the policies on which the US and the EU collaborate, assesses their current progress and recommends those with the most potential to be developed in the future. Chapter 4, in particular, focuses on policies that are not technology-specific, but represent the market functions outlined above. Sustainable finance was considered to be beyond the scope of this report, as were obligations for private buyers, given the lack of such policies in both the US and the EU. Instead, standards (carbon requirements) are discussed in detail as a long-term regulatory solution. Chapter 5 focuses on chosen tech-specific policies, such as circular economy solutions, clean hydrogen, and more. Chapter 6 concludes the report and suggests further research. Case studies from other fields which provide relevant examples for transatlantic cooperation are presented in boxes throughout the report.

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Box 1. Comparison of the policy-making process in the EU and the US

Legislation and instrument design

In the European Union, climate policy efforts, including the decarbonization of industry, are largely coordinated at the EU level. In the US, instead, the emergence of industrial decarbonization results from a combination of federal initiatives and state regulations, with some states (e.g., California, New York, Washington) proving particularly active. The federal government remains the key actor when it comes to setting the agenda and scaling initiatives, especially due to the Bipartisan Infrastructure Law (BIL), the IRA and its massive injection of funds into greening the economy. However, certain policies, such as carbon pricing, are being explored more actively at the state level.

EU law is based primarily on the so-called primary law (the founding Treaties) and secondary legislation, which is created by the EU institutions. The latter consists mostly of regulations, which are directly applicable in Member States, and directives, which require implementation into national legal systems. The EU legislative process relies on the exclusive legislative initiative of the Commission, with the proposals requiring the favorable vote of both the Council of the EU (representatives of Member States' governments) and the European Parliament (directly elected by EU citizens). The need to align positions between the Council and the Parliament results in frequent three-way negotiations (known as trilogues) in which the Commission serves as advisor and mediator. This tends to encourage compromise solutions acceptable for all parties, which are difficult to quickly change or repeal. Because of this, and the often very long interinstitutional and international negotiations, outcomes tend to be designed with lengthier temporal perspectives in mind. While the Commission enjoys significant freedom in shaping tertiary law – i.e., delegated and implementing acts – this freedom is not absolute as it is subject to consultations with Member States and review by the European Court of Justice. Nonetheless, in the absence of legislative initiative by the Council and the European Parliament, the Commission plays a dominant role in setting the EU agenda. This, combined with the status of most Commission staff as EU civil servants (as opposed to elected representatives) tends to result in a more technocratic approach to policy-making in comparison to national legislative procedures, where elected bodies and individual members of national parliaments enjoy the right of initiative. This can render the process more focused and fact-based, but also more detached from pressing socio-political issues affecting citizens, especially where the Commission operates on imperfect data.

The US legislative procedure is likewise influenced by many actors with diverse agendas and interests - partisan, constituency-related, interest-related (lobbying) and driven by the federal executive's objectives. While states retain some competences in relation to industrial decarbonization (e.g., intrastate commerce), the federal government has several ways of influencing state laws. For example, it uses federal agencies for implementing regulations at the state level, such as the Environmental Protection Agency. It can also use the conditionality of federal grants to require states to adjust their regulations with federal objectives.

Feature	EU	US
Key players	EU institutions, key in shaping the macroeconomic and regulatory environment of national industrial decarbonization.	Mostly federal level, through laws such as the BIL and IRA, with states showing more initiative in certain policy areas.
Characteristics of the legislation	Negotiated compromise, more difficult to change. Can have a more technocratic approach.	Less direct influence from US states in federal level legislation compared to EU governments in EU legislation. Less technocratic approach.

Source: Reform Institute

Budgeting

The European Union Multiannual Financial Framework (MFF) is a long–term budget that outlines the spending priorities and limits of the EU over several years – typically seven. The purpose of the MFF is to provide predictability and stability for the EU's financial planning. The MFF is divided into policy areas according to objectives, such as Sustainable Growth or Natural Resources and Environment. It also sets the maximum annual amounts for categories of expenditure under EU competences, such as agriculture, cohesion, and external action.

In the US, the general streams of federal funding (mandatory spending) are determined by the relevant legislation, but Congress must also annually appropriate funding to the federal agencies for previously authorized government programs (discretionary spending). This process has typically involved the passage of twelve appropriations bills, which are legislative measures providing the legal authority for federal agencies to spend money. In today's political climate, Congress often relies on omnibus legislation (bills packing together numerous appropriation packages to limit the number of votes) or continuing resolutions (extending – for a fixed period – levels of appropriation from a previous budget year until a deal on a new budget can be reached). The appropriation procedure plays a central role in shaping federal spending priorities and policies. This system results in greater dynamism and flexibility, but also less predictability of the US budget, including dramatic disruptions to government spending (e.g., a possible "federal government shutdown")[1] when Congress cannot agree on funding levels.

Feature	EU	US
Temporal perspective	7 years	Annual
Flexibility / Vulnerability (to political disruptions)	**Low** – significant changes outside the standard process are taken only under extraordinary circumstances (e.g., launching of the Recovery Fund in response to the COVID-19 crisis). Once negotiated, the budget framework tends to remain stable.	**High** – most relevant spending occurs through annual appropriations, which are susceptible to political jockeying and disruption. At the same time, significant adjustments reflecting new, sudden needs can be made year to year. Executive agencies often have significant freedom to tailor the schemes to best suit their intended purpose.
Key players in the procedure	**Initiative:** Commission as supranational institution. **Decision:** Governments of Member States in the Council and the elected representatives of citizens in the European Parliament.	**Initiative:** President as the author of the proposal informed by federal agencies, with Congressional committees as actual designers of appropriation bills and additional legislation for mandatory spending. **Decision:** Vote by elected representatives of citizens in the House and Senate.

Source: Reform Institute

1 Between 2013 and today, the US has experienced 19 days of all-agency shutdown (3 in 2013 and 16 in 2018) and 35 days of partial shutdown (2018-2019), similar to the situation in mid-90s. Between 1996 and 2012 there were no federal shutdowns at all.

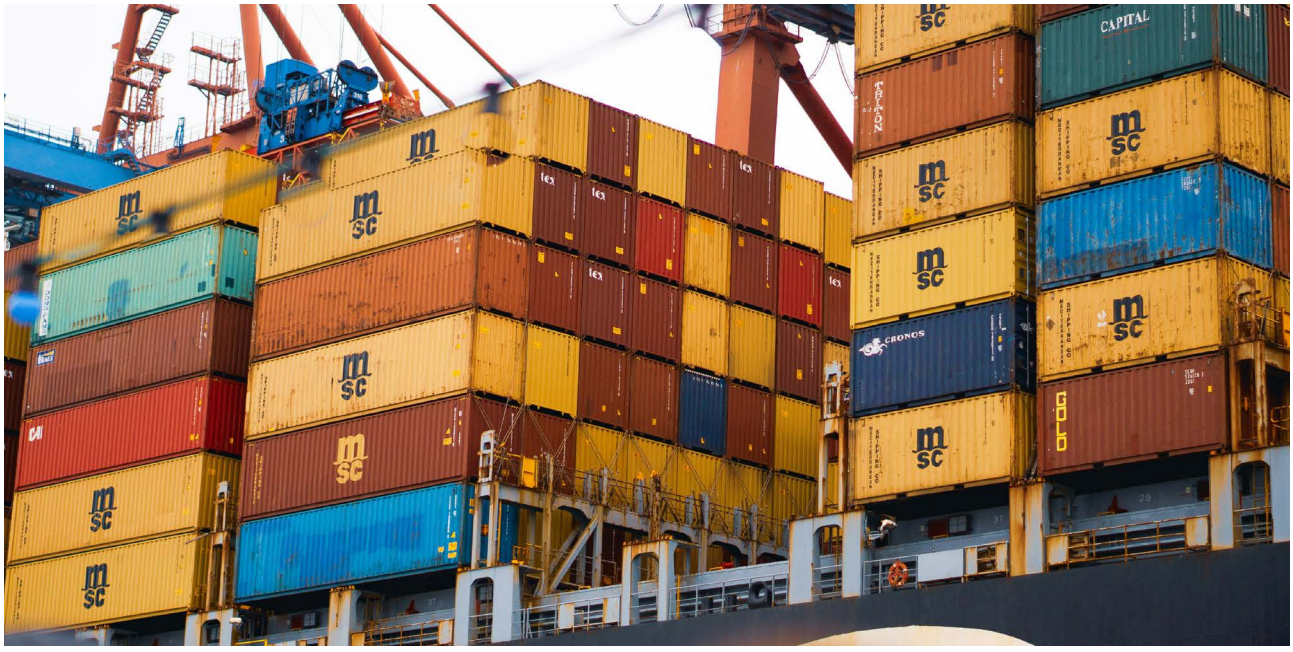
3 Current transatlantic links

This chapter describes the existing ecosystem of transatlantic initiatives on industrial decarbonization. The public debate on this topic has focused largely on the stalled Global Arrangement on Sustainable Steel and Aluminum (GASSA). The negotiations were intended to find a common approach to steel and aluminum imports, related to the way the EU prices embedded emissions through its Carbon Border Adjustment Mechanism (CBAM). Ultimately, they boiled down to agreeing on carbon prices, one of the most difficult issues for transatlantic cooperation.

While not focused on industrial decarbonization per se, negotiations around the Critical Minerals Agreement also show how attempts to harmonize green industrial policies across the Atlantic face significant political headwinds. These negotiations sought to address the comprehensive tax credits afforded under the IRA, which do not currently apply to EU-based cleantech companies. Tax credits of this kind are a way of providing broad price signals which encourage the use of technologies that reduce carbon emissions. This means that such negotiations suffer from some of the same challenges as carbon pricing: both sides need to agree how to apply them to the products imported from the other party.

There are however many other transatlantic forms of cooperation, often in the shape of dialogue platforms, which show much more potential for progress than the attempts to agree a unified transatlantic approach to carbon pricing. These dialogue platforms typically focus on *supply push* or *demand pull* initiatives, such as coordinating on R&D, creating common standards for green technologies, or greening public procurement. This section presents the landscape of such initiatives to show that there is potential to build on existing platforms, and that this system needs strengthening rather than reinvention. Sections 5 and 6 expand the analysis evaluating the potential for a deeper collaboration on specific industrial decarbonization policies.

While negotiations on carbon pricing are problematic (sections 4.1), the Trade and Technology Council (section 4.2) could be a space for high-level political coordination on industrial decarbonization. More sectoral initiatives create opportunities for deepening collaboration on *supply push* or *demand pull* mechanisms (section 4.3), and the evolution of the Climate Club, an intergovernmental forum for industrial decarbonization initially led by the G7, presents a case study of how difficulties of coordination on carbon pricing led to collaboration on softer market functions (section 4.4).



Credit: Unsplash / Eilis Garvey

3.1 GASSA: Why attempts at a common approach to carbon pricing failed

The GASSA negotiations aimed to reach a deal that would address the overcapacity of steel and aluminum production in non-market economies (such as China) and stimulate greener production globally. The agreement was expected to provide common rules to discourage trade in high-carbon steel and aluminum, and ensure that domestic policies in both geographies reduced carbon intensity in these industries. The agreement was called "global" because it would have been open to other countries interested in the collaboration on lowering the carbon-intensity of steel and aluminum production.

Historically, Europe and North America dominated the world markets for the supply of steel and aluminum, but emerging economies have gradually taken the lead, with China accounting for over half of global crude steel production[2] and almost 60% of global primary aluminum production in 2022.[3] Frequently, the expansion of production capacities has been driven by non-market forces such as government intervention, which has led to global over-capacity in the production of both these commodities.

The production of steel and aluminum can be very emissions-intensive, which makes these industries a priority for decarbonization. The level of emissions varies significantly between countries. The European and North American production are significantly below the world average, due to more energy efficient processes, higher shares of recycling and lower emission-intensity of electricity. The reduction of the market share of European and North American producers therefore has negative implications for the global decarbonization of these industries.

The need for the US-EU agreement on a common approach to imports of steel and aluminum emerged in the context of the Section 232 "national security" tariffs enacted by the Trump administration in 2018. Tariffs increased to 25% and 10% on certain imports of steel and aluminum respectively. The EU responded with retaliatory tariffs, as well as legal proceedings against the US before the WTO.

Negotiations for GASSA were launched in October 2021. A technical US-EU working group was established with the task of sharing relevant data and developing a common methodology for assessing the embodied greenhouse gas (GHG) emissions of traded steel and aluminum. While the text of the agreement was prepared, an interim arrangement replaced the Section 232 tariffs on EU-origin metals with quotas. This was effective from January 2022 until October 2023, with an extension until the end of 2023 as the negotiations continued.

The dialogue reached a stalemate in October 2023, as the positions of both parties remained deeply divergent. Washington proposed a mechanism that would be analogous to applying the Section 232 tariffs as a common external tariff against third countries and insisted on an exemption to the EU's CBAM. The CBAM places a price on emissions associated with the production of goods entering the European Union, which is proportional to the charges EU producers must pay under the EU Emissions Trading System (EU ETS). Brussels was opposed to creating an exemption to the CBAM, which could have unraveled the delicate compromises necessary to adopt the policy. Although the negotiations are still underway, it is now unclear whether they will be successfully concluded. In December 2023, the bilateral interim agreement between the US and the EU regarding steel and aluminum trade was extended until March 2025.

The disagreement is a result of fundamentally different approaches to decarbonization. The EU has developed its approach to carbon pricing under the EU ETS and the CBAM over many years, and this is the result of arduous negotiations between European countries. The US approach, which prioritizes domestic production, is also a result of political compromises which could easily unravel. The GASSA negotiations show that attempting to agree on a common approach to carbon pricing is politically unfeasible at this stage.

2 World Steel Association, 'World Steel in Figures 2023', 2023, https://worldsteel.org/wp-content/uploads/World-Steel-in-Figures-2023-4.pdf.
3 International Aluminium Institute, 'Primary Aluminium Production - International Aluminium Institute', 2024, https://international-aluminium.org/statistics/primary-aluminium-production/.

Another issue which has created difficulty in the negotiations is the technological difference in the respective steel industries. The US has on average a lower GHG-intensity in steel production due to the wider use of electric arc furnaces, which recycle scrap steel. EU steel, on the other hand, is predominantly produced in a two-step process using a blast furnace and a basic oxygen furnace, which is the process for obtaining primary steel. Finding a common definition of green steel was therefore difficult for the parties because the measure of average national carbon emissions from the steel industry, promoted by the US, was disadvantageous to the EU.

The GASSA negotiations attempted to deal with many complex issues in one negotiation: finding a common approach to green steel and aluminum, addressing the dominance of China in the industry, and making the system fit with domestic approaches to carbon pricing. However, the stalling of these talks does not mean that some elements, such as the definition of standards for green steel and aluminum, cannot be taken forward in other fora. The Trade and Technology Council, for example, offers more flexibility than the GASSA negotiations and could move cooperation beyond carbon pricing.

Box 2. The IRA and the EU-US Critical Minerals Agreement

While the provisions at the heart of the negotiations for the Critical Minerals Agreement are related to comprehensive tax credits in the production of electric vehicles, rather than industrial decarbonization, they provide a useful case study of why talks on carbon prices are particularly difficult for the EU and the US, further emphasizing the need to move toward initiatives that develop other types of market functions.

The EU's objections to the IRA local content requirements

The goal of the Inflation Reduction Act (IRA) to spur decarbonization was warmly received in Europe. However, the addition of local content requirements to many of the IRA's measures was met with significant criticism. These requirements were imposed because the Biden Administration sought to achieve several aims at once in the IRA: delivering the green transition, but also constraining the competition from China and reindustrializing the US.[4]

The EU responded to the IRA local content requirements by raising its objections with the US, calling the measures discriminatory and in violation of World Trade Organization (WTO) obligations. The primary concern for the EU was that, by requiring production to be based in the US or in countries that have a free trade agreement with the US, the IRA would drag investment out of Europe and effectively create a green subsidies race, requiring the EU to put in place its own subsidies not to lose competitiveness to the US.

At the same time, the EU has been loosening its own state aid rules to allow countries to subsidize their industries more. These measures were intended as temporary exceptions, first because of the pandemic, then due to Russia's war in Ukraine, and then due to the IRA, but their duration seems to indicate a more permanent trend.[5]

The Critical Minerals Agreement: attempting to negotiate on tax credits yields little progress

The EU is now pursuing an agreement with the US to limit the impact the IRA could have on its own industries through local content requirements in the Clean Vehicle Credit, a tax credit for the purchase of qualifying battery or fuel-cell operated vehicles. To obtain the full amount of the subsidy, the battery in the vehicle must have at least some of its critical mineral content (i) recycled in North America, or extracted and processed in (ii) the US or (iii) a country with which the US has a free trade agreement or a critical minerals agreement (CMA). Since the EU and the US do not have a comprehensive free trade agreement, the negotiations of a critical minerals agreement are an attempt to assuage tensions by

4 Erik Brattberg et al., 'Designing a US-EU Industrial and Trade Policy' (Atlantic Council, 18 October 2023), https://www.atlanticcouncil.org/in-depth-research-reports/issue-brief/designing-a-us-eu-industrial-and-trade-policy/.

5 Ibid.

ensuring that the EU's mining and chemical industries are not priced out of the US supply chain.

The main issue which has obstructed the negotiations, however, is the IRA requirement that deals such as the CMA are to be "free trade agreements", which would generally require an extensive legislative process to gain approval in the US Congress and in the EU's Member States, as well as in the European Parliament. Solutions that would avoid this politically difficult process would include calling the agreement a "non-binding instrument" or an "executive agreement", which also lowers the rank of the act. In fact, in March 2023 the US and Japan concluded a critical minerals agreement that did not go through the trade agreement process in the US Congress (thus not requiring a vote by the lawmakers).

There is frustration in the EU that the US is not willing to offer the EU the same kind of flexibility received by Japan, in requiring the agreement to be formalized as a trade deal. However, it has become politically impossible for the US to offer the same kind of treatment to the EU, due to significant opposition in Congress. The US legislators strongly opposed the Japan CMA; to prevent a similar deal being passed in the future, they have introduced draft legislation which would prevent the administration from adopting such agreements under the IRA without Congressional approval. They have also put in question the validity of the US-Japan CMA.[6]

A further issue which is blocking progress on the EU-US CMA is the US proposal of an enforcement mechanism, which would ensure that critical raw materials sourced from third countries would be subject to investigations and sanctions in the case of a breach of labor or environmental standards in the agreement. EU officials are opposed to this tool, as it would not be in line with EU practices and its implementation could be complicated, e.g., by requiring the EU to conduct investigations in third countries on their sourcing of critical raw materials.[7]

The slow progress in the CMA negotiations show that agreeing on a cross-cutting price signal in the form of a tax credit is extremely difficult for the US and the EU. The EU does not have the competence to put in place tax credits of the kind of the IRA, so it cannot compete with the Clean Vehicle Credit directly. It is also not willing to breach WTO rules in the way that the US does by setting local content requirements. It is thus an area of deep divergence which is further complicated by the political difficulty to reach a "free trade agreement" that requires approval from the European Parliament and the Congress.

6 'H.R.7983 - 118th Congress (2023-2024): Stop Executive Overreach on Trade Agreements' (2024), https://www.congress.gov/bill/118th-congress/house-bill/7983.

7 Shayerah I Akhtar and Andres B Schwarzenberg, 'Proposed U.S.-EU Critical Minerals Agreement', *Congressional Research Service*, n.d., 2, https://crsreports.congress.gov/product/pdf/IN/IN12145.

3.2 The Trade and Technology Council: broadening the dialogue beyond carbon pricing

The Trade and Technology Council (TTC) is a high-level forum which meets periodically at a political level and includes EU Commissioners and US Secretaries of State. Its stated goals include cooperation on the development of new technologies and trade policy. The TTC is supported by technical working groups on areas ranging from technology standards, through secure supply chains, to green technologies.

Critics say that this forum remains mostly a space for dialogue and that many important EU-US decisions on industrial policy take place outside of this platform. However, the usefulness of a platform for dialogue can be to help prevent disputes before they arise.[8] Furthermore, the TTC has already served to broaden the dialogue on industrial policy beyond areas which are particularly difficult for EU-US negotiations, such as tax credits and carbon pricing, or areas where there is more potential for collaboration, such as standards and rules on green public procurement.

On standards, the TTC has developed the US-EU Strategic Standardization Information (SSI) mechanism, which serves to exchange information on international standardization activities for critical and emerging technologies. This mechanism has facilitated the commonly recognized international standards for the rollout of charging systems for heavy-duty vehicles, as well as joint work of EU and US standardization bodies on plastics recycling and additive manufacturing.

The TTC also developed the Joint EU-US Catalogue of Best Practices on Green Public Procurement,[9] which addresses environmental challenges in all stages of the procurement process. This is intended as an inspiration for policy makers worldwide and serves as a method for policy harmonization in this area.

The latest ministerial meeting, in April 2024, outlined a renewed commitment to collaboration on

Credit: Unsplash / Daniel Moqvist

8 Brattberg et al., 'Designing a US-EU Industrial and Trade Policy'.
9 TTC Ministerial, 'Joint EU-US Catalogue of Best Practices on Green Public Procurement', 2024, https://circabc.europa.eu/ui/group/09242a36-a438-40fd-a7af-fe32e36cbd0e/library/4ed7eb8e-690a-4347-975f-6e48e851365a/details?download=true.

semiconductor supply chains, amongst others, through an early warning system that would better predict potential disruptions and dialogue on investments in this sector in both countries. The parties also sought to mitigate the lack of progress on the Critical Minerals Agreement by launching the Minerals Security Partnerships Forum, aimed at fostering cooperation between the US, EU and mineral producing countries.[10]

However, the ministerial offered little clarity as to the future of the TTC. The Joint Statement made no mention of continuing the TTC after this political cycle and the US elections introduce yet more uncertainty regarding the future of the forum.[11]

A strengthened TTC could provide a useful forum for collaborating on initiatives that are more likely to succeed than carbon pricing, such as greening procurement and standards. To make that possible, EU and US leaders could commit to continuing using the TTC to coordinate on trade and tech issues, while enhancing its effectiveness.[12] The key ways of strengthening the TTC could be to make it a permanent platform, independent of political cycles, and ensure regular stakeholder engagement.[13]

3.3 The ecosystem of sectoral initiatives: space for progress on softer market functions

Outside of the high-level political forum of the TTC, the existing ecosystem of sectoral initiatives provides good groundwork for strengthening the US-EU collaboration on industrial decarbonization. It is important to note that, in addition to political initiatives, there are many sectoral industrial initiatives that play an important role in developing common standards on decarbonizing industry and boosting innovation among members. The political initiatives also frequently include industrial representatives as stakeholders, and the industry initiatives feed into political platforms.

This section focuses on the landscape of political initiatives highlighting areas with potential for progress. It divides them into two groups: those which involve the US, the European Commission, and EU Member States, and those which only involve the US and EU Members States.

3.3.1. Dialogue involving the US, the European Commission, and EU Member States

A review of existing initiatives involving the US, the European Commission, and EU Member States shows that these tend to focus on creating demand for industrial decarbonization, for example through information tools. Several are also related to supply push for innovative technologies (see table at the end of this chapter). Some of these focus on coordinating research efforts by setting priorities (e.g., Mission Innovation) or producing research and analysis (e.g., IRENA Collaborative Frameworks), whereas others also provide R&D funding (e.g., the IEA Hydrogen Technology Collaboration Platform). Overall, there is a strong focus on hydrogen, with several intergovernmental initiatives focusing specifically on this technology.

Mission Innovation (MI) 2.0, established in 2021, is a partnership of 23 countries and the European Commission aiming to catalyze action and investment in clean technology R&D. MI's work focuses on strengthening access to evidence-based research, enhancing international R&D networks by facilitating collaboration and working with multiple stakeholders from different backgrounds to scale and help bring new technologies to the market. For example, as part of its Net-Zero Industries theme, MI sets a list of priority innovation topics to coordinate R&D, and supports technology demonstrations in energy intensive industry.[14]

IRENA Collaborative Frameworks are organizational units of IRENA (International Renewable Energy Agency), a key global intergovernmental agency for energy transformation. Created in 2009, IRENA has since been joined by 168 member countries and the EU. IRENA is a leading platform fostering international cooperation and multistakeholder action in the energy transition. It also serves as a source of reliable data, re-

10 'Joint Statement EU-US Trade and Technology Council', Text, European Commission - European Commission, accessed 9 July 2024, https://ec.europa.eu/commission/presscorner/detail/en/statement_24_1828.
11 'Joint Statement EU-US Trade and Technology Council'.
12 Brattberg et al., 'Designing a US-EU Industrial and Trade Policy'.
13 Micol Bertolini, 'EU-US Trade and Technology Council: The Last Hurrah?', CEPA, 9 April 2024, https://cepa.org/article/eu-us-trade-and-technology-council-the-last-hurrah/.
14 'Mission Innovation', Mission Innovation, accessed 9 July 2024, https://mission-innovation.net/.

search, and analysis in the areas of technology, innovation, policy, finance, and investment. Three out of eight IRENA Collaborative Frameworks focus on actions that are key from the point of view of industrial decarbonization: Critical Materials, Green Hydrogen and High Shares of Renewables.[15]

IEA Working Party on Industrial Decarbonization (WPID) is a forum within the International Energy Agency for governments, industrial organizations and other stakeholders, to work together toward accelerating industrial decarbonization.[16] It was created in February 2023 and consists of 19 countries and the European Commission. Functions of the newly created organization include enhancing dialogue and taking action on issues that particularly require international cooperation, sharing relevant data for tracking progress toward climate neutrality in industry and providing strategic input to the IEA Secretariat and other relevant dialogue platforms.[17]

In addition to these bodies, there are four significant initiatives focused on hydrogen, and all of them have a significant *supply push* focus, with some also looking at demand-side measures. The **IEA Hydrogen Technology Collaboration Program** was established already in 1977 with the aim to support and fund collaborative R&D in this area, as well as information exchange among its members.[18] The **International Partnership for Hydrogen and Fuel Cells in the Economy (IPHE)**, founded in 2003, helps develop international R&D initiatives that advance the introduction of hydrogen and fuel cell technologies on a global scale. It also supports demand-side projects on common codes and standards, as well as information sharing on infrastructure development.[19] **The Hydrogen Valley Platform**, developed under Mission Innovation, creates a space for presenting large-scale flagship projects.[20] **The Clean Energy Ministerial Hydrogen Initiative**, launched in 2019, focuses on the facilitation of hydrogen deployment within current industrial applications. It also supports hydrogen deployment in transport, and research regarding hydrogen potential to help fulfil the energy needs of communities.[21]

Credit: Unsplash / Troy Mortier

15 'Collaborative Frameworks', accessed 9 July 2024, https://www.irena.org/How-we-work/Collaborative-frameworks.
16 'On-Line Guide to OECD Intergovernmental Activity', accessed 9 July 2024, https://oecdgroups.oecd.org/Bodies/ShowBodyView.aspx?BodyID=7780&BodyPID=15186&Lang=en&Book=False.
17 'On-Line Guide to OECD Intergovernmental Activity'.
18 'IEA Hydrogen TCP - Research & Innovation in Hydrogen Technologies', IEA Hydrogen TCP, accessed 17 July 2024, https://www.ieahydrogen.org/.
19 'Home International Partnership for Hydrogen & Fuel Cells in the Economy', iphe, accessed 18 July 2024, https://www.iphe.net.
20 'H2Valleys | Mission Innovation Hydrogen Valley Platform', accessed 18 July 2024, https://h2v.eu/.
21 'Hydrogen', Clean Energy Ministerial, accessed 18 July 2024, https://www.cleanenergyministerial.org/initiatives-campaigns/hydrogen-initiative/.

3.3.2. Dialogue involving the US and EU Member States

The initiatives including the US and EU Member States (but not the European Commission) broadly focus on knowledge sharing. However, the Clean Energy Ministerial Deep Decarbonization Initiative (CEM IDDI) emerges as a promising example of deeper cooperation on aspects related to public procurement and harmonization of standards. Strengthening green public procurement shows potential for further collaboration between EU Member States and the US, as both IDDI and another international platform, the Greening Government Initiative, show willingness to work further on this topic.

CEM IDDI aims to bring together stakeholders from both the public and private sector to introduce actions that would stimulate the demand for low-carbon industrial materials. The initiative facilitates and promotes the harmonization of carbon accounting standards, the establishment of public and private sector procurement targets, the creation of incentives for investment in green product development, and the design of industry guidelines. Currently, CEM IDDI's efforts focus on lobbying governments to make public procurement commitments for low-carbon steel and cement. CEM IDDI consists of 10 member countries, coordinated by the **United Nations Industrial Development Organization (UNIDO)**. UNIDO's current focus is on green industrial policy. The UN agency, in particular, supports UN Member States through four mandated functions: technical cooperation, action-oriented research and policy advisory services, activities related to normative standards, and partnerships for knowledge and technology transfer.

A promising initiative started by IDDI is the **Green Public Procurement Pledge**, by which governments can commit to require that steel, cement and concrete used in all public construction projects are low-emissions, and that "signature projects" use near-zero emission materials (at the latest by 2030). The pledge also includes targets to require the monitoring and disclosure of embodied carbon emissions of steel, cement and concrete in publicly funded construction projects (by 2025). Canada, Germany, the UK and the US have announced actions under the GPP Pledge at COP28, and Japan, the United Arab Emirates and Austria stated their commitment to work toward the Pledge.[22]

Another important initiative emerging from IDDI is a framework of standards to establish what constitutes low and near-zero emissions for steel, cement and concrete. There is currently a working group on this topic which seeks to achieve three goals. Firstly, to agree a harmonized definition of low and near-zero emission steel, cement and concrete. Secondly, to collate the various standards being used or developed on these topics. Finally, to build on this work to agree global emission standards on these materials.[23]

With the UK, India, Canada, Germany, the US and the UAE amongst those on board, the initiative brings together a diverse range of countries, with the potential for more to join. It may offer an opportunity to develop global standards in these industries, a result that has not been achieved before. As such, it could be a good step for the EU to join this initiative to influence the global development of these standards. The Commission President, Ursula von der Leyen, has proposed a revision of the EU's Public Procurement Directive. This creates an opportunity to review also the environmental aspects of public procurement. Joining the initiative could therefore be linked to a review of EU legislation and allow the EU to shape the approach to green public procurement internationally as well as domestically.[24]

By focusing its efforts on demand side measures such as public procurement, CEM IDDI can support lead markets in green industries in a coordinated fashion. Much of the academic literature on climate clubs has focused on the "sticks" of

22 The Industrial Deep Decarbonization Initiative, 'Factsheet: The Industrial Deep Decarbonization Initiative', March 2024, https://www.industrialenergyaccelerator.org/general/factsheet-the-deep-industrial-decarbonization-initiative/.

23 'Driving Consistency in the Greenhouse Gas Accounting System', Industrial Decarbonization Accelerator, accessed 9 July 2024, https://www.industrialenergyaccelerator.org/general/driving-consistency-in-the-greenhouse-gas-accounting-system/.

24 Ursula von der Leyen, 'Political Guidelines for the next EU Commission 2024-2029', July 2024, https://commission.europa.eu/document/download/e6cd4328-673c-4e7a-8683-f63ffb2cf648_en?filename=Political%20Guidelines%202024-2029_EN.pdf.

the transition, such as carbon pricing and carbon border adjustment, but the "carrots" such as green public procurement have more potential when the "sticks" face political opposition. By leading the way with "carrots", countries can shift the markets toward greener production, creating the space for dealing with the necessary "sticks" later in the process.[25]

The **Clean Energy Ministerial CCUS Initiative (CEM CCUS)** aims to accelerate the use of CCS/CCU technologies as a viable CO_2 mitigation option, focusing primarily on the oil and gas, cement, steel, and power sectors. CEM CCUS activities focus on three areas: investment and financing, industry collaboration, and knowledge sharing. The initiative's activities include engagement with multilateral development banks, commercial banks, and other financial institutions to bring them the latest knowledge on CCS and CCU and help them position these technologies in their energy investment policies and development strategies. The membership of the organization is broad, as it includes China as well as the US and several EU countries.[26]

Greening Government Initiative (GGI) was established by the governments of the United States and Canada in 2021. It aims to provide a platform for officials from different countries to share information and best practices regarding the actions taken to increase the environmental sustainability of national governments' operations. The platform also supports the development of international collaborative relationships in this area, by hosting meetings, thematic sub-working groups within GGI, and other initiatives to support government officials in their greening efforts. Currently there are 53 countries participating in the GGI activities. There are no policy or financial commitments required to join the GGI.[27]

Leadership Group for Industry Transition (LeadIT) focuses on improving collaboration between decision makers in the public and private sectors to accelerate the transition in the industry, especially in hard-to-abate sectors. Launched in 2019 and supported by the World Economic Forum, it consists of 18 countries and 20 private sector representatives. LeadIT aims to help decision makers provide the necessary policy environment, finance flows, and a platform for exchange of best practices by organizing high-level dialogues and regular meetings between private and public decarbonization experts. It also supports processes to create roadmaps processes with science-based tools and analysis.[28]

The above description shows that the existing plurilateral initiatives in which the EU and the US participate offer many opportunities for deepening collaboration on topics such as the harmonization of standards (demand pull), green public procurement (demand pull) and systemic enablers such as financial guidelines. While they do not aim to set a cross-cutting price signal, like GASSA or the CMA negotiations, they offer other options that currently are more politically feasible.

The shift away from a carbon pricing to a broader approach for cooperation on industrial decarbonization is also represented by the evolution of the **Climate Club** (see box 3) and other initiatives started by the G7. While the Climate Club was originally intended as an alternative to the CBAM for a small group of more ambitious states, it has developed into an initiative which focuses on softer market functions, such as *demand pull*, and is open to a broader range of countries to join.

25 Lukas Hermwille et al., 'A Climate Club to Decarbonize the Global Steel Industry', Nature Climate Change 12, no. 6 (June 2022): 5, https://doi.org/10.1038/s41558-022-01383-9.
26 'Carbon Capture Utilization and Storage', Clean Energy Ministerial, accessed 11 July 2024, https://www.cleanenergyministerial.org/initiatives-campaigns/carbon-capture-utilization-and-storage/.
27 'Greening Government Initiative | Office of the Federal Chief Sustainability Officer', accessed 11 July 2024, https://www.sustainability.gov/ggi.
28 'Our Mission', Leadership Group for Industry Transition, accessed 11 July 2024, https://www.industrytransition.org/what-we-do/.

Box 3. Evolution of the Climate Club: moving away from carbon pricing to a broader cooperation on industrial decarbonization

The original concept of a climate club was for of a group of countries to agree on a form of carbon price that they all commit to. Crucially, non-participants of the club were penalized, for example through the imposition of a tariff when trading with members of the club.[29] When the CBAM proposal was being debated within the EU, Germany advocated for this type of climate club as an alternative to the CBAM.[30] The goal of creating a climate club was enshrined in the coalition agreement of the German government in 2021.[31]

During Germany's Presidency of the G7, in 2022, the Chancellor Olaf Scholz led the initiative of creating a G7 Climate Club. At that stage, the development of the CBAM was well under way, but the relationship of the Climate Club with the CBAM was still unclear. However, in September 2022, Commissioner Frans Timmermans envisaged the possibility to create an EU-US climate club under certain conditions that could exclude the US from the CBAM.[32]

This approach of linking the CBAM with a climate club was not pursued, and the G7 Climate Club was criticized for being too exclusive in its framing and lacking sufficient focus and clarity to attract broader interest, including from developing countries.[33]

The concept was relaunched at the 2023 United Nations Climate Change Conference (COP28) as a new initiative open to all climate-ambitious countries. Its initial focus has been on the steel and cement sectors, with the aim of scaling up lead markets for decarbonized industrial production. The work revolves around three main pillars. First, advancing ambitious and transparent climate change mitigation policies, working toward a common understanding of their effectiveness and strengthening methodologies and measurement. Second, advancing the enabling conditions for substantial industrial decarbonization by discussing methodologies, standards, sectoral strategies, and expanding markets for green industrial products. Third, boosting international partnerships to enable industrial decarbonization in developing and emerging economies. The club currently has 40 members, including the European Union, the US and many EU countries.

The evolution of the Climate Club shows how the difficulty of negotiating carbon pricing is driving the US and the EU to refocus cooperation on softer mechanisms. As Hermwille et al. argue, while carbon pricing faces political headwinds, governments can use climate clubs to support the demand side of industrial decarbonization. Incentivizing lead markets by cooperation on public procurement could create the space for reopening the discussion on carbon pricing and border adjustment in the future.[34]

It remains to be seen whether the Climate Club will lead to stronger collaboration on industrial decarbonization, in a similar way to the Clean Energy Ministerial IDDI, or whether it will remain more of a knowledge-sharing platform.

29 William Nordhaus, 'Climate Clubs: Overcoming Free-Riding in International Climate Policy', American Economic Review 105, no. 4 (April 2015): 1339–70, https://doi.org/10.1257/aer.15000001.
30 Marian Feist, Ann-Kathrin Kuehner, and Christian Flachsland, 'Selling CBAM - Diplomacy for the European Union's Carbon Border Adjustment Mechanism', application/pdf (Potsdam Institute for Climate Impact Research, 2024), 15, https://doi.org/10.48485/PIK.2024.010.
31 'Koalitionsvertrag 2021', Die Bundesregierung informiert | Startseite, accessed 4 July 2024, https://www.bundesregierung.de/breg-de/aktuelles/koalitionsvertrag-2021-1990800.
32 'US Could Dodge European Carbon Border Levy, EU's Timmermans Says', www.euractiv.com, 21 September 2022, https://www.euractiv.com/section/energy-environment/news/us-could-dodge-european-carbon-border-levy-eus-timmermans-says/.
33 Oliver Sartor, Domien Vangenechten, and Aylin Shawkat, 'A Climate Alliance for Industry Transformation: A Vision for the G7 "Climate Club"' (E3G, Agora Industry, November 2022).
34 Hermwille et al., 'A Climate Club to Decarbonize the Global Steel Industry'.

3.4 Overview of main transatlantic links and processes, and supported policy instruments

Although transatlantic collaboration on carbon price signals has yielded little progress, there is more scope to collaborate on other market functions, such as those creating *supply push* or *demand pull*. The system of transatlantic links does not need to be built up from scratch: there is an existing ecosystem of initiatives that could be further developed and strengthened. The next sections will analyze the policy areas in detail and recommend those that offer the most potential for future progress.

Process/dialogue platform	Supply push	Cross-cutting price signal	Demand pull	Systemic enablers
Global Arrangement on Sustainable Steel and Aluminum (GASSA)	✓	✓ (progress stalled)	✓	
Critical Minerals Agreement (CMA)		✓		
Dialogue Platforms				
Dialogue involving the US and the European Commission				
Trade and Technology Council (TTC)	✓		✓	
Dialogue involving the US, the European Commission, and the EU Member States				
Mission Innovation	✓			
IRENA collaborative framework	✓			✓
IEA Working Party on Industry Decarbonization (WPID)	✓		✓	
IEA Hydrogen Technology Collaboration	✓		✓	
International Partnership for Hydrogen and Fuel Cells in the Economy (IPHE)	✓		✓	
The Hydrogen Valley Platform (Mission Innovation)	✓			
Clean Energy Ministerial Hydrogen Initiative	✓			
Climate Club			✓	✓
Dialogue involving the US and EU Member States				
Clean Energy Ministerial Industrial Deep Decarbonization Initiative (IDDI)	✓		✓	
Clean Energy Ministerial CCUS Initiative	✓			✓
Leadership Group for Industry Transition (LeadIT)	✓			
Greening Government Initiative (GGI)			✓	
G7 Industrial Decarbonization Agenda	✓	✓	✓	✓

Source: Reform Institute

4 Overarching industrial decarbonization policies

4.1 Supply push policies

4.1.1 Research and development

Comparison of the EU and US R&D policies

There are numerous funding opportunities for R&D in decarbonizing industry across the EU and the US. Both sides seem to use grants as the preferred form of support for R&D, which is appropriate given the high risk of early innovation stages. The pillars of the EU approach are:

- Horizon Europe, a broad, mission-driven package of R&D support instruments, including grants and public-private partnerships.[35]
- Cohesion policy, established to bridge the gaps between Member State,[36]
- European Research Area, aimed at creating a single European market for innovation.[37]

In addition, Ursula von der Leyen has announced that, in her second term as President of the European Commission, she would bring forward an Industrial Decarbonization Accelerator Act, which would channel investment in infrastructure and industry, in particular for energy intensive sectors. The Commission President has also announced a European Competitiveness Fund, which would have capacity to invest in strategic technologies and support Important Projects of Common Interest (IPCEIs).[38] These could potentially be used to finance industrial decarbonization.

An important challenge for EU initiatives, as compared to the US, is unifying the fragmented

Credit: Unsplash / Guilherme Cunha

35 'Horizon Europe - European Commission', 3 July 2024, https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe_en.
36 'Inforegio - Cohesion Policy', accessed 28 August 2024, https://ec.europa.eu/regional_policy/policy/what/investment-policy_en.
37 'European Research Area - European Commission', 25 June 2024, https://research-and-innovation.ec.europa.eu/strategy/strategy-2020-2024/our-digital-future/european-research-area_en.
38 von der Leyen, 'Political Guidelines for the next EU Commission 2024-2029'.

EU innovation environment and bringing together - often parallel - research efforts conducted in Member States. Likewise, it needs to be remembered that although the European Research Area seeks to reflect the reality of the single market in the field of innovation, individual Member States often see each other as competitors rather than collaborators in this area, each striving to ensure that domestic innovations will benefit domestic industry first and foremost.

The US, an integrated national economy, is more directly focused on supporting its public and private innovators. Whereas the EU system relies on programs funded via the MFF - making it stable, if less flexible in funding allocation - the US relies on a constellation of different efforts managed by diverse agencies and established by different laws, all subject to annual appropriation procedures. There also seems to be greater consistency in how responsible offices and agencies remain involved in managing support once R&D transitions into demonstration and deployment phases. In recent years, about 12% of the federal climate-relevant R&D funding has gone into the industry sector.[39] In addition, several state-level initiatives have been launched in order to direct investment into state-level R&D programs.[40]

While the EU framework seems more robust in the scale and scope of its programs, this seems to stem largely from the fact that it needs to address the challenge of unifying the fragmented EU innovation environment, with a large roster of instruments aimed specifically at that goal. Neither the EU nor the US system are particularly easy to navigate, with many instruments and funding streams interacting in a complex way. This can be confusing for potential beneficiaries and other stakeholders. However, while the EU's challenges stem from the broad scope of available tools, in the US challenges derive from its multitude of narrower initiatives, tailored at sectors or technologies. While relevant institutions on both sides of the Atlantic are aware of the situation and offer various forms of assistance in navigating this environment (contact points, guides, etc.), the support structure can still be a barrier for potential beneficiaries, especially smaller innovators in the relevant fields for large industries.

The state of transatlantic interactions in R&D

The EU and US endeavors are bolstered by a rich landscape of transatlantic collaborations and dialogues. At least 10 transatlantic programs support R&D for industrial decarbonization addressing a variety of actors and priorities. A table summarizing the regional programs and transatlantic links is provided in the Annex.

In addition to the US government and the European Commission, these initiatives also involve the governments of partner countries, academia, industry, and international organizations. Notably, initiatives like Mission Innovation and the IRENA Collaborative Frameworks are wide-reaching and have influence, which are invaluable in building a multistakeholder cooperative approach to decarbonizing industry. However, several gaps, overlaps, and conflicts still exist. Addressing them could help increase the effectiveness of transatlantic interactions and, in turn, foster decarbonization efforts.

While there is a collective focus on advancing new technologies and innovations, key programs for direct cooperation between the US government and the European Commission, such as the Trade and Technology Council (TTC), do not focus specifically on industry. This indirect approach may hinder the effectiveness and urgency of actions aimed at reducing carbon emissions in this sector. Introducing dedicated initiatives within the TTC that concentrate on decarbonizing industry could address this gap and lead to improved outcomes.

In addition, initiatives like the TTC, which emphasize trade and technology with a focus on economic competitiveness, may also have objectives that clash with those of programs dedicated to environmental sustainability and decarbonization. Therefore, the development of an integrated, transparent, and coordinated approach across these programs is necessary to ensure that decarbonization efforts are not compromised and that common environmental standards are upheld.

Most forums of dialogue involving the US government, the European Commission, and EU Member States are dominated by programs focusing

39 https://innovationtracker.edf.org/insights/new-explore-climate-innovation-funding-from-the-infrastructure-investment-and-jobs-act-the-inflation-reduction-act-and-fiscal-years-2022-and-2023/

40 States that operate such schemes to date are California (e.g., Electric Program Investment Charge, EPIC), Maine (Clean Energy Innovation Challenge), Massachusetts (InnovateMass, IncubateMass), Michigan (C3 Accelerator), Minnesota (Conservation Applied Research and Development, CARD), and New York (Carbontech Development Initiative and other initiatives under NY Innovation Program).

on hydrogen cooperation. The IEA Hydrogen Technology Collaboration Program, the International Partnership for Hydrogen and Fuel Cells in the Economy, the Hydrogen Valley Platform, and the Clean Energy Ministerial Hydrogen Initiative all provide R&D support for developing this technology. While this focus is positive , and efforts to deploy hydrogen solutions should be continued, the need for R&D in other technologies and approaches essential for industrial decarbonization should not be neglected. Therefore, it would be beneficial to establish additional programs targeting R&D in alternative innovations, such as advanced manufacturing technologies or other low-carbon fuels.

The proliferation of hydrogen-related programs could potentially lead to the duplication of efforts in research and deployment strategies too. Therefore, it would be helpful to review these programs, as well as other R&D initiatives, to ensure they are managed in a way that avoids duplication, leverages mutual strengths, and efficiently utilizes available funding and expertise.

Moreover, there is currently a lack of emphasis on complementary measures essential for carbon-neutral manufacturing processes and energy-efficient industrial systems, such as incentives for adopting circular economy principles. Increasing R&D support in this area could prove highly advantageous.

Lastly, adopting common technology standards across these programs could be important. Currently several programs supporting R&D are concerned with setting technology and/or emissions accounting standards – TTC, IPHE, G7 Industrial Decarbonization Agenda. It is thus vital that they are aligned to provide a clear roadmap for innovators and public institutions.

SWOT analysis of transatlantic links in R&D support for decarbonizing industry

Strengths	Weaknesses
• Strong transatlantic links • Collective focus on new technologies and innovations	• Limited direct focus on industry in many programs • Dominance of hydrogen programs • Lack of emphasis on complementary measures such as circular economy
Opportunities	**Threats**
• Advance new technologies • Leadership in setting international standards	• Insufficient funding • Insufficient transparency and lack of coordination

Source: Reform Institute

Overall assessment of transatlantic links in R&D support for decarbonizing industry

Current state	Potential for improvement
Good	Good

Source: Reform Institute

4.1.2 First of a Kind (FOAK) and sectoral subsidies

Comparison of EU and US FOAK, and state subsidies policies

In order to preserve the common market, the EU has generally limited the use of national subsidies under state aid rules. However, it has allowed for a series of additional exemptions first in response to the pandemic, and later in response to Russia's attack on Ukraine. This seems to indicate a longer lasting trend, but creates issues due to the divergent capacities of EU Member States to provide such subsidies, which could jeopardize the cohesion of the European market. This is why the provision of subsidies at EU-level is key to the functioning of the common market. The existing EU-level funding is channeled mostly via broad instruments, such as the Innovation Fund, the Just Transition Mechanism or the Modernization Fund.

The **Innovation Fund (IF)** aims at achieving first-mover advantage in clean technology. Whereas Horizon Europe provides funding for R&D, proof of concept and early pilot stages of a project, the purpose of the Innovation Fund is to support the demonstration and commercialization phase until scale up, where InvestEU and CEF become available. This way, the IF serves as the key medium and a bridge in the crucial – and most vulnerable – stage of cleantech introduction. As such, it is expected to operate in synergy with other financing instruments, such as InvestEU or the Modernization Fund.

The funding for the Innovation Fund comes from the Emission Trading System,[41] which means that the exact total budget of the Fund depends on the price of emission allowances. This is currently estimated at EUR 75, for a total market of around EUR 40 billion. The IF is expected to bring greater focus on energy intensive industries, as well as simplified governance mechanisms compared to its predecessor program (NER300). The IF provides support up to 60% (for regular grants) and up to 100% (for competitive bid-

Credit: Unsplash / Guilherme Cunha

41 Ocean Energy Europe, Using NER 300 Leftovers efficiently Appropriate financing and funding solutions for innovative renewable energy demonstration projects, April 2017; https://www.oceanenergy-europe.eu/wp-content/uploads/2017/11/170410-OEE-NER300-leftovers-paper.pdf

42 'What Is the Innovation Fund? - European Commission', accessed 28 August 2024, https://climate.ec.europa.eu/eu-action/eu-funding-climate-action/innovation-fund/what-innovation-fund_en.

ding) of the relevant costs of a project, usually covering capital and operational costs, minus revenues.[42]

The **Net-Zero Industry Act (NZIA)** introduced measures to facilitate funding applications for the commercialization of projects in key technology areas. These include the Strategic Technologies for Europe Platform (STEP), which consolidates existing funding instruments, or the Sovereignty Seal label, which shows which projects have met the minimum quality requirements of STEP, thus increasing their visibility for other investors.[43] However, the NZIA does not introduce any additional funding to supplement the existing schemes.[44] What is more, the amount of funding currently available (under e.g., the Innovation Fund,[45] RES financing mechanism[46] or hydrogen auctions[47]) is often lower than the demand from project owners.[48]

The US tends to divide broad financing measures into more specific sector or tech-oriented programs, often administered by executive agencies such as the Environmental Protection Agency (EPA), or cabinet departments such as the Department of Energy (DOE)'s Office of Technology Transitions (OTT) or the Office of Clean Energy Demonstrations (OCED). OTT manages the Technology Commercialization Funds established under the IRA, the Bipartisan Infrastructure Law (BIL) and Base Annual Appropriations, while OCED supports the commercialization and demonstration of innovative solutions in specific technology areas. This results in a more transparent and targeted support system in the US compared to the EU.

The launch of the OCED represents a break away from the US approach of the last decades, which was to restrict funding to R&D and leave the demonstration and commercialization phases to the private sector. With a budget of over USD 25 billion and a target of supporting 100% clean electricity by 2035, the OCED now provides funds to demonstration projects across a range of industry-relevant areas, from hydrogen, through CCS and CCU to energy storage.[49] OCED's role is to serve as the funding manager, as well as a center of excellence, gathering know-how and lessons from previous demonstration initiatives. OCED's projects are structured as collaborative partnerships using cost share agreements, under which the OCED can provide up to 50% of the funding to its private sector partners. As illustrated by OCED, US support for FOAK and demonstrations tends to be divided into specific programs with a narrow scope in various fields.

The state of transatlantic interactions in FOAK and state subsidies

Contrary to R&D, no significant links have been found regarding transatlantic cooperation in the area of FOAK or sectoral subsidies. So, how do the results of joint research efforts translate into the commercialization phase on both sides of the Atlantic? It is assumed that either the commercialization phase is left to cooperation between private entities, or (which seems more likely) that while on the R&D level EU-US cooperation is seen as mutually beneficial, commercialization is where competition takes precedence with the willingness to capitalize on the results before competing industries from the other side. Currently, there seems to be little direct incentive for the EU and US to align their subsidy policies in this area. On the other hand, initiatives like the EU Foreign Subsidies Regulation (FSR) might increase the pressure for more alignment. The FSR empowers the Commission to increase the level of scrutiny on the impact of third country subsidies on the EU internal market to closer match that faced by Member States' aid.

While significant advancements in collaboration are hindered by competition dynamics during

43 'STEP Seal - European Union', accessed 30 July 2024, https://strategic-technologies.europa.eu/about/step-seal_en.
44 Lukas Hermwille and Anna Leipprand, 'The Net-Zero Industry Act: The EU Commits to an Active Industrial Policy' (Wuppertal Institute, April 2024), https://wupperinst.org/fileadmin/redaktion/downloads/misc/Net-Zero_Industry_Act_-_The_EU_Commits_to_an_Active_Industrial_Policy.pdf.
45 'Innovation Fund', accessed 30 July 2024 https://climate.ec.europa.eu/eu-action/eu-funding-climate-action/innovation-fund_en.
46 'EU renewable energy financing mechanism', accessed 6 September 2024, https://energy.ec.europa.eu/topics/renewable-energy/financing/eu-renewable-energy-financing-mechanism_en.
47 'European Hydrogen Bank', accessed 6 September 2024, https://energy.ec.europa.eu/topics/energy-systems-integration/hydrogen/european-hydrogen-bank_en.
48 'EU renewable energy financing mechanism – first tender oversubscribed', accessed 6 September 2024, https://energy.ec.europa.eu/news/eu-renewable-energy-financing-mechanism-first-tender-oversubscribed-2023-09-29_en.
49 'Office of Clean Energy Demonstrations – Portfolio', accessed 30 July 2024, https://www.energy.gov/oced/portfolio.

the commercialization phase as well as policy misalignment, including local content requirements, potential for moderate improvement exists in softer areas of cooperation, such as sharing best practices and expanding R&D links, already strong, to include aspects of FOAK and state subsidies.

SWOT analysis of the state of transatlantic links in FOAK and state subsidies for decarbonizing industry

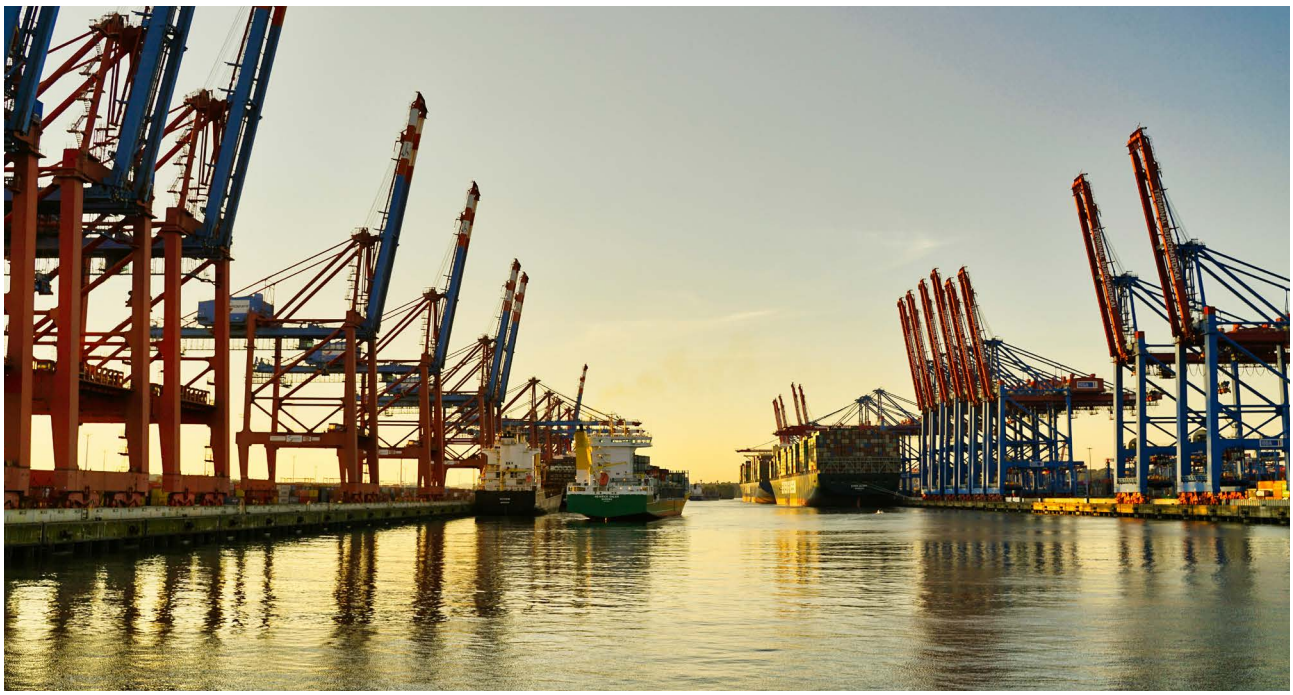
Strengths	Weaknesses
• Established infrastructure for support and funding on both sides, with the EU's Innovation Fund and the US OCED among other instruments	• Lack of direct transatlantic links • Differing focus and execution of funding mechanisms, with the EU using broad instruments and the US adopting programs with a narrow scope • Competitive pressures at the commercialization phase
Opportunities	**Threats**
• Potential for leveraging existing R&D collaboration to include FOAK and subsidies, but focusing on the softer areas of collaboration, such as sharing best practices	• Slower progress due to lack of collaboration and inefficient resource use

Source: Reform Institute

Overall assessment of transatlantic links in FOAK and state subsidies for decarbonizing industry

Current state	Potential for improvement
Poor	Moderate

Source: Reform Institute



Credit: Unsplash / Foto K.

4.2 Cross-cutting price signal

4.2.1 Comprehensive tax credits

The EU lacks the required competences to establish comprehensive tax credit schemes on the supranational level. Member States can and do create certain tax credits or exemptions within their national fiscal frameworks, but where such schemes can benefit industry, there is not always an established link between eligibility and the beneficiaries' demonstrated effort to decarbonize or achieve energy efficiency.[50] To illustrate, Germany's system of tax exemptions for energy-intensive industries has been fairly generous to date, but its primary goal is to boost domestic competitiveness rather than to secure concrete decarbonization commitments. At this point in time, the EU is only able to engage in cooperation on tax credits as a facilitator of the debate between Member States' positions and interests, though its ambitions in fiscal policy might eventually lead to a change in this regard.

On the other side of the Atlantic, tax credits are actively deployed as a crucial tool to stimulate both the energy transition and industrial decarbonization. The US offers a wide range of credits for both clean energy production and investment that can be used by industry (Production Tax Credit and Investment Tax Credit). There are also dedicated credits encouraging emission cuts at industrial facilities (48C Advanced Energy Project Credit), advanced manufacturing systems (45X Advanced Manufacturing PTC), or directly supporting relevant technologies (Section 45Q Credit for Carbon Dioxide Sequestration, 45V Clean Hydrogen Production Tax Credit). Many of such instruments have been either introduced or reinforced by the IRA.[51]

In conclusion, the US framework of tax credits allows for support on various stages and in various areas of decarbonization, with an emphasis on supporting clean energy sourcing. The harmonized EU approach to tax credits is currently absent, with such measures applied only at the Member State level, subject to EU state aid rules and not in a systemic manner – nor strictly related to decarbonization.

Credit: Unsplash / Eric Wang

50 D. R. Kälberer, Tax Incentives for Energy Efficiency in Germany, Industrial Efficiency Conference, Berlin, 12-14 September 2016

51 The White House, Building a Clean Energy Economy: A Guidebook to the Inflation Reduction Act's Investments in Clean Energy and Climate Action, January 2023

The state of transatlantic links in comprehensive tax credits

The issue of tax credits is a major source of discord in transatlantic relationships. The exclusion of EU entities from the IRA domestic content criteria caused controversy in the EU and led to the attempt to negotiate a Critical Minerals Agreement (CMA) as a solution. As explored in Box 2 (section 3.1), the IRA grants the full amount of the subsidy under the Clean Vehicle Credit when the battery has at least some of its content recycled or extracted and processed in the US or in a country with which the US has a CMA or a free trade agreement.

The negotiations have been extremely difficult, especially given the lack of support in the US for a deal with the EU (which would not go through Congress) as well as the reluctance from both the US government and the European Commission to negotiate a trade agreement that would need to be passed by their respective legislative bodies. These political blockers are unsurprising considering that the US strategy to include local content requirements is an attempt to re-shore critical parts of the cleantech supply chain, which is in direct competition with the EU's interests. This case illustrates the trade-offs of a green industrial policy understood as supporting the development of domestic industries and promoting decarbonization, where cooperation could be more beneficial.

Overall, we assess the current state of transatlantic cooperation in tax credits for decarbonizing industry to be poor, due to the EU's lack of supranational competences in this area and the US active focus on developing domestic manufacturing base.

While there is not much scope to deepen cooperation on tax credits, the opportunities lie in collaborating on the implementation of the IRA, which leaves a significant amount of discretion to the US executive branch.[52] The EU and the US could also agree to share information about tax credit measures earlier on, to prevent tensions in the future like those caused by the IRA's local content requirements.

SWOT analysis of the state of transatlantic links in comprehensive tax credits for decarbonizing industry

Strengths	Weaknesses
• Directly relevant to decarbonizing industry	• Negotiations very difficult to progress due to IRA local content requirements linked to the competitiveness of domestic production
Opportunities	**Threats**
• Improve communication through early information system on planned measures • Focus on implementation of the IRA tax breaks	• Political setbacks in the US or the EU • Broader trade conflicts spurred by the difficulty to reach an agreement on the Clean Vehicle Credit

Source: Reform Institute

Overall assessment of transatlantic links in comprehensive tax credits for decarbonizing industry

Current state	Potential for improvement
Poor	Poor

Source: Reform Institute

52 Brattberg et al., 'Designing a US-EU Industrial and Trade Policy'.

4.2.2 Carbon pricing

Comparison of the EU and the US carbon pricing programs

Carbon pricing is at the heart of the EU approach to climate policy and it plays no lesser role with regard to industrial decarbonization. Embodied in the EU Emission Trading System (EU ETS), it has been recently complemented by the Carbon Border Adjustment Mechanism (CBAM). The Mechanism applies a carbon price linked to the EU ETS at the border of the EU to prevent carbon leakage, i.e. industrial production being relocated to third countries due to unequal costs faced by polluters.

The flagship tool of EU climate action, the EU ETS, applies in the entire European Economic Area and in Northern Ireland (for electricity generation). It operates on a cap-and-trade principle and covers emissions from over 10,000 installations[53] across energy, manufacturing and civil aviation, with its scope being extended to buildings, road and maritime transport, and additional sectors. The EU ETS addresses CO_2, N_2O and PFC emissions in these sectors (though the exact scope varies depending on the sector), and participation is mandatory, with options for exemptions usually for smaller-scale entities.

Operating since 2005, the EU ETS is currently in its 4th trading period, which runs until December 2030. The system has been accelerated to achieve the goals of European Green Deal, with the current EU ETS target set to bring emissions down by 62% by 2030 compared to 2005.

An EU ETS allowance (EUA) enables its holder to emit 1 metric ton of CO_2, with the total amount of allowances available on the market setting a cap on the permissible emissions for all covered sectors. Allowances are distributed among eligible emitters via auctions and free allocations; once allocated they become tradeable, their price shaped by demand and steadily falling supply. A market stability reserve under the control of the Commission exists to prevent disruptions to the EU economy. Most of the revenue from allowance auctioning goes to the Member States, which are now required to use all of their EU ETS revenues for climate- and energy-related purposes.

Important parts of the "stick and carrot" design of the EU ETS are the free emission allowances and their gradual phaseout. The free allocation of allowances was initially conducted by the Member States, but it was centralized in 2013 under the Commission. The total amount of allowances distributed via free allocation is reduced gradually. Most of the freely allocated allowances have been granted to the manufacturing, power and aviation sectors, with the power sector losing free allowances post-2013 and the proportion within the manufacturing pool shrinking from 80% to 30% between 2013 and 2020.[54] The effectiveness of the system in driving down emissions has been debated, as direct reductions were estimated at about 3.8% in the period 2008-2016.[55] An argument has also been made that the free allocations in the past might have been greater than needed to prevent carbon leakage, and changed under Phase 4.[56]

The CBAM is effectively a carbon tariff on imported goods, introduced in parallel to the phase-out of free EU ETS allowances and expected to complement the EU ETS by preventing carbon leakage from the EU and establishing a fair price on the embedded emissions of (initially) six categories of imported goods:

- cement
- iron and steel
- aluminum
- fertilizers
- electricity
- hydrogen

The transitional phase of the CBAM deployment (2023-2026) focuses on the establishment of monitoring and reporting duties and capabilities of the importers, and the creation of the entire infrastructure needed to ensure the smooth

53 'Scope of the EU Emissions Trading System', accessed 30 July 2024, https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/scope-eu-emissions-trading-system_en.
54 'EU Emissions Trading System (EU ETS) – Free allocation', accessed 30 July 2024, https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/free-allocation_en.
55 P. Bayer and M. Aklin, The European Union Emissions Trading System reduced CO_2 emissions despite low prices, https://www.pnas.org/doi/full/10.1073/pnas.1918128117.
56 C. Marcantonini, J. Teixido-Figueras, S. F. Verde and X. Labandeira Free allowance allocation in the EU ETS,,Life Side Issue 2017/02, European University Institute, March 2017 p. 4-5

running of the scheme. The CBAM will become fully operational by 2026, requiring importers in the relevant sectors to become authorized CBAM declarants in order to maintain the ability to import their goods. Importers will obtain and surrender CBAM certificates corresponding to the embodied emissions in imports. The price of certificates will correspond to the average auction price of the EU ETS allowances in EUR/ton. Non-compliance will be met with financial penalties on the importers.[57]

Exemptions from the CBAM are possible based on the amount and value of the goods (if negligible), purpose (e.g., military activities), or the fact that the producers in the country of origin are already subject to an ETS linked to the EU system. Where products have been subject to a carbon price scheme in the country of origin, importers can obtain a reduction for what was already paid.

Overall, the EU ETS remains the benchmark for other similar initiatives, which is reflected in the US state-level carbon pricing schemes. The introduction of the CBAM aims to prevent carbon leakage due to the increasingly stringent conditions of the EU ETS. Carbon pricing schemes like EU ETS or CBAM can be viewed as an important source of revenue for climate action in the EU, fueling EU-level instruments as well as national revenues. However, their overall effectiveness is disputed and they cannot exist in a void, without other measures. The CBAM in particular has been criticized as a protectionist measure, with a particularly detrimental effect on developing countries. It also creates a noticeable administrative burden for all entities involved regarding emissions calculation, monitoring and reporting.[58]

The US has no comprehensive carbon pricing scheme that would apply to the industrial sector. However, the IRA has introduced a similar measure for methane emissions that could serve as a prototype for future carbon pricing instruments. The IRA's Methane Emissions Reduction Program introduces a charge on methane emitted by oil and gas companies which is subject to emission reporting duties under the Clean Air Act. It is expected to cover over 2,000 facilities and at least 42 million tons of methane emissions per year.[59]

In the US, the efforts to introduce carbon pricing at the federal level have consistently failed.

Credit: Unsplash / CHUTTERSNAP

57 'Carbon Border Adjustment Mechanism', accessed 30 July 2024, https://taxation-customs.ec.europa.eu/carbon-border-adjustment-mechanism_en.

58 R. Berahab, Is the EU's Carbon Border Adjustment Mechanism a Threat for Developing Countries?, Policy Center for the New South, 13 January 2022 https://www.policycenter.ma/opinion/eus-carbon-border-adjustment-mechanism-threat-developing-countries, T. Gore, The proposal for a Carbon Border Adjustment Mechanism fails the ambition and equity tests, Heinrich-Böll-Stiftung, Brussels,13 September 2021, https://eu.boell.org/en/2021/09/13/proposal-carbon-border-adjustment-mechanism-fails-ambition-and-equity-tests

59 'US EPA – Methane Emissions Reduction Program', accessed 30 July 2024, https://www.epa.gov/inflation-reduction-act/methane-emissions-reduction-program

However, such schemes have emerged at the state (California, Washington) and regional levels (Regional Greenhouse Gas Initiative). These initiatives could also signal a potential for the future development of carbon pricing instruments, as exemplified by California's cap-and-trade (C&T) scheme. The program is part of the toolkit to achieve California's emission reduction targets of 40% by 2030 and 80% by 2050 compared to 1990. It is a multi-sectoral scheme covering at least 450 enterprises responsible for 85% of the state emissions of the six gases included in the Kyoto Protocol (CO_2, CH_4, N_2O, HFCs, PFCs, SF_6). Similar to the EU ETS, allowances are distributed via a mix of auctions and free allocations; the revenue (USD 5 billion since 2013) fuels further emissions cuts in climate pollution via the Greenhouse Gas Reduction Fund. About 35% of the revenues are specifically directed to environmentally disadvantaged and low-income communities.[60]

The California scheme is currently undergoing review in the state legislature. Like the EU ETS, it has been criticized as an overly generous free allocation policy and for permitting indefinite allowance banking.[61] These features apparently allowed some companies to stockpile free allowances and carry them until 2022. It is claimed that, in its current form, the Californian C&T will not be enough to reach the 2030 and 2045 state targets and would need to become more stringent.[62] This indicates that authorities – just like the EU – might have been too cautious in their initial carbon pricing design due to concerns about competitiveness.

The state of transatlantic links in carbon pricing programs

Currently, there are limited forums of transatlantic dialogue on carbon pricing, thus we consider this collaboration as poor. While the EU has a mature and mandatory "top-down" scheme for all its Member States, the US has not adopted a comprehensive national strategy, with meaningful initiatives in the field coming only from a handful of states. Given the significant differences between the two regions - stemming from distinct climate ambitions, political contexts, and technical challenges - progress seems impossible unless the US federal approach changes significantly.

The negotiations under the GASSA demonstrated both an intent to collaborate on reducing the carbon intensity of these industries and

SWOT analysis of the state of transatlantic links in carbon pricing

Strengths	Weaknesses
• Existence of strong EU carbon pricing framework as a point of reference for future solutions • Functioning examples of carbon pricing initiatives at the state level in the US	• Controversies surrounding practical and political aspects of the EU scheme, in particular the EU ETS' effectiveness and CBAM's fairness • No clear path to carbon pricing policy on the US federal level
Opportunities	**Threats**
• Federal interest might appear if US state schemes survive and thrive • Questions raised by the CBAM might lead to more dialogue	• Weakening conditions of EU economies might reduce support for tightening the carbon pricing policy • Global economic outlook might encourage protectionism more than cooperation • None of the major political factions in the US is more favorable to carbon pricing than the current administration, and any change will likely reduce chances to improve collaboration in the immediate future

Source: Reform Institute

60 C2ES, California Cap and Trade, https://www.c2es.org/content/california-cap-and-trade/, 'California Cap-and-Trade Program', https://ww2.arb.ca.gov/our-work/programs/cap-and-trade-program/about, accessed 30 July 2024.
61 Legislative Analyst's Office, The Cap-and-Trade Program: Issues for Legislative Consideration, Senate of California, 13 February 2024, p. 6
62 Ibid., p. 4

the challenges in achieving such collaboration. However, fundamentally different approaches to carbon pricing and decarbonization of heavy industries resulted in a stalemate (see: Chapter 3.1). If GASSA can regain traction, this could be a hopeful sign for future carbon pricing dialogue.

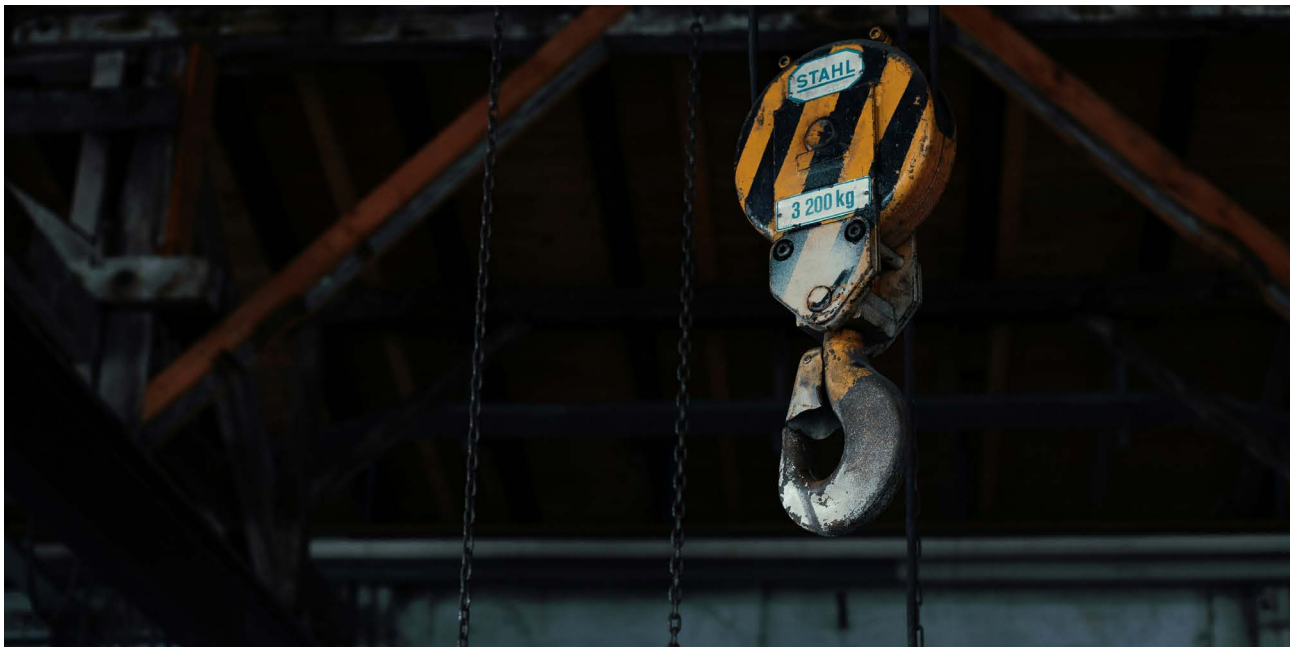
Given that greater alignment on the issue of carbon pricing seems unlikely, it might prove more productive for both sides to focus on the mitigation and resolution of potential conflicts that arise from diverging positions on the matter, at least in the immediate future. Meaningful change is prevented by the combination of the US' skepticism on the issue and the EU's resolution to tighten its system.[63] Given that carbon pricing alone, however crucial, is not likely to ensure the fast decarbonization of industry,[64] the EU and the US should at least ensure that the issue is not an obstacle in cooperation in the other fields described.

Some hope for greater alignment in the future can be derived from the state-level carbon pricing schemes introduced by California and Washington. These programs are presented as success stories which are set to continue, and even in case of lack of support at the federal level, it is for each state to determine the fate of their relevant policies (e.g., California has defended its cap-and-trade scheme from a judicial challenge issued by the Trump administration back in 2020). If the current programs survive and succeed in encouraging more states to build their own comprehensive carbon pricing schemes or join relevant regional initiatives (e.g., the Regional Greenhouse Gas Initiative), the idea of US carbon pricing might eventually escalate to the federal level. It remains uncertain, however, if and when such a process will occur.

Overall assessment of transatlantic links in carbon pricing schemes for decarbonizing industry

Current state	Potential for improvement
Poor	Poor

Source: Reform Institute



Credit: Unsplash / Alex Ronsdorf

63 ERCST, Options and Priorities for the EU-US Global Arrangement on Steel and Aluminium (and Implications for the CBAM), p. 11, https://ercst.org/options-and-priorities-for-the-eu-u-s-global-arrangement-on-steel-and-aluminium/.

64 S. Tagliapietra and R. Veugelers (eds.), Breugel Blueprint 33: Sparking Europe's New Industrial Revolution; A. Terzi, Green industrial policy: the necessary evil to avoid a climate catastrophe, p.109; C. Criscuolo, A. Dechezleprêtre and Lalanne. Industrial strategies for the green transition, p. 131, 2023

4.3 Demand pull policies

4.3.1 Green public procurement

Comparison of the EU and the US green public procurement programs

Aside from the incoming package of circular economy regulations (Ecodesign for Sustainable Products Regulation and the Construction Products Regulation), which addresses the supply side more than demand (and are thus described in the subchapter on information tools), the EU has no comprehensive and mandatory system of green public procurement. This, however, might change in the near future, as Ursula von der Leyen has announced a review of relevant legislation in her political guidelines for the 2024-29 Commission.[65] Several acts within the EU legal order include provisions related to green procurement practices and could lead to more:

- The **EU Public Procurement Directives** (2014/24/EU and 2014/25/EU) require public entities to conduct a life-cycle analysis as part of their procurement procedures. This should include the costs of embedded emissions and of climate change mitigation. The two Directives also provide guidelines for public authorities across EU Member States regarding procurement procedures. While the directives do not enact mandatory green procurement principles, they encourage and facilitate their implementation.

- The **Energy Efficiency Directive** requires public entities to apply the "energy efficiency first" principle to their procurement decisions, and the **Energy Performance of Buildings Directive** requires Member States to review their public procurement rules for energy efficiency renovations tendering. However, these conditions have only a minimal effect on industrial suppliers until e.g., comprehensive rules for green labelling are finalized.

- The **Net-Zero Industry Act** introduces mandatory sustainability and resilience criteria to auctions for the deployment of renewables and adds three more interchangeable criteria to other public procurement procedures for net-zero technologies: social sustainability, cyber security, and an obligation of timely delivery.

- The **EU green public procurement criteria**, developed for various product and service categories (including energy efficiency, resource efficiency, emissions reduction, and sustainable sourcing), help EU and national public authorities identify preferable options from an environmental perspective.

- The EU **Ecolabel** is a voluntary certification scheme that helps consumers and public authorities identify products and services with reduced environmental impacts.

- The EU **green taxonomy** is a point of reference for what activities and technologies should be considered "green".

- The **green public procurement best practice guides** support capacity building efforts.

In the US, the IRA introduced six measures, backed by financing, aimed at reducing the embedded GHG emissions of materials and products, principally in the construction sector. The relevant instruments are under the control of the Environmental Protection Agency (EPA), the Department of Transportation (DOT), the Department of Housing and Urban Development (HUD), the General Services Administration (GSA), and the Federal Emergency Management Agency (FEMA). They include:

- Section 60112 – USD 250 million to the EPA for a program supporting enhanced standardization, measurement, reporting and verification of the embodied carbon of construction materials/products (e.g., grants, technical assistance).

- Section 60116 – USD 100 million for an EPA program to identify and label construction materials or products with substantially lower embodied carbon, in coordination with the GSA and the DOT.

- Section 60503 – USD 2.15 billion to the GSA's Federal Buildings Fund.

65 Ursula von der Leyen, Political Guidelines for the Next European Commission 2024–2029, https://commission.europa.eu/document/download/e6cd4328-673c-4e7a-8683-f63ffb2cf648_en.

- Section 60506 – USD 2 billion to the DOT Federal Highway Administration (FHWA) to reimburse/incentivize eligible recipients for the use of construction materials/products that have substantially lower embodied carbon (as determined by the EPA).

- Section 30002 – USD 837.5 million to HUD for direct loans and grants to improve climate resilience of affordable housing, including low-emission building materials/processes.

- Section 70006 – Authority for FEMA to provide financial assistance for costs associated with low-carbon materials.[66]

While these measures have just been introduced and their actual influence will only be felt over time, it should be noted that concrete financial incentives linked to them should reinforce their effectiveness.

In addition, the Federal Buy Clean Initiative and the State Buy Clean Partnership, in synergy with the Buy American Act (general preference for US-made goods in governmental procurement) and Buy America Act (specific to transport-related projects), seek to ensure that US procurement will not only favor clean products, but also those that are domestically manufactured and have local content. In conjunction with the federal government's impressive purchasing power (as the *de facto* largest single buyer in the world), these initiatives encourage the development of the US clean industry by promising to safeguard reasonable demand for its output. This element is absent from the EU approach, which has led to friction between the two sides.

The US policy toolbox regarding GPP seems set for a better start, at least on the federal level, compared to the EU framework. It is designed as a more robust and well-coordinated approach within the overall idea of industrial decarbonization, although it remains to be seen how the schemes in place will play out in reality. In the US, the alignment of green procurement with domestic content requirements is well-pronounced, providing clear financial incentives for GPP and synergizing with the general idea of supporting domestic industries under the IRA and BIL. This, however, might lead to more acute competition

Credit: Unsplash / Jamie Street

66 'US EPA – Reducing Embodied Carbon of Construction Materials through the Inflation Reduction Act', https://www.epa.gov/greenerproducts/reducing-embodied-carbon-construction-materials-through-inflation-reduction-act, accessed 30 July 2024.

around the supply of clean materials. Despite the presence of large funding mechanisms at the EU level for material-intensive investments (e.g., infrastructure spending within the Cohesion Policy), there is no robust, binding framework in place to leverage them to ensure *demand pull* for decarbonized materials, although the EU has the basic foundations to set up a GPP framework in the future. A systemic approach is the main inspiration the EU could take from the US.

The issue of local content requirements in GPP (also present in US subsidies and tax credit policies) is, however, not conducive to enhanced EU-US cooperation in this area. The EU is not likely to accept an asymmetrical system where US companies in Europe can compete for public procurement on an equal footing without reciprocity for EU companies in the US. If both sides follow the local content logic consequently, global decarbonization efforts in the field might also be negatively impacted, limiting investments and technology transfer in developing countries.

The state of transatlantic links in green public procurement

The state of transatlantic links in green public procurement is assessed as moderate. Existing GPP programs and initiatives in the EU and the US are promising but have not yet delivered significant results. Their full impact remains to be observed. Furthermore, there are no forums dedicated to direct dialogue on this topic between the US and the European Commission, potentially impeding progress toward mutually beneficial outcomes.

A major shortfall is the lack of direct cooperation between the US and the European Commission. While some efforts in green procurement occur through the Climate Club and the G7 Industrial Decarbonization Agenda, which see the participation of both the US and the EU, these initiatives focus more on the promotion of high-level policy than on the establishment of specific rules and standards for green procurement. A more technical platform could address specific transatlantic challenges in green public procurement, leading to more effective strategies and policies for both the US and the EU.

SWOT analysis of the state of transatlantic links in green public procurement for decarbonizing industry

Strengths	Weaknesses
• Existing public procurement regulations on both sides as a cornerstone for further developments • Mature and reliable traditions and general public procurement standards in both the EU and the US • Promotion of green public procurement as an important instrument for decarbonizing industry	• The initiatives are recent, limited in scope and/or high-level • No direct cooperation between the US and the European Commission • Narrowly defined areas of focus • Unclear and potentially limited impact on public procurement outcomes
Opportunities	**Threats**
• Develop more technical platforms to address specific transatlantic challenges • Improve coordination and integration of existing initiatives for maximized effectiveness • Mutually beneficial public procurement mechanisms • Leadership in setting international standards	• Diverse economic and political contexts • Conflicting objectives • Temptation to support local content encouraging competition instead of cooperation

Source: Reform Institute

Existing programs often operate within narrowly defined areas, leading to isolated efforts and overlooked opportunities for cross-cutting collaboration. The Greening Government Initiative, which enables public officials from 53 countries to share information on increasing environmental sustainability in government operations, is a positive step. Yet its impact on public procurement outcomes is unclear and likely limited. CEM IDDI's procurement outcomes are restricted to low-carbon steel and cement, and involve only 9 member countries – Germany and Sweden being the only EU members. Enhancing the coordination and integration of these initiatives could maximize their effectiveness. This would require expanding their scope, improving communication, and building inclusive governance structures.

Developing universal green public procurement standards between the US and the EU would be beneficial, but the path is fraught with challenges. Diverse economic and political contexts may obstruct consensus in this area. It is therefore crucial for dialogue platforms to establish robust, inclusive governance structures that acknowledge and, at least to some extent, reconcile differences. If this can be achieved, the long-term perspective for cooperation looks promising.

In summary, the current state of US-EU cooperation on green public procurement for decarbonizing industry is being inhibited by the question of supporting domestic production. A meaningful effort is required to develop appropriate communication and collaboration platforms to better align their respective positions. However, the foundations for future improvement are good, as both sides have developed regulatory standards in this area.

Overall assessment of transatlantic links in green public procurement for decarbonizing industry

Current state	Potential for improvement
Moderate	Good

Source: Reform Institute

Credit: Unsplash / Patrick Hendry

4.3.2 Information tools

Comparison of the EU and the US policies on information tools

Information tools serve to inform markets of product parameters which are relevant for buyers to make climate-informed decisions. They are therefore classified as part of the *demand pull* because they are intended to shape the decisions of buyers or consumers.

The EU has put in place several tools of this type, with efforts to increase the circularity of its economy. For example, the energy label shows consumers how energy efficient products are.[67] The Sustainable Products Initiative seeks to create digital product passports for all regulated goods and services in order to increase transparency about their characteristics across the entire lifecycle. It strives to become the gold standard for sustainable product labelling, providing a unified and reliable label across many categories.[68] Overall, however, the standards and methodologies for measuring and informing the market about product performance and sustainability features are still in the making, and the EU's high ambitions regarding the tracking of embodied carbon and circularity will require significant efforts to reach an adequate level of transparency and reliability.

The US is also facing challenges regarding the transparency and reliability of its information tools. Consumer labels do exist on the US market, and the EPA directs at least 6 of them (e.g., Energy Star, SmartWay, WaterSense) for various product categories and their respective features.[69] There are many more state-issued or private commercial labels, including those established as voluntary consensus standards (VCS), the transparency of which is not always certain (a phenomenon also known in the EU). The EPA has issued recommended standards for such labels in cooperation with stakeholders,[70] but these are not binding, and a unified approach cannot be ensured with certainty.

Regarding embodied carbon measurement, the Federal Buy Clean Initiative requires precise methodologies, especially regarding construction materials and sustainable products tracking that are identifiable for consumers. The EPA, other federal agencies on the Buy Clean Task Force, and state authorities are working to identify the proper course of action in this regard, empowered by relevant IRA provisions.[71]

The state of transatlantic interactions in information tools

Overall, we assess the current state of US-EU cooperation in information tools for decarbonizing industry as good due to shared efforts in developing standards, methodologies, and labels to inform markets and consumers about product sustainability and efficiency.

However, the potential for future improvement remains high as both the EU and the US face challenges in ensuring the reliability and uniformity of these information tools, indicating a need for stronger collaboration and alignment on standards. For instance, there is no US-EU cooperation platform on information tools, which might constitute the greatest weakness of this link. A compelling dialogue could potentially emerge through the G7 Industrial Decarbonization Agenda (IDA), with its focus on setting standards for near-zero emission materials. As it involves major economies, its decisions are globally impactful, providing clear signals to investors and spurring innovation in such technologies. Meanwhile, the CEM IDDI promotes the demand for low-carbon materials and sets carbon accounting standards, complementing the G7 Agenda. However, the EU is not a CEM IDDI member, suggesting a need for stronger EU-US collaboration in this area.

67 'Understanding the Energy Label - European Commission', accessed 31 July 2024, https://energy-efficient-products.ec.europa.eu/ecodesign-and-energy-label/understanding-energy-label_en.
68 'Ecodesign for Sustainable Products Regulation - European Commission', accessed 28 August 2024, https://commission.europa.eu/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/sustainable-products/ecodesign-sustainable-products-regulation_en.
69 US EPA, Buying Green for Consumers, https://www.epa.gov/greenerproducts/buying-green-consumers
70 OCSPP US EPA, 'Framework for the Assessment of Environmental Performance Standards and Ecolabels for Federal Purchasing', Other Policies and Guidance, 2 September 2015, https://www.epa.gov/greenerproducts/framework-assessment-environmental-performance-standards-and-ecolabels-federal.
71 'Federal Buy Clean Initiative | Office of the Federal Chief Sustainability Officer', accessed 28 August 2024, https://www.sustainability.gov/buyclean/#abouttaskforce.

Multiple programs, including TTC, IPHE, and G7 IDA set technology and emissions standards, risking misalignment due to diverse membership. Aligning the work of these platforms is crucial to avoid duplication and provide a clear roadmap for innovators and institutions.

In terms of specific technology-focused platforms, initiatives on hydrogen dominate (e.g., IPHE, the Hydrogen Valley Platform), but platforms for detailed information on alternative decarbonization technologies, like advanced manufacturing or circular economy principles, are lacking.

Lastly, broader platforms like LeadIT, UNIDO, and GGI facilitate wide international collaboration and give access to a diversity of views about the decarbonization of industry. Despite challenges like diverging agendas and institutional barriers, their contribution can be viewed as positive and should be maintained in the future.

SWOT analysis of the state of transatlantic links in information tools for decarbonizing industry

Strengths	Weaknesses
• Range of diverse agreements and dialogues • Collective focus on setting international standards	• Lack of direct, overarching US-EU platform for information tools • Dominance of hydrogen programs • Lack of emphasis on complementary measures • Lack of comprehensive collaboration on the entire supply/value chain
Opportunities	**Threats**
• Create sustainable and predictable environment for innovators • Foster innovation throughout the entire value chain • Enhance direct cooperation between the US and the European Commission	• Duplications and economic inefficiencies • Conflicting objectives and standards

Source: Reform Institute

Overall assessment of transatlantic links in information tools for decarbonizing industry

Current state	Potential for improvement
Good	Good

Source: Reform Institute

4.3.3 Standards (carbon requirements)

Comparison of the EU and the US carbon requirements policies

Product carbon requirements (PCRs) refer to standards regulating the maximum emission intensity of materials and products on the market. They are generally associated with the idea of bans or limitations on the sale of carbon-intensive materials and products, i.e., those that fail to comply with a specified carbon requirement. PCRs are proposed as an important component of a complete policy landscape including carbon pricing regimes, as a supplement or alternative to a carbon tariff and a preventive measure against carbon leakage and carbon-intensive imports.

At the same time, they remain controversial largely for the same reason as carbon border taxes and tariffs. They risk protectionism and non-compliance with WTO rules, put third countries in the position of rule-takers, and generate an administrative and fiscal burden on importers and their suppliers. A full introduction of PCRs requires mature value chains for low-carbon materials to already be in place. However, they can be useful as a later-stage policy in the market functions methodology, to be used when lead markets for greener technologies have been created.

It is proposed that product carbon requirements limit their scope to emissions directly related to the production process, with other emissions (e.g., stemming from transport) subject to other policies.[72]

Currently, neither the US nor the EU have a comprehensive framework of product carbon requirements. Still, the existence or near-introduction of several policy instruments across the Atlantic imply that such standards will eventually emerge. Several policies in the EU already require a framework for monitoring carbon intensity, such as the CBAM, or the aforementioned green procurement guidelines. Furthermore, the EU is developing similar mechanism to PCRs in other areas, such as the European Conformity Standard, which requires both imported and domestically manufactured products to meet health, safety and environmental protections[73] or the "Euro" emission standards for road vehicles.[74]

The EU's starting position regarding the development of carbon standards seems stronger, given the catalogue of existing tools in relevant policy areas to draw inspiration from. Nonetheless, the

Credit: Unsplash / Luke Besley

72 T. Gerres, M. Haussner, K. Neuhoff, A. Pirlot, To ban or not to ban carbon-intensive materials: A legal and administrative assessment of product carbon requirements, RECIEL, 6 May 2021.

73 'CE Marking', accessed 9 August 2024, https://single-market-economy.ec.europa.eu/single-market/ce-marking_en.

74 'Euro 7: Council Adopts New Rules on Emission Limits for Cars, Vans and Trucks', Consilium, accessed 9 August 2024, https://www.consilium.europa.eu/en/press/press-releases/2024/04/12/euro-7-council-adopts-new-rules-on-emission-limits-for-cars-vans-and-trucks/.

US has already embarked on the road to establish carbon-relevant standards for its Federal Buy Clean Initiative. The US is also enhancing tools for emission reporting and tracking, such as the Greenhouse Gas Reporting Program (GHGRP) by the EPA that can provide insights for product carbon standardization, if there is political will to establish them. At the same time, the idea of PCRs suffers from the same controversies as the CBAM, and any ambition in this area, joint or otherwise, would need to take WTO rules into consideration.

The state of transatlantic interactions in carbon requirements

While many of the existing fora of transatlantic dialogue could prove suitable for developing cooperation in carbon requirements, this area remains largely unexplored, as the issue is not yet a high priority on the political agenda on either side of the Atlantic. As the CBAM enters into force in the EU, however, it seems probable that the subject of standardization will grow in importance. If any lesson is to be learned from EU-US tensions over carbon border adjustments and industrial subsidies, it is that dialogue on possible common efforts regarding carbon standards should begin sooner rather than later.

Collaboration on product carbon requirements on steel and aluminum specifically offers a potential way forward from the stalled GASSA negotiations. Finding a common approach to steel and aluminum tariffs proved difficult for the parties due to the vastly different approaches toward carbon pricing, but PCRs could provide a way of cooperating that is compatible with both the US and the EU systems.[75]

To be acceptable to both parties, common standards for steel and aluminum would need to take into account the technological differences between the US and the EU. The US average GHG-intensity for steel production is lower, due to the wider use of electric arc furnaces, which are used to recycle scrap steel. EU steel, on the other hand, is predominantly produced in a two-step process using a blast furnace and a basic oxygen furnace, which is the process for obtaining primary steel. A technology-agnostic standards would, at this stage, favor the US. However, it could be possible to create a sliding scale that demanded lower GHG intensity the more scrap steel is used in production. This could be dynamic, so that producers' expectations would strengthen quickly over time, and ultimately lead to a technology-agnostic standard.[76]

Dialogue and negotiations on product carbon requirements would best continue outside of the GASSA forum, which has attempted to resolve too many complex issues. A forum which offers more flexibility would be more appropriate. The Trade and Technology Council appears to be a good candidate for these dialogues.

Overall, this report assesses the state of current transatlantic links on product carbon requirements as poor, though with significant potential for future improvement given the foundational policy tools already in place. The EU's CBAM and the US Federal Buy Clean Initiative hint at an emerging consensus on the need for carbon standards, but also show large differences as to how such standards should be shaped and implemented. There is potential in particular to develop PCRs for steel and aluminum, to provide a way forward from the stalled GASSA negotiations and harmonize emerging approaches.

Overall assessment of transatlantic links in product carbon requirements

Current state	Potential for improvement
Poor	Good

Source: Reform Institute

75 ERCST, Options and Priorities for the EU-US Global Arrangement on Steel and Aluminium (and Implications for the CBAM), p. 14, https://ercst.org/options-and-priorities-for-the-eu-u-s-global-arrangement-on-steel-and-aluminium/.

76 Ibid.

4.4 Systemic enablers

4.4.1 Just transition policies

The EU addresses the just transition primarily via large financing programs with a broad scope, leaving the technicalities of distributing benefits to the population in the hands of Member States, which are better equipped to assist citizens on the ground. This occurs via Territorial Just Transition Plans, which enable and guide support under the following EU programs:

- **Social Climate Fund (SCF)** –EUR 86.7 billion for the period 2026-2032, funded mostly via the ETS 2 revenues from the introduction of carbon pricing in buildings, road transport and small industrial installations, and used to mitigate the effects of the ETS 2 rollout among vulnerable groups and accompanying national Social Climate Plans.

- **Just Transition Mechanism (JTM)**, with the Just Transition Fund (JTF) at its centre – EUR 17.5 billion for 2021-2027 including worker training programs in EU Member States.

- **InvestEU's Just Transition Scheme (JTS)** – budgetary guarantees and advisory assistance for projects under Territorial Just Transition Plans.

- **Public Sector Loan Facility (PSLF)** and **Cohesion Fund** –also relevant in providing support for investments in low-carbon public infrastructure, such as municipal transit systems (employment opportunities and infrastructure needed to facilitate economic development in regions undergoing the transition).

JTF and InvestEU's JTS will provide more direct financing for economic stimulation, workforce development, and infrastructure modernization. SCF, Cohesion Fund and PSLF will play a part in ensuring general social cohesion and mitigating the adverse effects of the transition on vulnerable groups throughout the process.

While seemingly robust, this framework is yet to demonstrate its practical effectiveness beyond the EU's traditional focus on coal-reliant regions and communities, and toward the broad spectrum of the EU population, including support for workforce development and entrepreneurship. A major concern is that the funds currently available (just over EUR 100 billion between the SCF and JTF, with an additional contribution from the cohesion policy which at the moment is hard to estimate) might not be enough to cover the scale of the challenges across the continent.

In the US, four just transition dimensions are present in dozens of federal and state programs, including support for employers, direct benefits for workers (e.g., healthcare, food), workforce development, and remedial action concerning infrastructure and the environment (e.g., revitalization and repurposing efforts). In a context of industrial decarbonization leading to the development of new industrial processes, the adequacy of the workforce skillset and the repurposing of obsolete industrial sites seem particularly relevant. Tools like the Abandoned Mine Land Program or the updated application of the Davis-Bacon Act (which mandates that contractors and subcontractors working on federally-funded construction projects must pay their workers' wages and fringe benefits consistent with the local prevailing standards) provide blueprints for guarantees and action in this new context.[77] The Partnerships for Opportunity and Workforce and Economic Revitalization (POWER) Initiative (2015–2020) was maybe the most comprehensive attempt to build a coherent policy framework for the just transition in the US, at least regarding coal-dependent regions. POWER provided USD 410 million through 484 grants awarded across 30 states, with over three quarters of available funding concentrated in the Appalachia. Most funds were dedicated to projects focusing on workforce and infrastructure development.[78] However, POWER covered no more than one third of the so-called "coal counties", 200 out of 641.[79]

With regard to funding, the total amount available to support the just transition under the IRA

77 W. Look, D. Raimi, M. Robertson, J. Higdon, D. Propp, Enabling Fairness for Energy Workers and Communities in Transition, EDF Report 21-07, March 2021
78 R. Shelton et al., POWER for Transition Investment in Coal Communities through the Partnerships for Opportunity and Workforce and Economic Revitalization (POWER) Initiative, EDF Report 22-07, July 2022, p.23, p.30
79 Ibid., p.18

could prove as high as USD 40-60 billion (a lower figure compared to the just transition programs in the EU discussed above), but this still depends on the exact allocation of funds under a broader label of "environmental justice".[80] Instruments provided by the IRA are the Prevailing Wage and Apprenticeship Bonus Credits, which ensure that the Davis-Bacon guarantees will be maintained in clean projects by offering tax benefits.

One feature of US policy on the just transition is its fragmentation. A wide range of programs and instruments exist on the federal and state level, many of which are or can be made relevant for industrial decarbonization. However, there still seems to be a lack of a robust overarching structure (comparable to the EU's SCF or cohesion policy), higher-level coordination, or a systemic approach that would focus on mitigating the overall social challenges mirroring the IRA's focus on industrial decarbonization. Though IRA funds provide significant support for employers, they do not seem to comprehensively address all the dimensions of the just transition.

Comparison of the EU and the US just transition policies

In the US, the just transition is embedded into specific conditions governing the use of particular mechanisms and financial instruments, rather than subject to an entirely separate policy. It should be noted that there are instruments specifically tailored to serve vulnerable communities (e.g., rural and tribal), but their scope is narrower compared to the EU schemes such as the JTF. EU Member States are expected to use their situational awareness and understanding of local needs and circumstances to play an active role in directing the funds via Social Climate Plans and Territorial Just Transition Plans. Without a clear federal framework on the issue, US states are to a greater extent left to their own devices, but also their own resources, in shaping their just transition approaches. On the flipside, governments exercising control of EU funding could result in less agency and more obstacles for local authorities (e.g., municipalities) seeking funding, with their counterparts in the US having more direct access to available programs.

Credit: Unsplash / Glenov Brankovic

80 H. Abdullah, L. Ford, N. Kambli, "Just Decarbonisation": an Opportunity for EU–US Cooperation, E3G, February 2023, https://www.e3g.org/wp-content/uploads/E3G-Briefing-Just-Decarbonisation-Opportunities-for-EU-US-cooperation.pdf.

The state of transatlantic interactions in just transition policies

Currently, there are no dedicated platforms for US-EU cooperation on just transition policies, resulting in a less robust dialogue on this issue. Collaboration might develop via the US-EU Energy Council, as the DOE hosted an EU-US just transition workshop on energy poverty with representatives of the Commission's Directorate-General for Energy (DG ENER) in May 2024. An expert workshop emphasized state-and Member State-level policies and the results were planned to be delivered to the Energy Council for future proceedings. This was a positive, if somewhat isolated, sign of interest in collaboration.

The limited scale of dialogue might be due to the fact that both the US and the EU support vulnerable communities, but their approaches to the just transition differ. The US incorporates these principles within specific conditions and financial instruments, whereas the EU employs broader schemes like the Just Transition Fund (JTF). Given the differing approaches, establishing stronger links in this area is challenging. However, collaborative efforts could involve sharing best practices, harmonizing standards, and aligning funding criteria to support just transition goals more effectively. One of the most effective methods might be to expand one of the existing platforms for collaboration to include a working group on just transition policies.

While integrating the principles of the just transition into every project is essential, the challenges are broad, cross-cutting, and often unique to each region undergoing transformation. An enhanced transatlantic dialogue could be achieved by strengthening existing programs to ensure that just transition mechanisms are applied consistently and upheld to a high and universal standard. Furthermore, establishing collaborative programs for capacity building, training, and knowledge exchange can facilitate the sharing of experiences and lessons learned, especially in areas such as workforce retraining, community engagement, and sustainable economic development in post-industrial regions.

Beyond this, the potential for a stronger connection might be limited. However, the EU and the US could consider joint efforts to support the just transition on the global scale and help greening industries in third countries. Reinforcing and developing the existing Just Energy Transition Partnerships (financing partnerships connecting donors, such as states, development banks and agencies, with beneficiaries, such as coal-dependent developing countries) could be the first step for more ambitious and inclusive global action.

SWOT analysis of the state of transatlantic links in just transition policies for decarbonizing industry

Strengths	Weaknesses
• Shared commitment to supporting vulnerable communities through the green transition • Some interest in a joint discussion demonstrated by the DOE and the European Commission	• No existing platforms for transatlantic cooperation • Differing approaches to financial instruments and mechanisms • Just transition challenges are broad and often unique to each region
Opportunities	**Threats**
• Potential to expand existing platforms of collaboration to include a working group on just transition policies • Joint efforts in supporting the just transition on a global scale, potentially leveraging models like the Just Energy Transition Partnerships for greening industries in third countries • Fairly non-partisan cause of support for disadvantaged communities	• Divergent policy priorities and financial strategies • Diversity in just transition approaches that limit the effectiveness of transatlantic collaboration in producing tangible outcomes • Helping communities might be non-controversial, but selecting and prioritizing beneficiaries might generate more friction

Source: Reform Institute

Overall, we assess the current state of US-EU cooperation in just transition policies for decarbonizing industry as poor due to the fragmented approaches and lack of high-level coordination. The EU focuses on large financing programs with national-level implementation to ensure social cohesion and mitigate adverse effects, while the US has a multitude of federal and state programs without a cohesive framework to address the social fallout of decarbonization comprehensively. However, there is a moderate potential for future improvement through possible collaborative efforts, such as sharing best practices and aligning funding criteria. Establishing strong links will be difficult due to differing approaches and the broad, region-specific nature of the just transition challenges.

Overall assessment of transatlantic links in just transition tools for decarbonizing industry

Current state	Potential for improvement
Poor	Moderate

Source: Reform Institute

Credit: Unsplash / Curioso Photography

5 Technology-specific policies

5.1 Circular economy

The transition from a linear to a circular economy has been a focus of EU legislation since 2014. However, from the perspective of industrial decarbonization, previous initiatives have largely failed to address the entire value chain comprehensively. To address these issues, the Circular Economy Action Plan 2.0 (CEAP 2.0), published in 2020, primarily focuses on certain major actions, namely setting recycling targets for products, enhancing the reuse of products, raw materials, and materials, raising consumer awareness, and implementing circular economy business models. While the first stage of the plan's introduction has already been initiated, the prospects to achieve significant progress by 2030 remain low to moderate, mainly due to ongoing implementation challenges at the Member States' level.[81]

The US has a more fragmented approach to the circular economy, lacking a unified, dedicated agenda. Federal legislation like the IRA, the CHIPS and Science Act, and the Bipartisan Infrastructure Law support circular economy initiatives primarily through investments in technology and infrastructure, with a focus on industrial decarbonization. Additionally, the EPA has launched the Circular Economy Strategy Series, which lays out a national roadmap for the transition to circularity. The series addresses key sectors such as plastics, food waste, critical minerals, electronics, the built environment, and textiles. The White House and the DOE have also included circular economy initiatives as a priority within investment programs that support recycling and reuse, particularly in the chemical, batteries, and construction materials sectors.

Decarbonizing heavy industry through the circular economy model is a primary driver to enhance high-quality recycling, directly impacting the domestic capacity to recycle products. EU legislation resulting from the CEAP includes measures to reduce the demand for steel, cement, construction products, vehicles, and plastic waste. From the US perspective, actions stemming from the IRA, the CHIPS and Science Act, and the Bipartisan Infrastructure Law support circular economy initiatives primarily in the chemicals, steel, aluminum, and cement sectors.

However, there are additional activities both in the US and EU that, while having a limited impact on the decarbonization of extraction processes, exert a broader circularity impact by supporting the development of industries that require critical raw materials. For instance, the Critical Raw Materials Act mandates that at least 25% of the EU's yearly consumption of critical raw materials

Credit: Unsplash / Crystal Kwok

81 EEA, Accelerating the circular economy in Europe — State and outlook 2024, EEA Report 13/2023; Luxembourg Publications Office of the European Union.

come from domestic recycling. Other legislation, such as the EU Battery Regulation and the End-of-Life Vehicles Regulation, also imposes obligations related to the recovery of critical raw materials. In the US, the Critical Materials Research, Development, Demonstration, and Commercialization Program aims to strengthen domestic market needs while also emphasizing the importance of circularity.

While the EU and the US are committed to advancing circular economy practices, their approaches differ significantly. The EU focuses on regulatory frameworks and mandatory targets, while the US prioritizes financial support and infrastructure development.

To address the decarbonization of the construction industry, critical EU legislation stemming from the CEAP 2.0 includes the revision of the Construction Products Regulation. This aims to establish a highly efficient single market for con-struction products, incorporating environmental obligations more widely and effectively implementing standardization mechanisms. From the US perspective, key actions toward circularity are driven by significant investments, such as those from the Bipartisan Infrastructure Law and the CHIPS Act, along with initiatives focused on low-embodied carbon construction materials. Notable efforts include Section 60503 of the IRA, the FederalState Buy Clean Partnership, and updates to the Facilities Standards for the Public Buildings Service P100. However, the general strategy for the built environment as part of the US Circular Economy Strategy series has not yet been developed.

In addressing the decarbonization of the plastics industry, the EU has proposed new packaging and packaging waste legislation to ensure that all packaging is recyclable or reusable by 2030. The EU faces significant challenges such as misleading labelling, overpackaging, and low levels of recyclable material in packaging. Additionally, the revised regulation on waste shipment bans the export of non-hazardous plastic waste to non-OECD countries. The End-of-Life Vehicle Regulation also mandates that new vehicles are manufactured using 25% of plastic derived from post-consumer waste, with a quarter of this amount coming from end-of-life vehicles. In comparison, the US published its first comprehensive strategy on plastics only recently, in July 2024 (the first EU strategy is from 2018).[82] The US strategy emphasizes R&D, infrastructure, and investment rather than setting quantitative targets. The Draft National Strategy to Prevent Plastic Pollution aims to eliminate land-based plastic waste generation by 2040. Future steps may include harmonizing approaches to plastic pollution through the UNEP global negotiation for a legally binding instrument.

In the automotive industry, CEAP 2.0 targets both end-of-life vehicles and the development of electric vehicles through the battery industry. For end-of-life vehicles, the new EU regulation mandates reporting on secondary steel, crucial for reducing embedded emissions, with potential future targets for steel and other materials to ensure circularity throughout the lifecycle. Additional measures, such as the introduction of digital passports and new obligations for manufacturers related to circular strategies, aim to enhance market transparency. On the other hand, the US lacks specific policy mechanisms for the recovery or recycling of steel from end-of-life vehicles.[83]

The new EU battery regulation imposes environmental and social requirements on manufacturers, which are obligatory instruments to improve market transparency as well as increase domestic manufacturing and recycling capacity. At the US level, investments resulting from the Bipartisan Infrastructure Law are the main instrument in this area, focusing on best practices for battery collection and voluntary battery labeling guidelines, while pushing for domestic battery manufacturing and recycling.

The state of transatlantic links in circular economy policies

The state of transatlantic relationships in circular economy policies for decarbonizing industry is currently limited but with significant potential for growth. There are numerous areas where mutual interests in sustainability, climate action, and innovation converge, creating opportunities for more collaboration. This could be achieved through, for example, shared innovation projects, the alignment of trade policies with circular economy principles, and by leveraging multilateral forums to advance global commitments.

82 'Plastic Waste: a European strategy to protect the planet, defend our citizens and empower our industries', accessed 30 July 2024,, https://ec.europa.eu/commission/presscorner/detail/en/IP_18_5.

83 WEF, Closing the Loop on Automotive Steel: A Policy Agenda, 2023. https://www3.weforum.org/docs/WEF_Closing_Loop_Automotive_Steel_2023.pdf.

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal is a good start, but it only covers the global management of hazardous waste, including their reduction, environmentally sound disposal, and prevention of illegal dumping. There is therefore scope to ensure that the circular economy principles are adopted, promoted and aligned in other areas relevant for decarbonizing industry. On the other hand, ongoing negotiations convened by UNEP to establish a global, legally binding plastics treaty represent a significant opportunity for enhanced collaboration between the US and the EU in the broader context of decarbonizing industry, as they would address the environmental impact of plastic production and waste. These talks could set a precedent for international cooperation, encouraging both regions to align their policies and practices toward more sustainable and low-carbon industrial processes.

Moreover, existing platforms of joint research and innovation could be expanded to cover the implementation of circular economy principles. At the same time, the creation of new partnerships and innovation hubs could prove valuable. This could involve joint funding for projects that explore innovative recycling technologies, sustainable materials, and energy-efficient manufacturing processes. Establishing innovation hubs that support startups and companies developing circular economy solutions could facilitate knowledge exchange, provide access to funding, and help scale up promising technologies.

The development of common circular economy standards between the US and the EU, including recycling protocols, product design requirements, and incentives for reuse, could further facilitate trade in circular goods and services and encourage the global adoption of best practices. Incorporating the EU digital product passport as a foundational element could serve as an effective starting point. Working toward interoperability and mutual standards based on the DPP model could be facilitated through the creation of a dedicated platform for dialogue, aimed specifically at developing and harmonizing these crucial criteria and policies.

Moreover, the *demand pull* instruments such as green public procurement and obligations for private sector buyers could be strengthened and coordinated to drive a greater adoption of circular economy solutions across the geographies. The current and future platforms of cooperation on sustainable finance should also encourage investment in circular economy projects through e.g., green bonds, sustainable finance initiatives, and public-private partnerships.

Lastly, together, the US and the EU have an opportunity to become global leaders in decarbonizing industry also thanks to the potential presented by the circular economy. In order to do so effectively, they should strive to negotiate agreements that include commitments to circular economy goals and practices, facilitating collaboration not only between the US and EU but also with other countries and regions.

SWOT analysis of the state of transatlantic links in the circular economy for decarbonizing industry

Strengths	Weaknesses
• Shared interests in actions related to the transition from linear economy to circular model • Works on global and regional initiatives • Strong economic and political position of the EU and the US • Similar key value chains considered from the US-EU perspective	• No collaboration • Lack of mandatory policy instruments at the US federal level
Opportunities	**Threats**
• Develop shared innovation in circular economy projects • Advancements in circularity via global forums • Design common standards and regulations	• Divergent regulatory approaches

Source: Reform Institute

Overall, the current state of transatlantic cooperation in circular economy practices for decarbonizing industry is assessed as poor due to limited integration and alignment of policies, but it harbors significant potential for improvement. Opportunities for enhanced collaboration lie in shared innovation projects, aligning trade policies with circular economy principles, and leveraging international negotiations, like those for a global plastics treaty convened by UNEP, to set a precedent for global cooperation too. Developing common standards, such as recycling protocols and the digital product passport, and strengthening demand pull instruments, such as green public procurement, could further drive the adoption of circular economy solutions. These efforts, along with encouraging sustainable finance for circular economy projects, could position the US and the EU as global leaders in sustainable industrial practices.

Overall assessment of transatlantic links in circular economy for decarbonizing industry

Current state	Potential for improvement
Poor	Good

Source: Reform Institute

Credit: Unsplash / Shane McLendon

5.2 Clean hydrogen and derivatives

EU policy action on hydrogen was driven by the European Hydrogen Strategy 2020, including 20 steps aiming to build a single market for this energy carrier. The regulatory environment for hydrogen includes:

- **The revised legislative package (Regulation and Directive) on gas markets and hydrogen**, which sets out the main framework for the integration of hydrogen into existing infrastructural and regulatory ecosystems, e.g., by creating the European Network of Network Operators for Hydrogen (ENNOH).

- **The Renewable Energy Directive (RED)**, which defines hydrogen's role as a renewable fuel of non-biological origin (RFNBO) and sets targets for its intake in transport and industry. This is accompanied by Hydrogen Delegated Acts, which define the conditions to consider hydrogen as a renewable fuel, including the three essential criteria of additionality, temporal and geographical correlation.[84]

In addition, the EU has enabled several institutions and instruments to support the development of the hydrogen economy. These include:

- The **Clean Hydrogen Partnership**, a public-private partnership between the Commission, the hydrogen industry and researchers under the EU research program Horizon Europe (with a budget of over EUR 1.8 billion across 369 projects to date) and in cooperation with the European Innovation Council.

- Support for investments in hydrogen projects across the value chain through grants and loans under **NextGenerationEU**, the post-pandemic economic recovery plan.

- Funding under the **Just Transition Mechanism** (as long as hydrogen projects are included in the relevant national Just Transition Plans).

- Exemptions from state aid restrictions for joint hydrogen projects labeled as **Important Projects of Common European Interest (IPCEI)**. Such projects must be developed jointly by at least two Member States, which also need to co-fund them. To date, over 41 hydrogen projects have qualified as IPCEI under the "Hy2Tech" and "Hy2Use" initiatives.

A key element of the Commission's hydrogen strategy is the European Hydrogen Bank, established in March 2023. The bank is operated by the Commission services as a financing instrument rather than an actual bank, with an objective to catalyze private investments in hydrogen value chains. The primary goal is to connect renewable energy supply with EU demand, overcoming initial investment challenges and fostering a market for renewable hydrogen. This goal will be realized via four pillars of action: domestic (production scale-up within the European Economic Area), international (imports and technology transfers), transparency and coordination of information, as well as coordination of existing support mechanisms. The principal way of allocating support is via auctioning. The first pilot auction under the Innovation Fund was launched in November 2023 and concluded in 2024, with a budget of EUR 800 million and 132 bids from 17 countries. The next auction, with a budget of EUR 2.2 billion, was originally scheduled for spring 2024 but was postponed to autumn to gather better feedback on the first auction. Green hydrogen partnerships with third countries will complement these efforts, promoting renewable hydrogen imports and contributing to decarbonization incentives while trying to ensure fairness between EU production and imports.

In the US, existing and new instruments have been made available to support hydrogen projects via the IRA. These instruments, managed mostly by the DOE and DOT, include:

84 The purpose of additionality is to ensure that the increased hydrogen production capacity is matched by corresponding new renewable electricity generation capacity. To this end, hydrogen producers without a direct connection to an installation generating renewable electricity are required to enter into adequate power purchase agreements (PPAs, including long-term ones) until 1 January 2028 with new and otherwise unsupported renewable electricity generation installations. Additionality shall not apply to installations that come into operation before 1 January 2028. At the same time, criteria of temporal and geographic correlation ensure that hydrogen is produced when and where renewable electricity is available, to avoid a situation where demand for energy for hydrogen production exceeds the renewable capacity available locally and leads to produce hydrogen with fossil fuels. Until January 2030, the temporal match will be monthly, while the geographical correlation should be within the same bidding zone or interconnected bidding zone with higher or equal prices (or an interconnected offshore bidding zone). After January 2030, the temporal correlation will become as narrow as one-hour periods.

- **Advanced Energy Project Credit (Extends IRC Code Section 48C)** – a 30% investment tax credit and financial support for manufacturing initiatives in the production of fuel cell electric vehicles, hydrogen infrastructure, electrolyzers, and various other products, as well as support for projects within manufacturing facilities aiming to achieve a minimum 20% reduction in greenhouse gas emissions that can include hydrogen solutions.

- **Alternative Fuel Refueling Property Credit (Extends 30C):** an instrument prolonging the credit sunset and elevating the credit cap to 30%., capped at USD 100,000. The amendment eliminates the previous limitation that restricted the credit to be used only once, permitting taxpayers who install qualified equipment at multiple sites to utilize the credit for each location, as long as this is within a low-income or non-urban community.

- **Clean Hydrogen Production Tax Credit (New, 45V):** a novel 10-year incentive program for clean hydrogen production, offering up to 3 USD/kg with an option to choose a 30% investment tax credit under Section 48. The credit amount operates on a four-tier system and is determined by the carbon intensity in production, favoring the lowest emission intensity. Construction (including retrofitting) of qualifying projects must start by 2033.

- **Clean Vehicle Credit (New, 30D):** instrument retaining the USD 7,500 incentive for the purchase of a fuel cell electric vehicle and introducing a new qualified clean vehicle credit modeled on the 30D credit applicable to plug-in battery electric vehicles. It contains penalties if battery production or vehicle assembly does not occur in USMCA countries (the US, Mexico, Canada).

- **Elective Payment for Energy Property:** This provision allows to receive direct payments instead of a tax liability reduction ("direct pay" until 2032) or to monetize credits by transferring them to an entity with a higher tax liability ("transferability"). It is applicable to various tax credits, such as the clean hydrogen production credit, energy investment tax credit, carbon capture and sequestration credit, alternative fuel vehicle refueling property credit, advanced energy project credit, and others.

- **Energy Credit (Extends 48):** an option that prolongs the 30% fuel cell investment tax credit until 2024, after which (starting in 2025) it transitions to the technology-neutral Clean Energy Investment Credit. There is an opportunity to receive a bonus for utilizing domestically sourced materials and for siting projects in designated "energy communities."

Credit: Unsplash / Markus Spiske

- **Energy Storage Credit (New, 48):** it updates the energy investment tax credit to cover energy storage, including hydrogen storage. This provision is applicable until 2025, after which there will be a shift to the Clean Energy Investment Credit.

- **Qualified Commercial Clean Vehicles Credit (New, 45W):** incentive aimed at businesses and tax-exempt organizations purchasing qualified commercial clean vehicles and determined as the lesser of 15% of the vehicle's basis (30% if not gas or diesel-powered) or the incremental cost of the vehicle. The maximum credit stands at USD 7,500 for qualified vehicles with gross vehicle weight ratings (GVWRs) under 14,000 pounds and USD 40,000 for all other vehicles.

- **Regional Clean Hydrogen Hubs (RCHH):** the core of the Bipartisan Infrastructure Law's hydrogen framework has a budget of USD 7 billion. The initiative aims to create 6-10 clean hydrogen regional hubs across the US in order to support the decarbonization of heavy industry (steel and cement in particular) and heavy-duty transport. The purpose of the program is not just to support demonstration production facilities, but to create complete environments of producers and consumers connected by distribution networks and equipped with storage infrastructure. On 13 October 2023, the DOE selected 7 projects, ranging from California and the Pacific Northwest to Appalachia. They will share the total costs of over USD 40 billion. The assessment was based on production capacity, commercial viability, quality of management, and impact on jobs and communities.

Rules for hydrogen production similar to those already binding in the EU (additionality, geographic and temporal correlation) have been drafted by the DOE (Clean Hydrogen Production Standard, with 4 kg CO_2e/kg H2 set as the threshold for "clean hydrogen") and the Department of Treasury (additionality, hourly matching and geographical correlation requirements for hydrogen tax credits under the IRA), but are yet to come into force. There seems to be a possibility to achieve greater alignment in this area. In terms of structure, the US places more emphasis on tax credits (a tool largely unavailable at the EU level) and local content as a criterion of getting support. This might cause tensions in further dialogue, as the EU perceives such measures as threatening its own hydrogen economy, while not being able to exactly respond in kind.

The state of transatlantic links in clean hydrogen and derivatives

The US-EU collaboration on hydrogen is largely positive, showcasing a strong commitment to leveraging such technology for clean energy transitions, and thus probably does not require much more attention. The IEA Hydrogen Technology Collaboration Program, the International Partnership for Hydrogen and Fuel Cells in the Economy (IPHE), the Hydrogen Valley platform under Mission Innovation, and the Clean Energy Ministerial Hydrogen Initiative are all notable examples of effective transatlantic partnership. These initiatives foster a broad and multifaceted dialogue that spans direct government-to-government interactions, engagements involving the US, the European Commission, EU Member States, and industry bodies.

The key strengths of this collaboration include a holistic approach to overcoming technological, economic, and regulatory challenges; a concentrated effort on innovation and the scaling of technologies; and the formation of international partnerships and networks. Along with some alignment regarding standards (e.g., additionality), these strengths pave the way for scaling up hydrogen production and infrastructure development in an effective and compatible way. In addition, they support the harmonization of policies and standards, which is crucial for shaping international trends in hydrogen energy. On the other hand, the dialogue on regulatory frameworks related to hydrogen technologies is still limited and constitutes an area with high potential for future collaboration. A case could be made for more efforts to harmonize hydrogen standards and classification, as foundations for alignment in this area seem to already be in place.

Rising concerns about the EU's ability to meet domestic demand with domestic production capacity, combined with ambitious US investments in hydrogen production, create the possibility of a "Hydrogen Stream" forming across the Atlantic. Increased trade in hydrogen would be conducive to the development of common approaches and standards. However, it would also likely raise

concerns of energy dependency on the EU side, which could fuel more defensive and protectionist positions. There is also a question of addressing cooperation with developing countries in the areas of technology transfers and value chains. Those with significant potential for clean hydrogen production remain wary of unfair deals or protectionism by the EU and the US. Cultivating a common and inclusive approach toward third parties would be an important element of EU-US collaboration on establishing a global hydrogen economy.

While the relationship between the US and the EU concerning hydrogen is strong and should continue to be nurtured, some attention should be given to other technologies vital for decarbonizing industry, such as circular economy principles, electrification, and bioenergy. By diversifying the areas of cooperation, the US and EU can further enhance their leadership in global efforts to transition to a cleaner and more sustainable industry.

Overall, we assess the current state of transatlantic cooperation in clean hydrogen for decarbonizing industry positive. This is highlighted by a shared commitment and successful initiatives like the IEA Hydrogen Technology Collaboration Program and the Hydrogen Valley Platform. This cooperation is characterized by a comprehensive approach to addressing challenges and promoting innovation, which has laid a foundation for scaling hydrogen production and harmonizing international policies. Therefore, the potential for future improvement is considered moderate and centered around dialogue on regulatory frameworks for hydrogen technologies. In addition, expanding the focus to include other decarbonization technologies could further solidify US-EU leadership in achieving a sustainable industrial transition.

SWOT analysis of the state of transatlantic links in clean hydrogen for decarbonizing industry

Strengths	Weaknesses
• Dialogue already exists • Diverse lines of collaboration • Joint industry initiatives • Holistic approach to challenges and concentrated efforts	• Limited dialogue on regulatory frameworks
Opportunities	**Threats**
• "Hydrogen Stream" from growing transatlantic trade in hydrogen • Joint cooperation with developing countries	• Critical material availability (being addressed e.g., by CMA) • Challenges in developing a common approach to support measures

Source: Reform Institute

Overall assessment of transatlantic links in clean hydrogen and derivatives for decarbonizing industry

Current state	Potential for improvement
Good	Moderate

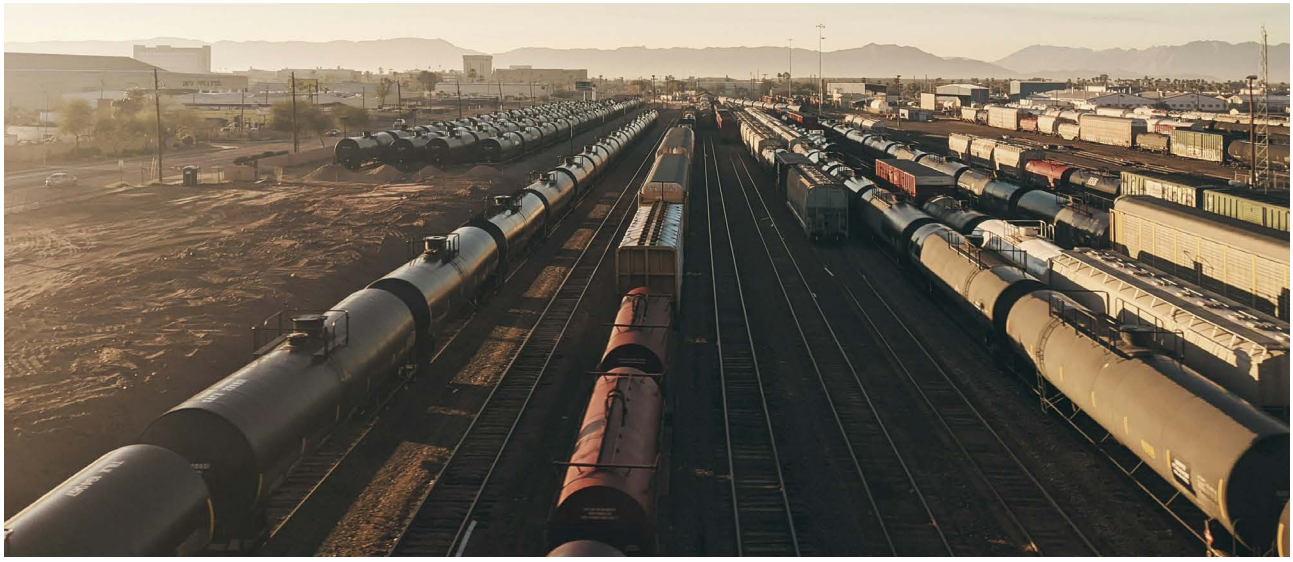
Source: Reform Institute

5.3 CCS and CCU

The approach of the EU and the US to carbon capture and storage (CCS) and carbon capture and utilization (CCU) follows a similar logic to other areas of policy. The EU focuses on regulating and setting targets, whereas the US subsidizes the technology through tax credits. The EU complements its regulatory approach with funding for projects, which are granted through a competitive process, as opposed to the subsidy-based approach of the US. In the Net-Zero Industry Act the EU has set a target for the injection of 50 Mtpa of CO_2 by 2030. The Act also requires the creation of a European Storage Atlas and creates an obligation on oil and gas producers to invest in carbon storage facilities. The Industrial Carbon Management Strategy (ICMS) sets out the EU's vision on how to scale up carbon capture and storage technologies. The main elements of the strategy are the development of CO_2 transport infrastructure, R&I, and policy regarding industrial carbon removals. The strategy also aims to increase carbon utilization, including through a framework for accounting CO_2 when it is used as a resource.

The EU has also created a certification scheme for carbon removal activities through the Carbon Removal Certification Framework (CRCF), which is awaiting final approval by the EU Council.[85] The European Commission, assisted by an expert group, will develop methodologies for the certification of a range of carbon removal procedures, with the requirement to meet a set of quality criteria (quantification, additionality, long-term storage and sustainability). The CRCF will generally allow the use of certificates as carbon credits to offset emissions. The use of CRCF credits, including the extent of offsetting allowed, will need to be determined for each market where they are used, both for voluntary and compliance markets.[86]

The EU supports its regulatory approach by providing competitive funding for the development of CCS and CCU technology. This happens through general funding programs that have been described in section 5.2 (FOAK and sectoral subsidies), including the Horizon Europe program and the Innovation Fund. Horizon Europe provides funding for R&D and early pilot stages of technology development, including CCS and CCU. Through a dedicated project – the CCUS Zero Emission Network – it supports the adoption of CCS and CCU in industrial hubs and clusters.[87] The Innovation Fund frequently supports the commercialization and demonstration of CCS and CCU projects.[88] CO_2 transport infrastructure initiatives can also apply to be



Credit: Unsplash / Avi Waxman

85 'EU Carbon Removal Certification Framework', Carbon Gap - Policy Tracker (blog), accessed 14 August 2024, https://tracker.carbongap.org/policy/crcf/.
86 Institute for Agriculture and Trade Policy, 'Unpacking the EU Carbon Removal Certification Framework: Implications for EU Climate and Agriculture Policy', accessed 15 August 2024, https://www.iatp.org/unpacking-eu-crcf.
87 'Welcome to CCUS ZEN | CCUS ZEN', accessed 15 August 2024, https://www.ccuszen.eu/.
88 'Carbon Removal in the EU Innovation Fund', Carbon Gap - Policy Tracker (blog), accessed 15 August 2024, https://tracker.carbongap.org/policy/innovation-fund/.

projects of common interest, which can then access further support under the Connecting Europe Facility.[89]

The US incentivizes the development of CCS and CCU mainly through the provision of funding through subsidies or tax credits, rather than regulation. The Bipartisan Infrastructure Law of 2021 dedicates USD 12 billion to carbon management over 5 years.[90] The IRA includes a substantial change to tax credits for the carbon capture industry, which is intended to facilitate the achievement of 40% GHG emission reduction by 2030 over 2005 levels. Through changing the federal Section 45Q tax credit, the IRA provides 12 years of guaranteed incentives for carbon capture technology, which can be paid directly for the first five years.[91, 92] It also provides additional funding to the EPA to streamline the permitting process that governs the injection of CO_2 for underground storage.[93]

The US also uses a range of different funding schemes to support CCS and CCU demonstration projects, including through the Office of Clean Energy Demonstrations, which supports a carbon management portfolio of projects.[94]

The state of transatlantic links in CCS and CCU

The Clean Energy Ministerial CCUS (CEM CCUS) Initiative is a prominent international platform dealing directly with CCS and CCU. It is action-oriented - it does not perform analysis, but focuses on supporting investment and financing, industry collaboration, and knowledge sharing. An example of collaboration with industry led by the Initiative is the joint work with the Global Cement and Concrete Association to scale up deployment of CCS and CCU in the respective industries.[95] The Initiative also runs monthly meetings of members to share recent developments and learnings, as well as public webinars and events to share information more widely. This type of collaboration could be further strengthened, especially to include discussion about developing global standards and policies on CCS and CCU.

Mission Innovation, which focuses on *supply push* policies for clean energy, hosts several missions which deal with CCS and CCU. The Carbon Dioxide Removal mission undertakes technical work on biomass with carbon removal.[96] The Net Zero Industries mission, which focuses on the decarbonization of hard-to-abate energy intensive sectors, includes CCUS as one of its priority innovation topics.[97]

Other initiatives aiming to catalyze international cooperation on CCS and CCU include the Carbon Management Challenge, with 20 countries (including the US) and the European Commission taking part. Participants can choose which actions to take forward, including developing policies on CCS and CCU, creating financial incentives, expanding research funding or joining existing international initiatives.[98]

While there are initiatives for international cooperation on CCS and CCU, the pursuit of deeper transatlantic links to develop these technologies for decarbonizing industry involves navigating a variety of challenges. One of the biggest is that CCS and CCU technologies require significant

89 'Industrial Carbon Management', accessed 15 August 2024, https://energy.ec.europa.eu/topics/carbon-management-and-fossil-fuels/industrial-carbon-management_en.
90 Office of Fossil Energy and Carbon Management, 'FECM Infrastructure Factsheet', September 2022, https://www.energy.gov/sites/default/files/2022-09/FECM%20Infrastructure%20Factsheet-revised%209-27-22.pdf.
91 International CCS Knowledge Centre, 'International CCS Knowledge Centre « International CCS Knowledge Centre', accessed 15 August 2024, https://ccsknowledge.com/our-services/expertise/ccs-policy-analysis.
92 Nina Fahy, 'Carbon Capture and Sequestration: Roadblocks and Opportunities in the US Market', Rabobank, accessed 15 August 2024, https://www.rabobank.com/knowledge/d011432638-carbon-capture-and-sequestration-roadblocks-and-opportunities-in-the-us-market.
93 'CCS Commercial and Regulatory Frameworks', Global CCS Institute, accessed 15 August 2024, https://www.globalccsinstitute.com/news-media/insights/ccs-commercial-and-regulatory-frameworks/.
94 'Carbon Management', Energy.gov, accessed 15 August 2024, https://www.energy.gov/oced/carbon-management-0.
95 decarbonfuse.com, 'GCCA: Cement and Concrete Industry Scales Up Carbon Capture, Utilisation and Storage (CCUS) Efforts to Accelerate Decarbonisation', decarbonfuse.com, 2022, https://decarbonfuse.com/posts/gcca-cement-and-concrete-industry-scales-up-carbon-capture-utilisation-and-storage-ccus-efforts-to-accelerate-decarbonisation.
96 'Carbon Dioxide Removal – Mission Innovation', accessed 16 August 2024, https://explore.mission-innovation.net/mission/carbon-dioxide-removal/.
97 'Net-Zero Industries – Mission Innovation', accessed 16 August 2024, https://explore.mission-innovation.net/mission/net-zero-industries/.
98 'Carbon Management Challenge (CMC)', accessed 15 August 2024, https://www.carbonmanagementchallenge.org/cmc/.

upfront investment, and there is uncertainty regarding their commercial viability and long-term profitability. As a result, some difficulties might arise in securing funding for joint projects and technology pilots. This does not erase the potential for strengthening collaboration but the chances for improvement might be moderate, at least in the short term.

SWOT analysis of the state of transatlantic links in CCU and CCS for decarbonizing industry

Strengths	Weaknesses
• Recognition of strategic importance of CCU/CCS technologies	• Significant upfront investment required • Uncertainty about commercial viability
Opportunities	**Threats**
• Strengthen collaboration to include the development of common standards and regulations	• Divergent regulatory approaches

Source: Reform Institute

Overall assessment of transatlantic links in CCU and CCS for decarbonizing industry

Current state	Potential for improvement
Moderate	Moderate

Source: Reform Institute

Credit: Unsplash / Rob Lambert

5.4 Electrification

The European institutions recognize the importance of industrial electrification for the Green Deal objectives, which is reflected in the inclusion of industrial emissions in the legislative effort to align with the ambition of 55% emissions reductions by 2030 (the "Fit for 55" package). To meet these goals, the EU has set targets for the share of renewable energy in industry (1.6% increase per year), which are enshrined in the revised **Renewable Energy Directive**.[99] Support for clean hydrogen and its growing availability, as described above, should also indirectly support the electrification of industrial processes. More generally, the EU strategy on energy system integration, which seeks to reduce waste in the EU energy system, could support the electrification of industrial processes, e.g., encouraging the use of excess heat and heat pumps while promoting the use of renewable hydrogen in industry.

The **Energy Efficiency Directive** introduces more stringent targets for final and primary energy use, and national consumption reduction targets. Energy audits and energy management schemes are made obligatory depending on companies' energy use. All of these measures will increase pressure on sectoral modernization. The Directive also enshrines in law the "energy efficiency first" principle, which requires EU countries to consider energy efficiency in all relevant policy and major investment decisions taken in the energy and non-energy sectors. This will further encourage energy savings in the industrial sector.[100]

The **Industrial Emissions Directive**, in its final form also following a revision, enforces stricter emission limits compared to the previous ones. It requires companies (from 2030 onwards) to put forward comprehensive transformation plans for 2050, and what is more, expects competent authorities to demand the most environmentally effective as well as economically and technically viable techniques for the prevention and control of emissions. These are to be based on Best Available Techniques, which are identified sector by sector through a process managed by the EU Commission's Joint Research Centre.[101]

Credit: Unsplash / Jakub Pabis

99 'Renewable Energy: Council Adopts New Rules', Consilium, accessed 28 August 2024, https://www.consilium.europa.eu/en/press/press-releases/2023/10/09/renewable-energy-council-adopts-new-rules/.
100 'Energy Efficiency Directive', accessed 28 August 2024, https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficiency-targets-directive-and-rules/energy-efficiency-directive_en.
101 'Industrial and Livestock Rearing Emissions Directive (IED 2.0) - European Commission', 2 August 2024, https://environment.ec.europa.eu/topics/industrial-emissions-and-safety/industrial-and-livestock-rearing-emissions-directive-ied-20_en.

The US has a national goal of 100% carbon-free electricity by 2035 and net-zero economy-wide greenhouse gas emissions by 2050. Industrial use accounts for about 25% of energy consumption in the US and a comparable share (around 23% in 2021)[102] in national GHG emissions, though the US definition of the sector includes refining operations. Industrial thermal energy needs are a significant challenge: heat represents two-thirds of all energy demand in the industrial sector, but only 10% is met using renewable energy.[103] The IRA energy security and climate package, dedicating USD 360 billion to climate and clean energy incentives, is viewed as the key instrument for the electrification of industrial processes via the creation of new, co-located clean power generation capacities.

Several proposals are being publicly discussed regarding the further development of US policy in this direction. This includes pricing rules (such as the recognition of flexible loads, i.e., adjusting usage to demand, in retail rate design), and encouragement of new capacity building in rural areas (in particular in the Mid-West) based on available funding in order to reach net-zero emissions by 2050, with capacity increasing by 2-5 times from current levels and investments estimated at USD 2.4 trillion.[104] This may include:

- clean energy industrial hubs, areas combining industrial activity with clean energy, storage and/or CCS and CCU infrastructure)
- new grid connections as recent studies tend to indicate that a massive expansion of the electricity grid will be needed
- review and development of rules for direct access to the grid.

The state of transatlantic links in industrial electrification

There are currently few transatlantic links in industrial electrification, which may be due to the fact that electrification depends on the grid, and this is developed based on local circumstances. However, there is space for cooperation on energy generation technologies, building components and infrastructure, rather than electrification as such.

IRENA and Mission Innovation present valuable opportunities around the sharing of best practices on electrification, through for example, writing joint reports and bringing industry and government together. Additionally, the First Movers Coalition under the World Economic Forum brings a unique approach by fostering commitments from US and EU companies toward purchasing green technologies. Although it is technology-agnostic, this initiative underscores the importance of electrification among a broad spectrum of decarbonization strategies and can be capitalized on to promote electrification in industry.

The potential for future improvement is generally good, especially in facilitating specific areas of collaboration, such as advancing the adoption of green technologies, sharing commitments to emissions reductions, and developing sustainable industrial practices. A strong US-EU partnership on electrification, that leverages on and expands the scope of already existing platforms, can set a benchmark for global efforts in industrial decarbonization, encouraging other countries to adopt similar measures.

To make these collaborative efforts more concrete and actionable, the US and the EU could jointly produce detailed analyses on the current state of industrial electrification, identifying gaps in the adoption and opportunities for the scaling up of green technologies. Specifically, setting ambitious and achievable targets for electrified industrial processes, and establishing international standards for emissions in heavy industries could accelerate the global efforts toward decarbonization. Addressing key barriers and challenges should be a central component of this collaboration. This includes jointly tackling financial and technological hurdles, creating incentives for innovation and adoption of electrification technologies, and ensuring a just transition for workers and communities affected by the shift toward greener industrial processes.

102 EPA, Sources of Greenhouse Gas Emissions https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions

103 Ali Hasanbeigi and Lynn A Kirshbaum, 'Industrial Electrification in U.S. States', February 2023, https://static1.squarespace.com/static/5877e86f9de4bb8bce72105c/t/644b590c1b2a3c41e1ff4e8f/1682659627566/State+level+industrial+Electrification-2.6.2023+Clean-E.7.pdf.

104 J. M. Moch, H. Lee, The Challenges of Decarbonizing the U.S. Electric Grid by 2035, The Belfer Center for Science and International Affairs, 2022. https://www.belfercenter.org/publication/challenges-decarbonizing-us-electric-grid-2035.

Overall, we assess the current state of transatlantic cooperation in electrification for decarbonizing industry as moderate, reflecting its importance but the lack of extensive collabo-rative frameworks. Both regions have initiatives in this area, like the EU's Strategy for Energy System Integration and the US's IRA package, highlighting the potential for joint efforts. The good perspective for future improvement lies in leveraging existing platforms, such as the TTC, IRENA, and Mission Innovation, to foster collaborative research, development, and the setting of global benchmarks for industrial electrification. Strengthening these links could accelerate innovation in electrification technologies and align international efforts toward a decarbonized industrial sector.

SWOT analysis of the state of transatlantic links in industrial electrification for decarbonizing industry

Strengths	Weaknesses
• Recognition of the need for electrification • Mature scientific and industrial base to drive the process • Parallel push from businesses on both sides of Atlantic	• Localized infrastructure
Opportunities	**Threats**
• Expansion of collaborative initiatives • Development and commercialization of technologies, in e.g., chemical industries • Development of common standards and regulations • Existing transatlantic bodies capable of accommodating the subject of electrification	• Technological and financial barriers • Divergent regulatory approaches

Source: Reform Institute

Overall assessment of transatlantic links in industrial electrification for decarbonizing industry

Current state	Potential for improvement
Moderate	Good

Source: Reform Institute

Credit: Unsplash / Fons Heijnsbroek

5.5 Bioenergy

Bioenergy constituted 59% of the total EU renewable energy consumption in 2021, with primary solid biofuels providing for over 70% of the share.[105] Consumption in industry was at 21.1 Mtoe.[106] This results largely from the history of generous support to this energy source. In 2019 and 2020 biomass subsidies across the EU stood at EUR 17 billion and EUR 13 billion, respectively.[107] Forest biomass is the leading source of solid fuels for many EU Member States. 19% of the solid biomass use for energy is based on imports.[108] Biogas and municipal waste remain minor but gradually increasing sources of bioenergy. Such a significant share of solid fuels, and significant scale of imports (with Russia and the US as leading sources of feedstocks like wood pellets) raises concerns regarding not only the sustainability of domestic biomass use in the EU, but also its impact on deforestation in third countries (e.g., Russia, US, Brazil). These concerns have been exacerbated by reports of sourcing biomass from protected forest areas in countries such as Romania.[109]

The EU regulates biomass principally via:

- The revised **Renewable Energy Directive (RED)**, which sets the cascading principle for biomass use
- The **Land Use, Land Use Change and Forestry (LULUCF) Regulation**, which sets out rules for sustainable land and forest management, including biomass sourcing
- The **REFuelEU Aviation Regulation**, which includes provisions for minimum market share of Sustainable Aviation Fuels (2% SAF from 2025, 70% by 2050 and 1,2% synthetic fuels from 2030, 35% by 2050)
- The **Nature Restoration Law** (indirectly), which will reduce the options of sourcing biomass from nature areas.

The **revised RED** introduces an indicative target of an 1.6% annual increase in the share of renewable energies in the total energy consumption by industry. This can help drive demand for bioenergy in the sector, but, unlike other mandatory RES-related goals, this is only indicative. The RED also defines sourcing criteria for most biomass and introduces the crucial cascading principle regarding its exploitation. The principle requires that energy from biomass is produced in a way that minimizes excessive destructive effects on the biomass market and harmful effects on biodiversity. In other words, biomass should be used according to its highest economic and environmental added value, following a six-step ladder of priorities:

1. Wood-based products
2. Extending their service life
3. Re-use
4. Recycling
5. Bioenergy
6. Disposal

It should be noted that the principles put the use of biomass for energy generation as second last priority, above only the disposal when biomass is no longer useful even as an energy source. In this spirit, there is no support under the Directive for the incineration of waste matter sourced from trees (sawlogs, stumps, roots etc.) to produce energy or renewable energy if such waste matter falls under the collection requirements set out in the Waste Directive.

The **LULUCF Regulation** binds Member States to take national obligations under the EU-wide target (of -310 Mt CO_2 equivalent of net carbon removals by 2030) and include appropriate actions in their updated National Energy and Climate Plans 2021-2030 and Common Agricultural Policy Plans. Any initiative aiming at generating energy from biomass needs to take into account the monitoring, reporting and verification duties

105 European Commission, Union Bioenergy Sustainability Report, 2023. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52023DC0650#document2
106 'European Commission – Biomass', accessed 9 July 2024, https://energy.ec.europa.eu/topics/renewable-energy/bioenergy/biomass_en
107 Enerdata, Study on energy subsidies and other government interventions in the European Union, 2021, https://op.europa.eu/en/publication-detail/-/publication/be5268ba-3609-11ec-bd8e-01aa75ed71a1/language-en
108 Ibid.
109 Environmental Investigation Agency, The EU's Renewable Energy Policies Driving the Logging and Burning of Europe's Protected Forests, 2022. https://us.eia.org/report/the-eus-renewable-energy-policies-driving-the-logging-and-burning-of-europes-protected-forests/

imposed by the Regulation on the sources of biomass, as well as land-use emission accounting standards. At the same time, land managers who take care of their lands' carbon stocks and biodiversity gain access to funding from:

- The Common Agricultural Policy (CAP)
- Other EU programs (LIFE, Horizon Europe - Soil Mission, Cohesion Fund)
- State aid, subject to revised and simplified rules.

In the US, renewables as a whole provided just 8% of total energy supply in 2023, with their share remaining rather stagnant throughout many years. Around 60% of total US renewable energy in 2023 came from biomass – this has also stayed constant in recent history.[110] As regards consumption in the industrial sector, however, biomass remains nearly the sole renewable energy source.

While solid biofuels continued to be the basic source of US bioenergy in the early 2000s and their use has been stable since then, in recent years the growth in bioenergy use has been driven by liquid biofuels. The transport sector is the main driver, with the share of biofuels (mainly bioethanol) increasing rapidly until 2013, at which point the growth stabilized. This trend does not extend to the industrial sector, which has not seen much increase in biomass use since 2000. The role of biomass in electricity generation tends to be marginal, but represents up to 10% of annual national heat. This makes biomass (mostly solid wood) a primary source of renewable heat for residential and industrial use.[111] Overall, aside from the heating sector, bioenergy is not a key energy source in the US, with the greatest potential for growth observed so far in the segment of liquid biofuels. Consumption of solid biomass is below what would be allowed by US forestation levels, though increasing it would seem counterproductive to both emissions savings and biodiversity. The US is already exporting large quantities of solid wood as pellets (25% of global wood pellet exports in 2022), most of which to Europe,[112] where the cascading principles of biomass use make such consumption increasingly hard to justify. Biogas production and use in the US is negligible compared to the national potential of organic waste-based production.

Credit: Unsplash / Wonderlane

110 IEA, Implementation of bioenergy in the United States – 2021 update. https://www.ieabioenergy.com/wp-content/uploads/2021/11/CountryReport2021_USA_final.pdf
111 EIA Database, accessed 30 July 2024, https://www.eia.gov/totalenergy/data/browser/?tbl=T10.02B.
112 'Stanford Understand Energy Learning Hub – Biomass', accessed 30 July 2024, https://understand-energy.stanford.edu/energy-resources/renewable-energy/biomass.

Several sources of funding are available for biomass in the US, but they tend to be open to most or all of renewables solutions.

The **Modified Accelerated Cost-Recovery System (MACRS)** allows owners to partially recover the costs of a qualified property for the first year it is in service, in the form of an allowance. Under the MACRS, a 50% special depreciation allowance is available for qualified second-generation biofuel plants. This offers business owners of certain properties the option to recover investments by depreciation of deductions. Eligible properties include those that utilize combined heat and power, including biomass-fueled installations.

The **Rural Energy for America Program (REAP)** administered by the Department of Agriculture (USDA) provides grants for energy audits and renewable energy development assistance to state, tribal or local governments, land-grant colleges and universities, rural electric cooperatives, and public power entities. REAP provides loans (up to 75% of the total eligible costs), grants (up to 25%) and combined loan-grant-guarantee options. Eligible projects concern the purchase, installation, and construction of energy efficiency solutions, including biomass and high-efficiency heating (biofuels and power generation from biomass).

The Department of Energy's **Office of Indian Energy Policy and Programs** offers tribes funding, training and technical assistance for the development of renewable energy and energy efficiency systems, including combined heat and power (CHP) biomass, biogas, solid waste, waste gases, or waste process heat. The funding criteria take account of how sustainably the biomass is sourced.

Biomass is also in line with certain standardization policies. The **Renewable Portfolio Standards (RPS)** are formulated and applied at state level, requiring energy utilities and retailers to meet a specified minimum percentage (or absolute amount) of customer demand with eligible sources of renewable electricity, usually including biomass. Some states supplement RPS with voluntary renewable energy targets or goals for the electricity sector. At least 38 states use some sort of RPS to boost the supply of clean energy, biomass included.[113] RPS remain particularly important across the Northeast and Mid-Atlantic. The federal government has no direct hand in deploying RPS, but the EPA provides recommendations on their design, implementation, and evaluation.

The **Green Power Partnership**, a federal program administered by the EPA that works with various entities operating in the US, also ensures that they procure their energy from renewable sources.[114]

In general, the level of support for bioenergy is not impressive compared to the country's potential, especially regarding dedicated instruments. Bioenergy is eligible for all general policy instruments supporting the deployment of renewables, such as the PTC credit, Renewable Energy Certificates or Credits (RECs), net metering, feed-in tariffs (FITs) and green power purchasing, but it does not seem to develop as fast as other sources.

An argument could be made that there are little to no environmental, economic and technological incentives in further increasing the consumption of the leading source of US biomass, solid wood. However, second-generation biomass technologies – aside from biofuels in transport – also do not seem to gain much traction. It would seem that, where funding is available in the US for various renewable energy options, biomass is a less popular choice and the likely cause is that in a technologically-agnostic environment, biomass solutions are often outcompeted by other sources.

The state of transatlantic links in bioenergy to decarbonize industry

Bioenergy could contribute to the decarbonization of industry, provided that its deployment is managed sustainably and is supported by appropriate policies and technological advancements. It can play a role as an industrial energy source, as illustrated by its prominent (relative to other renewables) role in the US industrial consumption, though a question remains on whether it would retain its role if solid biomass were to be replaced by more sustainable solutions. However, it must be part of a broader strategy that includes energy efficiency, electrification, and other renewable energy sources,

113 EPA, Energy and Environment Guide to Action, 2022. https://www.epa.gov/statelocalenergy/energy-and-environment-guide-action.
114 IEA, Implementation of bioenergy in the United States – 2021 update, p.5.

and its use needs to be subject to rules that ensure its positive effect on emissions and safeguard biodiversity.

Transatlantic cooperation on bioenergy solutions is currently rather limited, most likely due to the fact that both geographies do not treat it as a priority for decarbonizing industry. Some of the main concerns revolve around its sustainability, its cost competitiveness, or technological and infrastructure challenges. At the same time, bioenergy remains the largest source of renewable energy in the EU, including large-scale imports from the US. Civil society groups have raised concerns about the sustainability and actual climate benefit of this ongoing trade.[115] Therefore, a large potential exists for improved collaboration to align sustainability criteria across the Atlantic, and/or to improve monitoring and verification of biomass sourcing and consumption.

Existing platforms of collaboration that address the issue indirectly can be leveraged to deepen research on and knowledge of bioenergy solutions, as well as sustainability and monitoring criteria. Beyond that, the potential for strengthening transatlantic collaboration might be moderate, unless more tailored cooperation bodies are established.

SWOT analysis of the state of transatlantic links in bioenergy for decarbonizing industry

Strengths	Weaknesses
• Decent level of interest in the EU • Increasing awareness of land use potential in carbon removal • Decent but limited development of biomass in US transport	• Limited direct collaboration • High level approach
Opportunities	**Threats**
• Development and commercialization of technologies • Development of common standards and regulations • Huge untapped potential for bioenergy in the US • Potential to link bioenergy to carbon removal dialogue	• Technological and financial barriers • Divergent regulatory approaches • Global competition • Diverging visions on bioenergy, e.g., regarding sourcing rules and application of the cascading principle

Source: Reform Institute

Overall assessment of transatlantic links in bioenergy for decarbonizing industry

Current state	Potential for improvement
Poor	Moderate

Source: Reform Institute

115 Forest Defenders Alliance, An Open Letter to European Union Policymakers from US and Canadian NGOs, 2023, https://forestdefenders.eu/115-us-and-canadian-ngos-to-eu-for-how-long-will-you-keep-destroying-our-forests-for-fuel/.

Box 4. The role of transatlantic dialogue in decarbonizing the automotive industry

The pressing need to address climate change has prompted countries worldwide to take decisive action toward decarbonizing various sectors, including transportation. The shared vision emerged from a complex interplay of international dialogue involving diverse stakeholders and policy makers. It resulted in many governments signing onto the Zero Emission Vehicles Declaration (ZEV declaration)[116] and/or adopting decarbonization targets for the transport sector.[117] The European Union and the United States have emerged as leaders in this global effort, specifically with the goal of ending the sales of new internal combustion engine (ICE) light vehicles by 2035. Despite many differences in their approaches, both geographies are set on achieving the same goal and provide support for the ICE phase-out, including incentives for purchases of electric vehicles (EV), investments in charging infrastructure, and regulations that promote the development and sale of ZEVs.

EU ban on the sale of new petrol and diesel cars from 2035

The EU committed to phasing out new ICE cars by 2035, marking a pivotal shift toward zero-emission vehicles. This move is part of the broader "Fit for 55" package, which seeks to align the EU's climate and energy frameworks with its increased climate ambitions, aiming for a 55% reduction in CO_2 emissions by 2030 compared to 1990 levels and achieving climate neutrality by 2050. Under the new legislation, all new cars and vans sold in the EU from 2035 must not produce any CO_2 emissions. This measure is designed to ensure that by 2050, the transport sector can become carbon neutral. The regulation will not affect vehicles already on the road by 2035. These can continue to be used until the end of their lifespan. The transition focuses on new vehicles entering the market from 2035 onwards and sets intermediate targets for CO_2 emissions reductions by 2030 at 55% for cars and 50% for vans compared to 2021 levels.[118]

US efforts to phase out ICE cars

The US does not have a nationwide ICE ban target but several (at least nine) states have pledged to follow California's Advanced Clean Cars II rule, which aims to end gasoline car sales by 2035. They include Vermont, New York, Washington, and Oregon, among others, and phase-out conversations are ongoing in other states. On top of that, the federal proposal coming from the Environmental Protection Agency would set more restrictive emissions standards, essentially requiring that 67% of new car sales be electric vehicles by 2032.

Transatlantic collaboration in effort to phase out ICE cars

The EU approach to decarbonizing transportation is different from that adopted in the US. The EU focuses on legislative measures and the US on a mix of state-level and proposed federal regulations. Both geographies, however, have managed to develop a shared vision and understanding of the need for decarbonizing transport, which emerged thanks to transatlantic dialogue in a variety of forums that, complementing each other, allowed to reach also a global consensus. Notable platforms included, among others, the United Nations Framework Convention on Climate Change (UNFCCC) Conferences, the International Energy Agency (IEA), G7 and G20 Summits, bilateral dialogues, and international partnerships like the Electric Vehicles Initiative (EVI). The UNFCCC Conference of the Parties (COP) meetings, as well as the G7 and G20 summits, have been pivotal in setting the global climate agenda and commitments, helping to create a high-level consensus on the importance of transitioning to electric vehicles. At the same time, the IEA has been providing critical data, analysis and policy recommendations on electric vehicles and the phasing out of ICE cars as part of broader energy transition strategies. Moreover, direct dialogues between the EU and the US, including summits and trade discussions,

116 Accelerating to Zero Coalition, Zero Emission Vehicles Declaration, Glasgow 2021 https://acceleratingtozero.org/the-declaration/.
117 'ZEV Transition Council, Phase-out targets: LDV', accessed 30 July 2024, https://zevtc.org/tracking-progress/light-duty-vehicle-map/.
118 European Parliament, Fit for 55: zero CO_2 emissions for new cars and vans in 2035, 14 February 2023 https://www.europarl.europa.eu/news/en/press-room/20230210IPR74715/fit-for-55-zero-co2-emissions-for-new-cars-and-vans-in-2035.

have included climate change and sustainable transportation as key agenda items. These interactions have allowed for the sharing of policy approaches and the alignment of goals in reducing vehicle emissions. Finally, the Electric Vehicles Initiative (EVI), a multi-government policy forum under the Clean Energy Ministerial (CEM), has facilitated international cooperation to accelerate the adoption of electric vehicles, influencing both the EU and US policies.

Conclusions

The transatlantic dialogue has been instrumental in advancing the global agenda for decarbonizing the automotive industry. Through a combination of international forums, bilateral agreements, and shared initiatives, the US and the EU have not only aligned their goals, but also set an example for successful global cooperation in tackling climate change. The process has underscored the importance of international dialogue in harmonizing policies, sharing best practices, and addressing common challenges. As the world moves closer to the 2035 target, the lessons learned from this partnership will serve as a valuable blueprint for other regions and sectors aiming to achieve their decarbonization goals.

Credit: Unsplash / Troy Mortier

Box 5. Global Methane Pledge as an example of successful US-EU collaboration in leading global climate action

The Global Methane Pledge (GMP), announced at COP26 in Glasgow in 2021 as an initiative under joint EU-US leadership, aims to catalyze international action to reduce methane emissions. The Pledge can be joined by any country that agrees to take voluntary action to contribute to reach global methane emissions reductions by at least 30% by 2030 from 2020 levels. This global target is consistent with pathways to stay within 1.5°C warming as set out in the Paris Agreement, and is expected to eliminate over 0.2˚C of warming by 2050. Since its launch, the GMP has been joined by 155 countries, which account for over 50% of total global anthropogenic methane emissions. The initiative also engages other stakeholders, such as international organizations (e.g., the International Energy Agency), development banks (e.g., the European Investment Bank), private philanthropies (e.g., the IKEA Foundation and Bloomberg Philanthropies), and philanthropic institutions (e.g., the Green Climate Fund), which support implementation of GMP-related projects.

The GMP's impact

Since the launch of the pledge over two years ago, the initiative has managed to have a significant impact on global action for methane emissions reductions. The GMP influences global stakeholders through numerous initiatives and projects undertaken within its six major areas of work:

- the Energy Pathway
- the Waste Pathway
- the Food and Agriculture Pathway
- Methane plans and policies
- Data for Methane Action
- Finance for Methane Abatement.

One of the successful undertakings of the GMP is securing ample financing for projects related to methane reduction. This includes collecting USD 1 billion in new grant funding between COP27 to COP28, which is expected to be invested in cutting methane emissions across all sectors, with a focus in low- and middle-income countries (USD 408 million coming from governments and the European Commission, the rest from philanthropies and the private sector). As estimated by the Climate Policy Initiative, since the launch of the GMP, average annual methane abatement finance has moved in the right direction, with an increase of 18% in 2021-2022 compared to 2019-2020.

Other successful initiatives supported by the GMP include the launch of the World Bank's Global Flaring and Methane Reduction Partnership, which facilitates investment in methane reduction technologies at oil production sites, as well as the launch of the Oil & Gas Methane Partnership 2.0, a reporting and mitigation program for businesses in the oil and gas sector. Another project initiated by participants of the GMP is the Dairy Methane Action Alliance, set up during COP28. In this initiative, signatory companies commit to annually account for and publicly disclose methane generated by their dairy supply chains. They are also obligated to announce and implement a comprehensive methane action plan, which should be made public by the end of 2024. So far, companies that joined the Alliance include food manufacturing leaders such as Nestlé, General Mills and Danone.

The Pledge has also shown a stimulating effect on policy action taken by participating countries. So far, 60 have started the process of drawing up their National Methane Action Plans, the documents which outline existing and future policies to reduce emissions by 2030 and afterwards. The GMP provides technical help to support the development and implementation of transparent and consistent methane mitigation policies included in the plans. The US and the EU have already submitted their plans. The GMP promotes also including a separate methane target or assessment of methane mitigation potential in the Nationally Determined Contributions under the Paris Agreement.

Conclusions

In the case of the GMP launch, the US government and the European Commission took a common action and presented to the international community a fully coordinated vision of necessary methane reduction pathways, together with policy actions to reach the target. This strong, joint US-EU leadership managed to bring together stakeholders from different parts of the globe, generating unprecedented momentum to address a potent greenhouse gas. This case study is an example of how effective US-EU undertakings can be in effectively steering the direction of global action, provided they can establish a high level of coordination.

Credit: Unsplash / Jonathan Cooper

6 Summary and recommendations

6.1 Summary of US-EU links in overarching industrial decarbonization policies

While the EU and the US jointly participate in numerous platforms and forums aimed at aligning industrial decarbonization policies, there is an imbalance in thematic coverage and collaborative efforts across different instruments. These forums typically focus on broad, high-level discussions (e.g., the G7 Industrial Decarbonization Agenda, the CEM Industrial Deep Decarbonization Initiative) and general technological developments (e.g., the Trade and Technology Council, Mission Innovation).

The assessment of the current state of transatlantic links, along with their improvement potential, is provided in the table (the detailed assessments are provided in the relevant sub-sections in chapter 5).

In terms of links within specific policy instruments, the strongest connections exist in the areas of R&D and information tools. It is natural for those areas to form a strong base for other means of collaboration. Here, the dialogue occurs through large international forums, such as Mission Innovation and the IRENA Collaborative Frameworks, and technology-specific projects, such as the International Partnership for Hydrogen and Fuel Cells in the Economy, the Hydrogen Valley Platform, and the Clean Energy Ministerial Hydrogen Initiative. In addition to the US government and the European Commission, these initiatives also involve the governments of partner countries, academia, industry, and international organizations, responding to the need for multi-stakeholder engagement in decarbonizing industry. Although R&D and information tools constitute already well-developed links in EU-US dialogue, there is good potential for their improvement. Expanding the scope to cover different technologies and practices, as well as identifying specific targets and comprehensive, universal standards for decarbonizing industry, may be a good start.

Demand-pull policies, such as green public procurement; price signaling tools, like a comprehensive carbon tax, and approaches to sustainable finance mechanisms are currently moderately advanced. Existing programs and initiatives show promise but are often new, in the negotiation phase, limited in scope, or high-level. This suggests that their current impact is relatively limited, but here too exists potential for strengthening the links. If sufficiently developed,

Assessment of current transatlantic links in overarching industrial decarbonization policies and their potential for improvement

Policy instrument	Current state	Improvement potential
Research & Development	Good	Good
FOAK and sectoral subsidies	Poor	Moderate
Comprehensive tax credits	Poor	Poor
Carbon pricing	Poor	Poor
Green public procurement	Moderate	Good
Information tools	Good	Good
Just transition policies	Poor	Moderate

Source: Reform Institute

they are expected to benefit both geographies by fostering the commercialization of new technologies and innovations throughout the entire supply chain, as well as promoting the supply of sustainable materials, which would boost international trade and enhance decarbonization efforts.

FOAK and sectoral subsidies show poor transatlantic links, and their strengthening might be challenging. This is due to the fact that both the US and the EU have already developed extensive support programs relying on financing mechanisms, rules, and targets specific to their respective geographies. Moreover, the financing of these activities comes directly from internal budgets, posing competition, accounting, and governance difficulties. Potential for improvement exists in softer areas of collaboration, such as the exchange of good practices. Both the US and the EU have demonstrated strong R&D links represented by collaborative initiatives and bodies, which could serve as a foundation for enhancing cooperation in the area of state subsidies related to the commercialization phase – if there is will to jointly benefit from shared research results. A similar situation can be observed in carbon pricing. Despite both geographies imposing some form of carbon tax, their approaches diverge, with the ETS in the EU and regional schemes in the US. Given these significant differences between the two regions, as well as their distinct climate ambitions, political contexts, and technical challenges, establishing stronger collaboration might be difficult.

Finally, there are little to no links between the US and the EU on just transition policies. Both have their own programs, but they, too, vary in approach and scope. Thus, as much as there is the possibility of building a more robust dialogue, establishing a strong collaboration in this area is not straightforward. It could be beneficial to build upon the budding cooperation in this area between the US federal administration and the Commission to ensure that the just transition mechanisms are applied to better aligned standards. It would also be helpful to make sure that differing needs are understood and communicated and best practices identified and shared. Beyond this, the potential for stronger links is estimated to be moderate. Still, the US and the EU could consider meaningful joint efforts toward supporting a just transition at the global scale and the greening of industries in third countries. A model similar to the Just Energy Transition Partnerships (financing partnerships connecting donors, such as states, development banks and agencies, with beneficiaries, such as coal-dependent developing countries) could be the blueprint for such purposes.

Credit: Unsplash / Glenov Brankovic

6.2 Recommendations for strengthening transatlantic links in overarching policies to decarbonize industry

Recommendations for strengthening transatlantic links in R&D

R&D displays a wide array of platforms for transatlantic dialogue, engaging multiple stakeholders and approaches to decarbonizing industry. While this sets a positive landscape, several actions could enhance the effectiveness and efficiency of joint decarbonization efforts.

Strengthen	Expand	Add
• Review existing programs to avoid duplication, leverage mutual strengths, and utilize funding and expertise efficiently. • Foster the adoption of common standards across the different R&D programs.	• Expand research and development into technologies beyond hydrogen, such as other low-carbon fuels and advanced manufacturing. • Increase funding opportunities in existing programs to cover a wider range of decarbonization technologies.	• Introduce initiatives within the Trade and Technology Council specifically targeting industrial decarbonization. • Establish new initiatives focusing on complementary measures for decarbonizing industry, such as circular economy principles and carbon-neutral manufacturing processes. • Develop a cohesive framework in programs like the TTC to align their objectives with environmental sustainability and decarbonization.

Source: Reform Institute

Recommendations for strengthening transatlantic links in FOAK and sectoral subsidies

Compared to R&D, FOAK and sectoral subsidies offer fewer opportunities for transatlantic cooperation. While US-EU collaboration on R&D is perceived as mutually beneficial, the commercialization of new technologies is perceived by both sides as a competitive process. Policy alignment is more difficult, but there are opportunities to share knowledge and best practices on how to manage this stage.

Expand
• Potential for leveraging existing R&D links to include FOAK and subsidies, but focusing on the softer areas of collaboration, such as sharing best practices.

Source: Reform Institute

Recommendations for strengthening transatlantic links in comprehensive tax credits

Cooperation on tax credits raises a lot of challenges. The EU lacks supranational competences to establish comprehensive tax credit schemes, whereas for the US tax credits are the core of its policy approach to decarbonization. The recommendations in this area are therefore to mitigate the existing tensions, e.g., regarding the barriers to negotiating an EU-US CMA, and to prevent future conflicts learning the lessons from the IRA and setting up better information systems for the future.

Strengthen	Add
• Cooperate more on the implementation of the IRA to soften the blow of the Clean Vehicles Credit. This is more likely to succeed than the negotiations on the EU-US CMA.	• Early information systems for any new measures that could affect the US or the EU, to avoid tensions similar to those caused by the IRA

Source: Reform Institute

Recommendations for strengthening transatlantic links in carbon pricing

Carbon pricing remains one of the most controversial policy measures, both in internal political debates and at the transatlantic level. With fundamentally different positions (the EU views its EU ETS and CBAM as a model solution, while the US refrains from the measure at the federal level), the best course of action, at least for the time being, seems to be to try and mitigate any disputes on the issue from erupting and spilling over to other areas of cooperation. In the long-term, there seems to be little willingness on the EU's side to dismantle its carbon pricing schemes, but in the US, it might be argued that some sort of "creeping carbon pricing" might emerge as a combination of state-level cap and trade programs and specific federal regulations that could effectively increase the cost of carbon without pricing it directly.

Strengthen	Expand
• Mitigate the influence of the issue on bilateral relations as much as possible, until matters such as legal disputes concerning the EU CBAM and the results of US elections are clarified.	• Enhance the exchange of observations, experiences and know-how between US federal government, European Commission and US states that introduced carbon pricing measures.

Source: Reform Institute

Credit: Unsplash / Marcin Jozwiak

Recommendations for strengthening transatlantic links in green public procurement

Despite recognition in both the US and the EU that green public procurement is an important instrument for decarbonizing industry, there is no platform for direct collaboration. Additionally, existing forums are limited to high-level dialogue with narrow scope. With the GPP rules still in development on both sides of the Atlantic and likely to diverge on local content, the US seems to be more focused on the issue compared to the EU, which, despite having many guidelines and relevant provisions in related areas, is yet to come up with a comprehensive and binding framework. It seems inevitable that, in order to achieve progress, the EU needs first to develop a more definite position on its own common GPP rules – and indeed, a review of GPP legislation was included in Ursula von der Leyen's guidelines for the new Commission. Beyond political dilemmas, any alignment on GPP would require solving numerous technical and standardization challenges, which would require a fairly robust, dedicated collaborative platform involving industry experts and regulators from both sides. Finally, since GPP rules inevitably affect both domestic and foreign suppliers, the EU and the US might at some point want to identify and include other countries in the dialogue, especially those likely to be affected by such rules and/or having their own experiences with designing GPP frameworks.

Strengthening direct US-EU cooperation could yield several benefits for both economies. These include addressing specific challenges in green public procurement, leading to more effective strategies, increased trade, and a greater supply of sustainable materials. A first step could be introducing dedicated forums for direct dialogue between the US government and the European Commission, supported by technical platforms to tackle specific transatlantic challenges in green public procurement for industrial decarbonization.

Existing programs often operate within narrowly defined areas, resulting in isolated efforts and overlooked opportunities for cross-cutting collaboration. Expanding the scope of current initiatives to cover more sectors and aspects of green procurement, as well as including more countries, could be valuable. In addition, communication strategies within and between initiatives could be strengthened to better align and understand broader international contexts and best practices.

Strengthen	Expand	Add
• Enhance dialogue between the US government and the European Commission. • Foster communication strategies within and between initiatives for better alignment and understanding.	• Expand the scope of existing initiatives to cover more sectors and aspects of green procurement. • Build on the EU GPP program and US PP rules to seek alignment where possible and mitigate content issues where necessary (primarily, local content) • Explore the possibilities of involving other partners in GPP dialogue and initiatives (e.g., Japan, UK, USMCA members).	• Develop a more definite internal position on green public procurement within the EU regarding i.e., the issues of local content and common binding rules. • Introduce dedicated forums for direct dialogue between the US government and the European Commission. • Establish technical platforms to address specific transatlantic challenges in green public procurement in industry decarbonization. • Introduce mechanisms for developing universal standards in green public procurement. • Develop strategies to balance varying needs and approaches among US and EU states.

Source: Reform Institute

Recommendations for strengthening transatlantic links in information tools

Information tools offer significant potential for deepening collaboration. A range of existing platforms aim to set technology standards, which is both a promising sign and a risk of misalignment. Hence, the creation of a dedicated platform for direct US-EU collaboration on information tools could be beneficial and lead to a more coordinated approach. Although there are several initiatives focusing on hydrogen, CCS and CCU, more focus on alternative decarbonization technologies such as circular economy principles would be advantageous.

Strengthen	Expand	Add
• Align the work of multiple platforms aiming to set technology and emissions standards (TTC, IPHE, G7 IDA). • Leverage platforms such as LeadIT and GGI which can facilitate international collaboration across many diverse countries.	• Expand cooperation on alternative decarbonization technologies, such as advanced manufacturing and circular economy principles.	• Create direct EU-US platform for cooperating on information tools. • For the European Commission, consider joining the Clean Energy Ministerial IDDI.

Source: Reform Institute

Credit: Unsplash / Ant Rozetsky

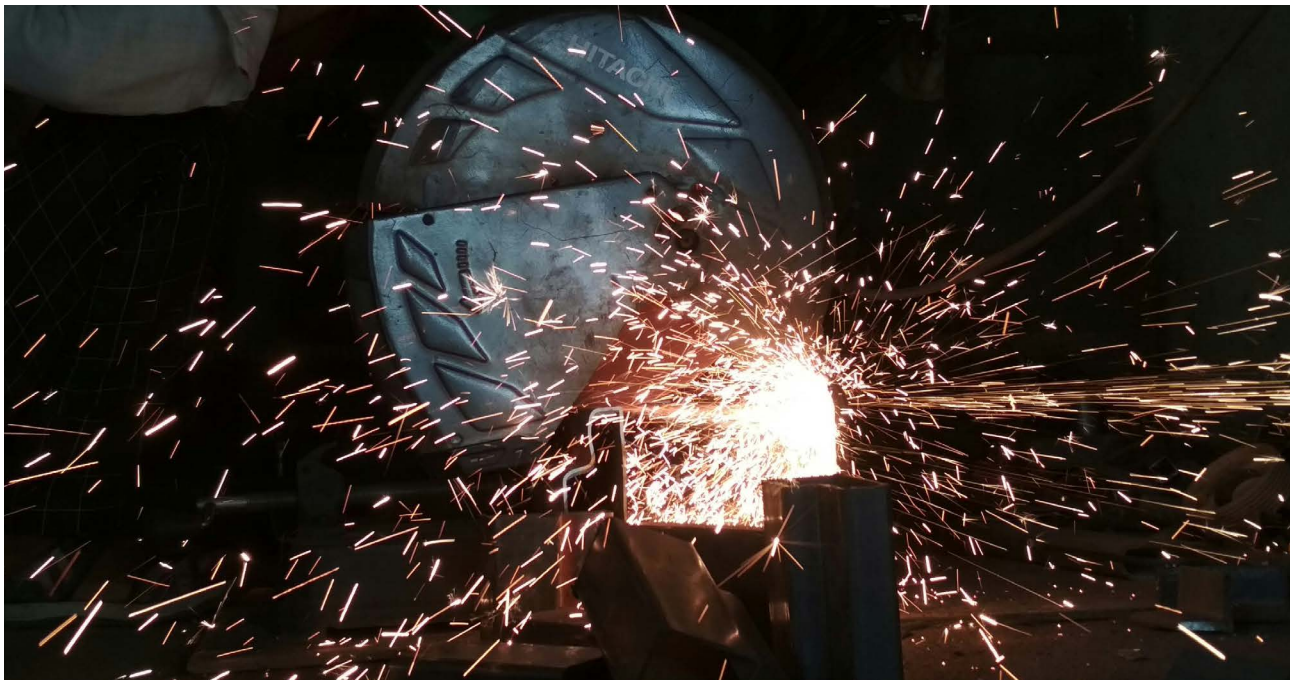
Recommendations for strengthening transatlantic links in just transition policies

Currently, there are no platforms for transatlantic cooperation on just transition policies, resulting in a less robust dialogue on this issue. While the potential for building strong US-EU links might be limited, there are opportunities for better collaboration between these geographies. Collaborative efforts could involve sharing best practices, harmonizing standards, and aligning funding criteria to more effectively support just transition goals. An effective method might be to expand one of the existing US-EU collaboration platforms to include a working group on just transition policies. A 2024 workshop to inform the US-EU Energy Council's work on the matter shows the situation is evolving in the right direction. Alternatively, establishing a new dedicated platform could also be an option.

Enhancing the transatlantic dialogue could be achieved by strengthening existing programs to ensure that just transition mechanisms are applied consistently and maintained to a high and universal standard. Establishing collaborative programs for capacity building, training, and knowledge exchange can facilitate the sharing of experiences and lessons learned, particularly in areas such as workforce retraining, community engagement, and sustainable economic development in post-industrial regions.

Strengthen	Expand	Add
• Strengthen existing programs to adhere to just transition mechanisms.	• Share best practices and develop a closer understanding of specific contexts and needs on each side. • Further develop dialogue via the US-EU Energy Council. • Include a permanent working group on just transition policies in at least one of the existing platforms of direct collaboration between the EU and the US.	• Establish a dedicated transatlantic platform. • Establish collaborative programs for capacity building, training, and knowledge exchange, e.g., beginning with the DOE and the European Commission.

Source: Reform Institute



Credit: Unsplash / Surya Prakash

6.3 Summary of US-EU links in technology-specific policies

The dialogue across key technological domains crucial for industrial decarbonization (circular economy, hydrogen and derivatives, CCS and CCU, industrial electrification, and bioenergy) is imbalanced in terms of intensity and effectiveness. There is an emphasis on hydrogen projects, and quite a few initiatives dealing with CCS and CCU, but little or no attention is paid to other decarbonization technologies like electrification, bioenergy, or circular economy solutions, as shown in the table.

Assessment of the current state of transatlantic links in technologies specific for decarbonizing industry and their potential for improvement

Technology	Current state	Improvement potential
Circular economy	Poor	Good
Hydrogen and derivatives	Good	Moderate
CCU/CCS	Moderate	Moderate
Industrial electrification	Moderate	Good
Bioenergy	Poor	Moderate

Source: Reform Institute

Credit: Unsplash / SELİM ARDA ERYILMAZ

6.4 Recommendations for strengthening transatlantic links in technology-specific policies to decarbonize industry

To improve US-EU collaboration in the realm of technologies for decarbonizing industry, a strategic approach focusing on strengthening, expanding, and adding new initiatives is recommended. This involves harmonizing policies and standards to create a unified regulatory framework that supports sustainable practices across various technologies, including circular economy solutions, hydrogen and its derivatives, CCS and CCU, industrial electrification, and bioenergy. Enhancing joint R&D efforts is crucial to foster innovation, along with strengthening public-private partnerships to facilitate financing and deployment.

Moreover, to establish global leadership, it is necessary to expand international commitments and set benchmarks for decarbonization practices. Introducing innovation hubs can offer vital support to startups and companies developing sustainable solutions, encouraging knowledge exchange and access to funding. Specific recommendations relevant to each of the technologies are provided in the following tables.

Recommendations for strengthening transatlantic links in circular economy policies
To enhance US-EU collaboration in fostering circular economy policies for decarbonizing industry, several areas require attention. First, it is crucial to strengthen the partnership by bridging the regulatory gap between the two regions and establishing cooperative efforts around value chains of mutual interest, which includes aligning standards. Expanding the collaboration involves broadening international partnerships to incorporate a wider range of stakeholders from different sectors and intensifying efforts to lead in global commitments and benchmarks for circular economy practices. Furthermore, there might be value in introducing new elements, such as transatlantic innovation hubs, to support startups and businesses focused on circular economy, electrification, and bioenergy solutions. This could facilitate knowledge exchange and enhance access to funding. In addition, coordinated policies that mandate circularity across public and private sectors and the creation of platforms for dialogue to develop shared criteria and practices are important steps to deepen and enhance the effectiveness of US-EU collaboration in this area.

Recommendations for strengthening transatlantic links in clean hydrogen and derivatives
Several areas might require action to improve transatlantic collaboration in developing clean hydrogen and derivatives technologies. Efforts should focus on developing common regulatory, standardization, and certification frameworks for hydrogen technologies, enhancing joint research and innovation projects aimed at com-

Strengthen	Expand	Add
• Bridge the gap between the robustness of US and EU regulations. • Establish cooperation around value chains of common interest, seeking alignment of standards.	• Broaden the scope of international partnerships to include more stakeholders from various sectors. • Expand efforts to lead global commitments and set benchmarks for circularity.	• Establish transatlantic innovation hubs to support startups and companies developing circular economy, electrification, and bioenergy solutions, facilitating knowledge exchange and access to funding. • Introduce coordinated policies, including obligations for the public and private sector to encourage the adoption of circularity. • Create dedicated platforms for dialogue focused on developing common circularity criteria, policies, and practices.

Source: Reform Institute

mercializing them, and building comprehensive value chains. Moreover, cooperation between governmental bodies and the private sector needs to be intensified to support the financing, development, and deployment of decarbonization technologies. Collaboration on the hydrogen economy should aim to synergize with that in other areas, such as electrification, and to seek global partnerships for technology dissemination and hydrogen trade. In addition, the establishment of transatlantic innovation hubs could support startups and companies in this field, while dedicated platforms for dialogue would facilitate the development of common criteria, policies, and practices.

Strengthen	Expand	Add
• Develop common frameworks for regulations, standards, and certification as the foundation for a transatlantic hydrogen ecosystem. • Enhance joint research initiatives and innovation projects, focusing on the commercialization of hydrogen technology and building mutually beneficial value chains. • Strengthen collaborations between governmental bodies and the private sector to support the financing, development, and deployment of decarbonization technologies.	• Seek ways to use progress in hydrogen to support cooperation in other fields, such as industrial electrification and renewable alternative fuels. • Seek multilateral, sustainable global partnerships with third countries in technology dissemination and hydrogen trade.	• Establish transatlantic innovation hubs to support startups and companies developing the hydrogen economy. • Create dedicated platforms for dialogue focused on developing common criteria, policies, and practices.

Source: Reform Institute

Recommendations for strengthening transatlantic links in CCS and CCU

There are already several international initiatives focusing on CCS and CCU, mainly on supply push policies (Mission Innovation) and some types of systemic enablers like finance (the CEM CCUS Initiative). There is potential to grow international collaboration to include more demand pull policies, in particular the development of harmonized standards for these technologies. The EU is already taking forward the certification of CCS and CCU through its Carbon Removal Certification Framework, and more transatlantic collaboration on this aspect could be beneficial.

Strengthen	Add
• Strengthen collaboration between governmental bodies and the private sector to support the financing, development, and deployment of CCS and CCU in order to alleviate high capital requirements.	• Develop common frameworks for regulations, standards, and certifications that support sustainable practices in CCS and CCU. • Enhance joint research initiatives and innovation projects to verify market viability.

Source: Reform Institute

Recommendations for strengthening transatlantic links in electrification

A key area of focus to bolster US-EU collaboration in developing electrification technologies for industrial decarbonization is consensus on common targets and standards. Expanding the scope of international partnerships, potentially through mechanisms like the IRENA Collaborative Framework, could bring a wider array of stakeholders into the fold. In addition, the establishment of transatlantic innovation hubs would provide vital support to startups and companies focusing on electrification and related technologies, by facilitating knowledge exchange and improving access to funding. Creating dedicated platforms for dialogue to develop common criteria, policies, and practices is also valuable, as it would further harmonize efforts and accelerate the transition to a decarbonized industry.

Strengthen	Expand	Add
• Seek an agreement regarding common targets and standards for industrial electrification.	• Broaden the scope of international partnerships to include more stakeholders from various sectors, e.g., via the IRENA Collaborative Framework.	• Establish transatlantic innovation hubs to support startups and companies developing solutions in electrification and related technology, facilitating knowledge exchange and access to funding. • Create dedicated platforms for dialogue focused on developing common criteria, policies, and practices.

Source: Reform Institute

Recommendations for strengthening transatlantic links in bioenergy

With regard to bioenergy, despite its non-negligible role in US and EU energy and heat generation, there seems to be relatively low interest compared to other renewables. There is little alignment on the matter, especially in the industrial context. To collaborate, both sides need to first fully define respective policy approaches in relation to the current and the future role of bioenergy in industry (the EU, with the cascading principle and other RED provisions, seems ahead on the issue). Caution is however advised as the sustainability of those technologies is heavily reliant on proper sourcing and specific parameters. A common understanding of sourcing of biomass and efforts for more sustainable trade between the parties could be reasonable steps to improve dialogue and collaboration.

Strengthen	Add
• Strengthen respective large-scale visions of biomass use in industry and other sectors, outlining more specifically its role in industrial decarbonization. • Seek more sustainable trade practices where relevant for biomass, in particular in solid wood exports and imports.	• Develop exchanges of scientific and policy-making expertise. • Seek alignment on the principles and standards of biomass sourcing and use.

Source: Reform Institute

Annex Overview of policies relevant to industrial decarbonization across the EU and the US

R&D support programs and mechanisms

EU	US	Links
• Horizon Europe • European Research Area (ERA) • Knowledge Exchange Platform • Joint Programming Initiatives (JPIs) • Cohesion policy and structural funds • Just Transition Mechanism • National Schemes	• Advanced Research Projects Agency – Energy (ARPA-E) • DOE Offices • National Laboratories • State-level initiatives	• Trade and Technology Council (TTC) • IEA Hydrogen Technology Collaboration Program • International Partnership for Hydrogen and Fuel Cells in Economy (IPHE) • The Hydrogen Valley Platform (Mission Innovation) • Clean Energy Ministerial Hydrogen Initiative • Mission Innovation • International Renewable Energy Agency (IRENA) • Leadership Group for Industry Transition (LeadIT) • G7 Industrial Decarbonization Agenda • Industry initiatives: Global Cement and Concrete Association, International Council of Chemical Association

Source: Reform Institute

Overview of FOAK and state subsidies policies across the EU and the US

EU	US	Links

• Innovation Fund - flagship projects in innovative technologies
• Just Transition Mechanism: alleviating social, economic, and environmental challenges in vulnerable regions
• Modernization Fund: modernization of energy systems and the improvement of energy efficiency in 13 lower-income EU Member States
• Important Projects of Common European Interest (IPCEI) – large-scale projects to overcome important market or systemic failures and societal challenges which could not otherwise be addressed
• Projects of Common interest (PCI): creating cross-border links in infrastructure and energy
	• DOE's Office of Clean Energy Demonstrations (OCED), including inter alia:
	  • Advanced Industrial Facilities Deployment Program
	  • Industrial Demonstration Program
	  • Regional Clean Hydrogen Hubs
	  • Carbon management portfolio, including Direct Air Capture Hubs
	  • Carbon Capture Demonstration Projects Program
	  • Carbon Capture Large-Scale Pilot Projects
	• DOE's Office of Manufacturing and Energy Supply Chains (MESC)
	  • Advanced Energy Manufacturing and Recycling Grant Program
	  • Enhanced Use of Defense Production Act of 1950 and Domestic Manufacturing Conversion Grants
	  • State Manufacturing Leadership
	• DOE's Office of Fossil Energy and Carbon Management (FECM)
	• National Labs
	• Environmental Protection Agency (EPA) programs, including support for environmental product declarations, low embodied carbon labeling for construction materials, and methane emissions reductions
	• Department of the Treasury tax credits for clean energy technologies, including the clean hydrogen production tax credit.
	• State-level grant and incentive schemes
		-

Source: Reform Institute

Overview of carbon pricing schemes across the EU and the US

EU	US	Links
• EU ETS • CBAM	• IRA waste emissions charge on facilities with methane emissions • California's Cap-and-Trade Program • Washington's Climate Commitment Act • Regional Greenhouse Gas Initiative	• Global Arrangement on Sustainable Steel and Aluminum (GASSA)

Source: Reform Institute

Overview of green public procurement policies across the EU and the US

EU	US	Links
• Voluntary GPP requirements (GPP Advisory Group) • GPP requirements in the EU Directives	• Federal Buy Clean Initiative • EPA's Reducing Embodied Greenhouse Gas Emissions for Construction Materials and Products • EPA's Label Program for Substantially Lower Carbon Construction Materials • GSA Federal Buildings Fund and Low Embodied Carbon Concrete Requirements • DOT's Low-Carbon Transportation Materials Grants • EPA's Environmental Product Declaration Assistance • GSA's Use of Low-Carbon Materials • HUD's Green and Resilient Retrofit Program • Affordable Housing Energy / Water Efficiency and Climate Resilience Grant Program • FEMA: Hazard Mitigation Grant Program and Building Resilient Infrastructure and Communities Federal-State State Buy Clean Partnership • Environmental Preferable Purchasing Program • State-level Buy Clean laws (e.g., Buy Clean California), state-level sectoral programs, mostly in cement and construction sectors	• The Greening Government Initiative (GGI) • Clean Energy Ministerial Industrial Deep Decarbonization Initiative (IDDI) • Climate Club • G7 Industrial Decarbonization Agenda

Source: Reform Institute

Overview of comprehensive tax credits programs across the EU and the US

EU	US	Links
• N/A (only national-level policies)	• Production Tax Credit (PTC) and Investment Tax Credit (ITC) for renewable energy • 48C Advanced Energy Project Credit to include projects that reduce greenhouse gas emissions • Section 45Q Credit for Carbon Dioxide Sequestration • State-level grant and incentive schemes	• Critical Minerals Agreement (CMA) • G7 Industrial Decarbonization Agenda

Source: Reform Institute

Overview of information tools used across the EU and the US to support industrial decarbonization

EU	US	Links
• Corporate Sustainability Due Diligence Directive • Energy Performance of Buildings Directive (EPBD) whole-life carbon • European Platform on LCA • Ecodesign for Sustainable Products Regulation • Right to Repair Directive	• Labels with EPA participation, e.g., Energy Star, Smartway, WaterSense, SNAP etc. • State-issued and commercial labels • EPA Framework for the Assessment of Environmental Performance Standards and Ecolabels	• CEM Industrial Deep Decarbonization Initiative • International Partnership for Hydrogen and Fuel Cells in the Economy (IPHE) • The Hydrogen Valley Platform • Leadership Group for Industry Transition (LeadIT) • G7 Industrial Decarbonization Agenda • United Nations Industrial Development Organization (UNIDO) • Greening Government Initiative (GGI) • Clean Energy Ministerial CCUS Initiative

Source: Reform Institute

Overview of just transition policies across the EU and the US

EU	US	Links
• EBRD Just Transition Initiative • Just Transition Mechanism • Just Transition Platform • Social Climate Fund	• 1931 Davis-Bacon Act • Various reinforcements and guarantees in specific IRA and IIJA provisions	• No direct links

Source: Reform Institute

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Find out more about the project and our latest events and publications at https://climatestrategies.org/projects/race-to-the-top/

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