4

Transatlantic Energy Transformations

The transatlantic energy economy is undergoing significant transformation. First, the United States has become a critical energy supplier to Europe, as U.S. crude oil and natural gas production reached record highs in 2023 and the United States became the world's largest producer of both oil and natural gas. Second, groundbreaking U.S. and EU policy initiatives are accelerating each party's efforts to address climate change, supercharge the transition to cleaner energies, boost competitiveness, and reduce strategic vulnerabilities. Third, energy investors, innovators and firms are capitalizing on dense transatlantic commercial linkages to spearhead the next generation of clean technologies.

The United States: A Critical Energy Partner for Europe

In 2022, Moscow shut off more than 80% of its pipeline gas spigots to Europe. Since then, Europe has largely navigated the crisis by diversifying supplies, chiefly through liquefied natural gas (LNG); accelerating renewables deployments; using less gas; boosting storage reserves; and improving efficiencies. Europe entered 2024 with gas storage levels at a record 86%, and has weathered its second winter since Moscow's 2022 invasion of Ukraine. It is building new infrastructure to boost its import capacity, adding six new port terminals in two years. By 2030 it will be able to receive 25% more LNG than in 2022.[1]

Europe's gas supply mix has changed considerably over the past two years. Russian pipeline gas as a share of EU natural gas imports fell precipitously from 41% in 2021 to just 9% in 2023. Russian LNG and Russian pipeline gas together only accounted for 13% of the EU's overall supplies in 2023, down from 40% in 2021, although as part of that mix, EU imports of Russian LNG actually increased by about 26% between 2021 and 2023.[2]

Norway has replaced Russia as the EU's largest gas supplier, providing half of the bloc's piped gas and 30% of its LNG imports. The United States has overtaken Qatar to become Europe's most important supplier of LNG, accounting for 50% of EU total LNG imports – and around 20% of EU total gas imports. In turn, Europe has become the U.S.'s most important LNG export market, accounting for more than 60% of U.S. LNG exports in 2023, double U.S. flows going to Asia (Table 1). By 2032, EU imports of U.S. energy are predicted to almost double in value, to around $114 billion.[3]

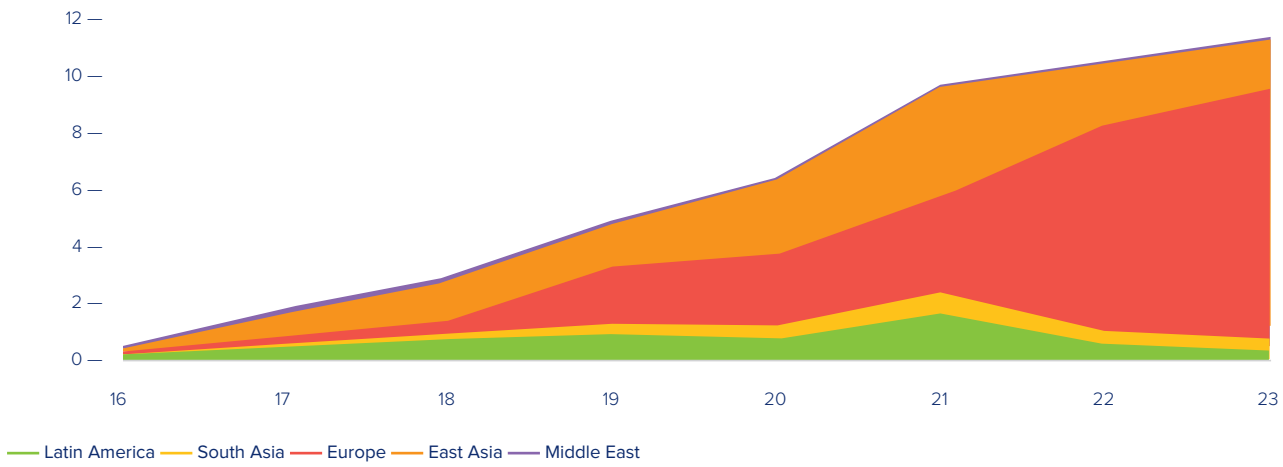
Three major shifts

U.S. as critical energy supplier to Europe

New policy initiatives to accelerate green transition and boost competitiveness

Substantial investment and capitalization of transatlantic commercial linkages

Table 1. **U.S. LNG Export Destinations** (Bcfd)



Bcfd: billion cubic feet per day. Sources: U.S. Department of Energy; Jeremy Goh, Kent Bayazitoglu, Ajey Chandra, "Another 9 bcfd of US LNG export capacity required by 2035," Oil & Gas Journal, August 7, 2023.

Risks continue. Further sabotage could follow damages to the Nordstream pipeline in September 2022 and the Balticconnector in October 2023. Russia, which still accounts for 13% of the EU's total gas imports, could sever its remaining pipeline gas exports to Europe, notably via Türkiye or Ukraine, especially since the Russia-Ukraine gas transit agreement ends in December 2024. Brussels policymakers are preparing legislation to fully ban Russian exports of LNG and piped gas, but the Iberian Peninsula relies heavily on imported LNG and the landlocked countries of Austria and Hungary are significantly dependent on Russian pipeline gas. U.S. LNG producer Cheniere Energy agreed in November to provide Austrian energy group OMV with LNG beginning in 2029, but Hungary has done little to wean itself off Russian imports, and Rosatom is building two new reactors there.[4]

In addition, the Biden administration has paused licenses for new LNG export terminals to assess their impact on domestic energy prices and global greenhouse gas emissions. While this action's tangible effect on energy flows is likely to be felt later in this decade, the decision to pause has already caused U.S. exporters and European importers to question the reliability of the U.S. as a strategic partner for energy security in Europe, especially since the continent could face a gas shortfall of 2100 bcm, or 37% of demand, between 2028 and 2040 if Russian natural gas imports are eliminated in the coming years as expected.[5]

Moreover, Europe's response has been costly – its gas import bill ran about $400 billion in 2022, more than three times 2021 levels. Gas prices have lowered significantly since then, but remain above their historical average. Estimates are that

The EU reduced its dependence on Russian gas from 40% in 2021 to 13% in 2023.

gas in Europe, which was twice as expensive than in the United States before Russia's 2022 invasion, will be 4 times more expensive than in the United States for the foreseeable future. This also puts upward pressure on the cost of electricity in the EU, which is generating concerns about EU industrial competitiveness.[6]

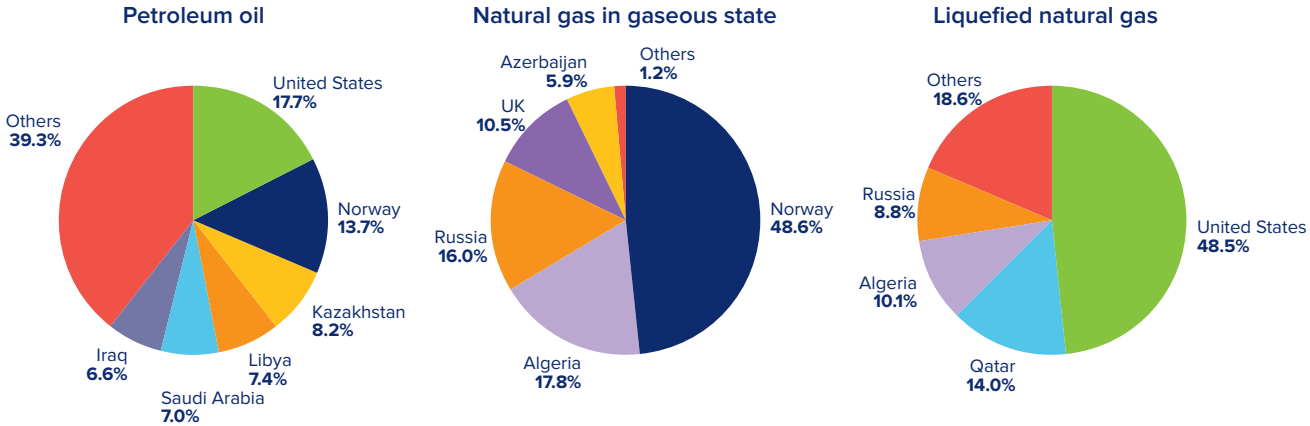
A similar shift is underway in Europe's oil markets. Russia's share of Europe's oil and petroleum products imports declined from nearly 45% in 2021 to under 4% in 2023, whereas U.S. oil shipments to Europe have jumped 82% since Russia's invasion of Ukraine, according to Kpler. The United States has become the EU's largest supplier of petroleum oil, accounting for about 18% of imports, followed by Norway (14%) and Kazakhstan (8%) in the third quarter of 2023 (Table 2).[7]

Extended production cuts by OPEC+, together with tensions generated by the Israel-Hamas war and Yemeni rebel attacks on shipping in the Red Sea, have spiked prices and raised concerns about disruptions of oil supplies. Yet large production increases by the U.S., Brazil and Guyana have dented the influence of OPEC+, which now controls barely half of global crude oil supply. The U.S. was on course to increase oil output by 1.4 million barrels per day in 2023, three times the 400,000 barrels a day cut from OPEC+ countries, even as the U.S. pushed ahead with its green transition.[8]

Inflation Reduction Act subsidies and tax credits

$369 billion

Table 2. **EU Imports of Energy Products by Partner** (% of trade in value, Q3 2023)



Source: Eurostat.

Comparing U.S. and EU Green Subsidies

The Inflation Reduction Act

The U.S. Inflation Reduction Act (IRA) passed by the U.S. Congress in 2022 is by far the single biggest climate investment in U.S. history. It puts the U.S. on a path to roughly 40% emissions reductions by 2030. It is fueled by at least $369 billion in subsidies and tax credits to qualifying parties. As we discuss in Chapter 3, it is part of an even larger U.S. effort to position its domestic economy for a cleaner energy future, to be more globally competitive, and to mitigate critical materials dependencies on China and other suppliers.

In its first year, the IRA led to over $110 billion of capital investments announced for clean energy manufacturing projects in the U.S., including over $70 billion towards electric vehicles and battery supply chains. U.S. battery power capacity doubled in 2023 and is slated to double again in 2024. Today about 30 U.S. battery factories are operating, under construction, or being planned. In 2019 only two were in operation.[9]

The boom in clean energy and manufacturing investment accounted for a record 10% of U.S. GDP growth in 2023. The Biden administration says its full agenda, discussed in Chapter 3, will unleash $3.5 trillion in public capital and private investment over the next decade. The IRA alone could spur $1.7 trillion in public and private investments, according to Credit Suisse. BCG forecasts that the IRA could lower global clean-energy costs by as much as 25% ($120 billion) this decade.[10]

IRA Conditions

The IRA provides tax breaks for electric vehicle (EV) buyers and offers battery-makers a tax credit which covers about one-third of the cost of production, but only if the products contain no parts from a "foreign entity of concern" – China, Russia, Iran, and North Korea. The rules apply to battery components starting in 2024 and the minerals that go into them in 2025. Other arrangements that involve Chinese companies, such as licensing technology, might be permissible under the rules.[11]

Europe's investment outlook is also conditioned by distortive subsidies offered by other countries, particularly China.

In addition, the IRA stipulates that at least 40% of the value of the critical minerals, including lithium, contained in a battery "must be extracted or processed in the United States or a country with which the United States has a free trade agreement, or be recycled in North America". The applicable percentage will increase each year from 2024, rising to 80% from 2027. At least 50% of the value of the battery components must be manufactured or assembled in North America. The percentage will rise from 2024, reaching 100% from 2029.[12]

Beyond tax credits, the IRA provides $11.7 billion in new federal funding to the U.S. Department of Energy's (DOE) Loan Programs Office – whose loans helped Tesla scale its manufacturing more than a decade ago – enabling it to unlock more than $312 billion in additional private sector investment, according to the Environmental Defense Fund. The DOE also operates a $6 billion battery-grant program under the U.S. 2021 infrastructure law, for which the "foreign entity of concern" restrictions also apply.[13]

European officials have hailed the IRA's climate goals yet expressed concerns about the Act's discriminatory local content provisions, and its market-distorting manufacturing subsidies that might induce European firms to shift their production to the United States. Such concerns are amplified by far lower U.S. energy costs. Following U.S.-EU discussions, some apprehensions were addressed. Used clean vehicles, which comprise 70% of the market, will benefit from tax credits and are not subject to local sourcing requirements. The new implementing rules also allow subsidies for "commercial clean vehicles" produced by European and other foreign carmakers if they are leased and not purchased, a favored option of U.S. consumers. Currently half of German electric vehicles in the United States are leased.[14] U.S. Treasury guidance confirms that EU companies can benefit from the Commercial Clean Vehicle Credit scheme (covering leased vehicles) under the IRA, although certain concerns remain with regards to the market for private cars. The EU-U.S. Clean Energy Incentives Dialogue, launched in March 2023 as part of the EU-U.S. Trade and Technology Council (TTC), aims to ensure that respective EU and U.S. incentive programs are mutually reinforcing.

Discussions regarding batteries continue. The IRA stipulates that batteries must meet a gradually increasing threshold of critical minerals extracted and processed in countries with "free trade agreements" with the U.S., beginning at 40% in

2023 and increasing by 10% each year through 2026. Neither the EU nor the UK has a free trade agreement with the United States. The EU and the U.S. are negotiating a Critical Minerals Agreement, modeled after a U.S.-Japanese agreement signed in March 2023, that seeks to ensure that the EU is granted the equivalent status of an FTA partner under the provisions of the IRA, although the two sides have clashed over a U.S. proposal to allow labor inspections at mines and facilities producing minerals outside the United States and Europe.[15]

U.S. carmakers have joined their European counterparts in their concern about how fast they will be able to meet the IRA's provisions that restrict tax credits to new electric vehicles that do not include battery components or critical materials coming from "foreign entities of concern," including China, which is the source for many such materials.

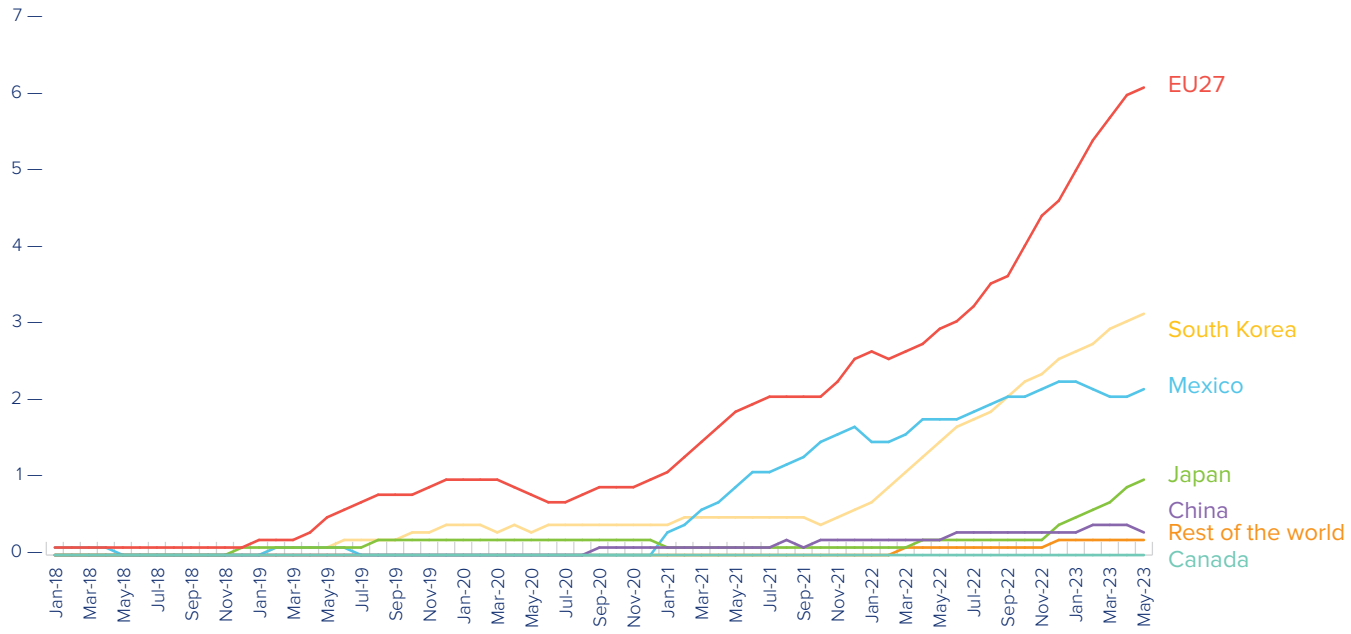
Some European carmakers have complained that their exports could be hit by IRA provisions limiting tax credits to manufacturers that complete "final vehicle assembly" in North America. This ignores the dense transatlantic linkages that underpin the auto industry. The main European automakers already conduct "final vehicle assembly" at their plants in the United States. Volkswagen, which is the largest European seller of electric vehicles in the U.S., also became the first foreign carmaker to qualify for the full EV tax credit of $7,500 because its best-selling model, the ID.4, is produced in Chattanooga, Tennessee. Mercedes produces its electric EQS in Tuscaloosa, Alabama. Two of BMW's electric vehicle brands are produced at its plant in Spartanburg, South Carolina, which is bigger than its home plant in Munich.

Moreover, the evidence thus far shows that the IRA has not suppressed U.S. imports of electric vehicles, it has turbocharged them: imports from the EU, South Korea, and Japan are all steadily climbing to new highs (Table 3). This is because non-domestically manufactured EVs can qualify for tax credits if they are leased instead of bought, which has led to a massive surge in the leasing of foreign-made EVs.[16]

Global clean technology market value by 2030

$650 billion annually

Table 3. **U.S. Imports of Electric Vehicles by Source** ($Billions)



Sources: U.S. International Trade Commission Dataweb; Chad P. Bown, "How the United States solved South Korea's problems with electric vehicle subsidies under the Inflation Reduction Act," Working Papers 23-6, Peterson Institute for International Economics, July 2023, https://www.piie.com/publications/working-papers/how-united-states-solved-south-koreas-problems-electric-vehicle.

U.S. companies in Europe have become a driving force for Europe's green revolution, accounting for more than half of the long-term renewable energy purchase agreements signed in Europe since 2007. European companies are the leading source of FDI in the U.S. energy sector.

This surge underscores another U.S-EU difference: European exports of finished electric vehicles to the United States face a 2.5% tariff when they enter the U.S., a far lower levy than the 10% tariff the European Commission imposes on every U.S. car exported to the EU. The 10% tariff corresponds to a subsidy for European vehicles of around $3,750 for an average price of around $50,000.[17]

The EU's Green Subsidies

The EU and its member states are pushing a flurry of initiatives to power the green transition. Following the COVID-19 pandemic and Russia's renewed invasion of Ukraine in February 2022, new spending programs were created to accelerate the green transition. The EU's Recovery and Resilience Facility (RRF)'s national recovery plans include $218 billion of expenditure for the green transition. RePowerEU, the EU's plan to rapidly reduce dependence on Russian fossil fuels and accelerate the green transition, aims to mobilize $327 billion by 2030 (most from the RRF but with an additional $22 billion in grants) to reduce energy consumption, increase energy efficiency and renewables deployment.[18]

Following passage of the U.S. IRA in 2022, and with an eye to Chinese energy subsidies, in early 2023 the European Commission drew on this funding base but proposed to go further with a $560 billion Green Deal Industrial Plan (GDIP). As originally conceived, the plan would consist of four main initiatives: the Net-Zero Industry Act (NZIA); the Critical Raw Materials Act (CRMA); a Strategic Technologies for Europe Platform (STEP), intended as a precursor to a larger so-called European Sovereignty Fund to drive joint investment in specific clean technology projects; and a Temporary Crisis and Transition Framework (TCTF), an amended and extended version of a 2022 mechanism the EU adopted to cope with the severe energy consequences of Russia's invasion of Ukraine. The TCTF loosens EU rules on state aid, which in principle is incompatible with the EU Single Market. Not all elements of this package have survived.[19]

The Net-Zero Industry Act aims to ensure that at least 40% of the EU's demand for clean tech is made domestically by 2030. It seeks to promote manufacturing in a predetermined set of specific "strategic" clean technologies, including solar photovoltaic and solar thermal, onshore wind and offshore renewables, batteries and storage, heat pumps and geothermal energy, electrolysers and fuel cells, sustainable biogas and biomethane, carbon capture and storage (CCS) and grid technologies. Member states would identify strategic projects in these areas. The NZIA would accelerate permitting, facilitate private funding via a so-called Net-Zero Europe Platform, allow limited public subsidies by member states, and include sustainability and resilience criteria in public procurement processes. EU member states and the European Parliament have reached a provisional deal on the NZIA; it is expected to go into effect in spring 2024.[20]

The Critical Raw Materials Act eases financing and permitting for new mining and refining projects at home to help the EU meet a target to extract 10%, recycle 25% and process 40% of its annual consumption by 2030 for 18 strategic raw materials. The Act also aims to ensure that no third country should provide more than 65% of any strategic raw material. The CRMA does not provide new resources but would establish a European Critical Raw Materials Board where representatives from member states and the Commission would coordinate existing financing mechanisms. The CRMA is due to be formally adopted after the European Parliament and the Council reached agreement on its text in fall 2023.[21]

The stillborn European Sovereignty Fund was originally conceived to be funded by common EU borrowing, following the model of the bloc's pandemic-related Recovery and Resilience Fund. After member states failed to agree, a far more modest Strategic Technologies for Europe Platform has been devised, but with only $1.65 billion in a common fund to be used for defense-related projects rather than clean tech, leaving this element of the GDIP adrift.[22]

The Temporary Crisis and Transition Framework, in force until December 31, 2025, allows member states to offer certain forms of aid and measures to support the green transition. With U.S. and Chinese subsidies in mind, the TCTF enables the EU to help member states match aid offered by a third country if such offers might otherwise lure investments away from the EU. It has sparked billions in subsidies by the Commission and individual EU member states, headlined by a $3.2 billion French tax credit scheme to support renewable energy companies, and Germany's $983 billion subsidy of Swedish battery manufacturer Northvolt's investment in the state of Schleswig-Holstein, to dissuade the company from considering $850 billion in U.S. subsidies for a production site in the state of Nebraska.[23]

Several EU funding schemes existed prior to the announcement of the GDIP, and a number continue in addition to the elements mentioned above. For instance, the EU's primary R&D financing mechanism, Horizon Europe, has allocated up to $13 billion for net-zero technology R&D in its current 2021-2027 budget cycle. An additional $44 billion is available until 2030 for demonstration projects in energy-intensive industries via the EU Innovation Fund. Moreover, lower-income member states can access $52 billion until 2030 for clean and decarbonization technologies via the EU's Modernization Fund, and another $78 billion is available to improve energy efficiency in buildings and decarbonizing heating and cooling via the EU's Social Climate Fund. A further $93 billion for energy and cleantech projects is included under the EU's Cohesion Fund, the European Regional and Development Fund, and the Just Transition Fund.[24]

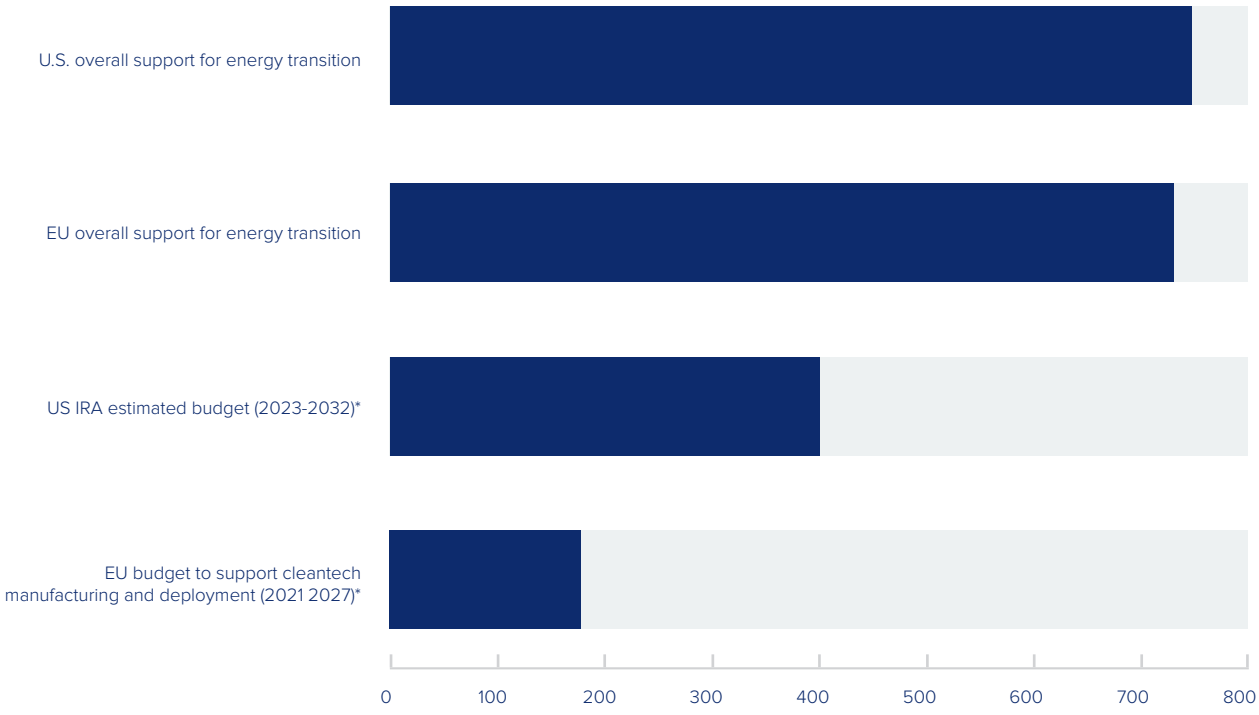
Many EU member states offer additional support measures. For instance, almost every EU country subsidizes the purchase of electric vehicles. Bruegel estimates such support totaled $6.5 billion and averaged about $6,500 per vehicle in 2022 (compared to IRA tax credits of up to $7,500 per vehicle). Member states spent over $92 billion on state aid for environmental protection and energy savings in 2021, the last year of available data. Such spending varies widely among countries. Germany alone accounted for 60% of the $523 billion spent on EU environmental aid between 2014 and 2021.[25]

Private capital is also significant. European investment funds that prioritize climate impacts grew to record levels in 2023. According to Morningstar, Europe's climate-themed funds grew sevenfold in value between 2019, when the European Commission first presented its Green Deal, and the first half of 2023. At $447 billion, these funds' net assets were five times the size of similar funds across the rest of the world combined.[26]

Comparing U.S. and EU Initiatives

Several estimates released over the course of 2023 comparing the U.S. IRA with EU support schemes concluded that EU subsidies are of equivalent size, or even higher, than those in the United States. The Franco-German Council of Economic Experts concluded that "the overall funding level of EU programs is comparable to the IRA". Bruegel concluded that EU and U.S. IRA subsidies for electric vehicles and cleantech manufacturing are roughly similar in size, and that European subsidies for renewable energy production are four times higher than subsidies foreseen by the IRA. The International Renewable Energy Agency estimated that subsidies for renewable energy account for 0.5% percentage of EU GDP – twice as high as the IRA's share of U.S. GDP. Since these studies were completed, the European Commission has proposed additional support schemes, including offering battery makers in the EU an additional $3.3 billion in subsidies from the EU's Innovation Fund.[27]

Table 4. Clean and Green: Comparing U.S. and EU Energy Transition and Cleantech Support ($Billions)



**Euro exchange rate as of 27 feb 2024.*
Source: own elaboration, based on German Council of Economic Experts, "The Inflation Reduction Act: Is the new U.S. industrial policy a threat for Europe?" Policy Brief 1/2023; Milan Elkerbout, Edoardo Righetti, Christian Egenhofer, "Different Roads, Aligned Goals," CEPS Explainer, 2023-16; European Commission, "Investment needs assessment and funding availabilities to strengthen EU's Net-Zero technology manufacturing capacity," Staff Working Paper, March 2023; 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, Version 2.

Most analysts suggest that Europe's challenge is not a lack of financial or state resources, but its own fragmentation and the legacy effects of its overreliance on cheap Russian energy. They conclude that U.S.-EU differences are less about the sheer size of their respective efforts and more about how those initiatives are being rolled out. They judge IRA clean tech subsidies to be simpler, faster, and less disjointed than those in Europe. For instance, the EU's NZIA is mostly regulatory, whereas the IRA is essentially an enormous public investment. Easy tax credits are the IRA's primary tool, whereas NZIA funding consists largely of direct subsidies for projects, since fiscal policy remains with the member states and thus is not available to EU policymakers in Brussels. The IRA's credits are straightforward, transparent, predictable, uncapped and immediately available, while applicants seeking EU subsidies must endure slow and cumbersome application procedures that can take months or years. The U.S. IRA does discriminate against foreign producers. European analysts tend to argue that EU subsidies do not. However, the EU's CRMA provision that no third country should provide more than 65% of any strategic raw material is discriminatory, as is its TCTF provision that bends EU state aid rules to enable member states to match aid offered by a third country.[28]

A transatlantic cleantech alliance could highlight and support synergies among existing EU and U.S. cleantech efforts.

Some Europeans are concerned that these discrepancies could lead to investors leaving Europe for U.S. destinations. It is still too early to tell whether this will happen. The European Commission in October 2023 assessed that

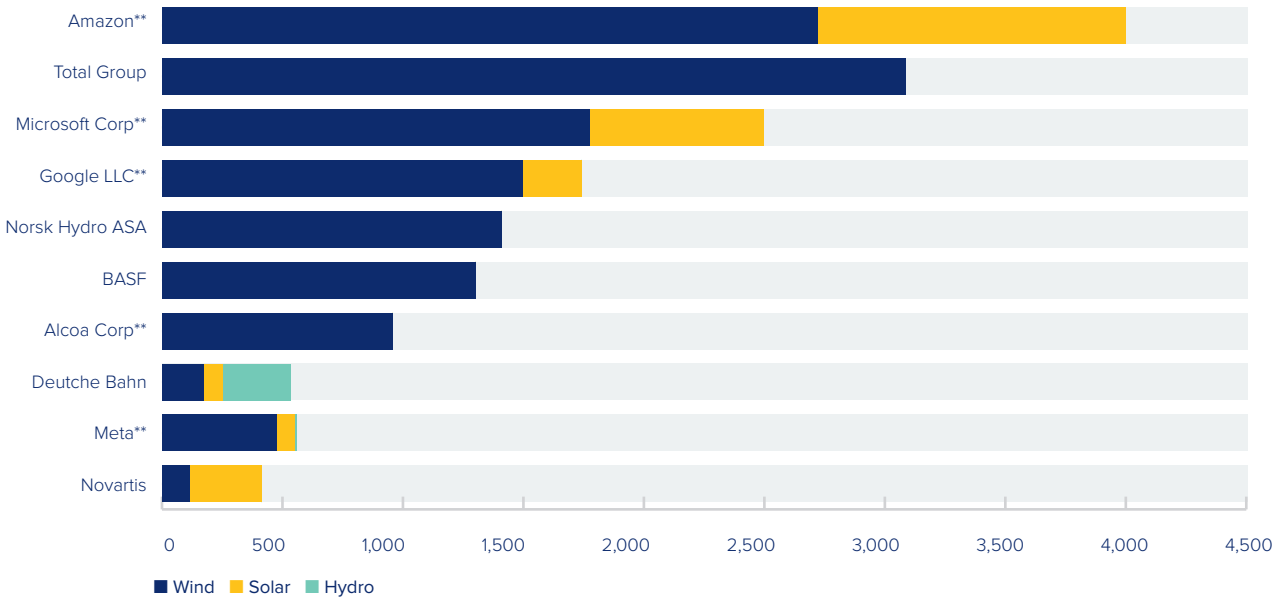
the IRA's macroeconomic effect on Europe had thus far been limited. And since IRA tax credits can only be claimed after the end of fiscal year 2023, with tax returns filed in 2024, we do not yet know the initial size of those credits. The Franco-German Council of Economic Experts concluded that the IRA would "exert minimal overall macroeconomic impact" on the EU, and that "a closer examination at the sectoral level fails to yield evidence linking the IRA to significant risks for the EU." They pointed instead to "sizeable energy price differentials," not the IRA, as a key challenge to Europe's attractiveness and the competitiveness of its industries. Europe's investment outlook is also conditioned by other factors, including interest rates, inflation and recession pressures, and distortive subsidies offered by other countries, particularly China, as we note in Chapter 3. According to President von der Leyen, "The true pressure, the unleveling of the playing field, is not our American friends, it's China – with massive hidden subsidies, with a lot of denial of access to our companies to the Chinese market and of course there is strategic shopping towards here, the European Union."[29]

The Franco-German Council of Economic Experts also underscored a point we have made consistently in this annual survey: the deep intra-industry links that bind the North American and European economies mean that these cleantech support schemes could actually boost transatlantic commercial ties. "The Inflation Reduction Act will provide a demand stimulus for European high technology in green power generation," the Council concludes, and adds that "despite domestic content requirements, the IRA is likely to strengthen these commercial links."[30] Table 3 shows that this is already evident in electric vehicles.

Powering the Transatlantic Energy Innovation Economy

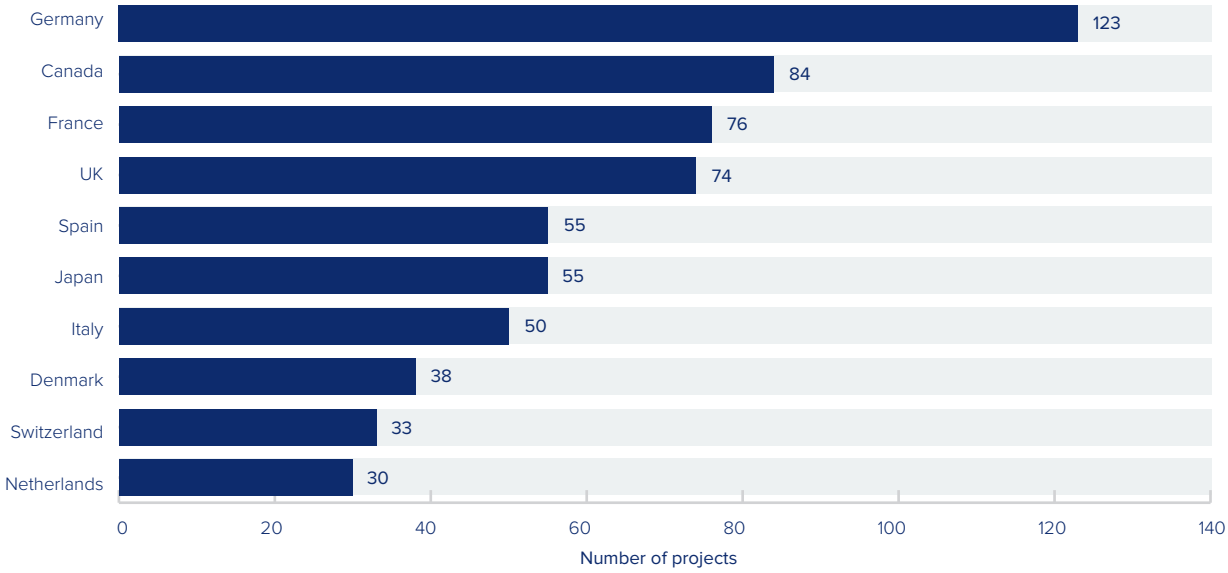
Transatlantic investment is not a zero-sum game, as we demonstrate throughout this book. That is particularly true regarding the transatlantic energy economy. U.S. and European firms are deeply embedded in each other's fossil-fuel and renewable energy markets – through trade, foreign investment, cross-border financing, and collaboration in research and development (R&D).[31] U.S. companies in Europe have become a driving force for Europe's green revolution, accounting for more than half of the long-term renewable energy purchase agreements signed in Europe since 2007 (Table 5), and European companies are the leading source of foreign direct investment (FDI) in the U.S. energy sector (Table 6).

Table 5. Top Purchasers of Renewable Energy in Europe, 2008-2021 (Megawatts)



*** Companies with asterisks are U.S. companies and represented by darker shading of bars.*
Europe is the EU plus Norway, Iceland, Switzerland and the UK.
Source: Bloomberg New Energy Finance.
Data as of February 2022.

Table 6. Top Sources of Inward FDI in U.S. Energy (825 Total Announced Greenfield Projects, July 2011 – August 2022)



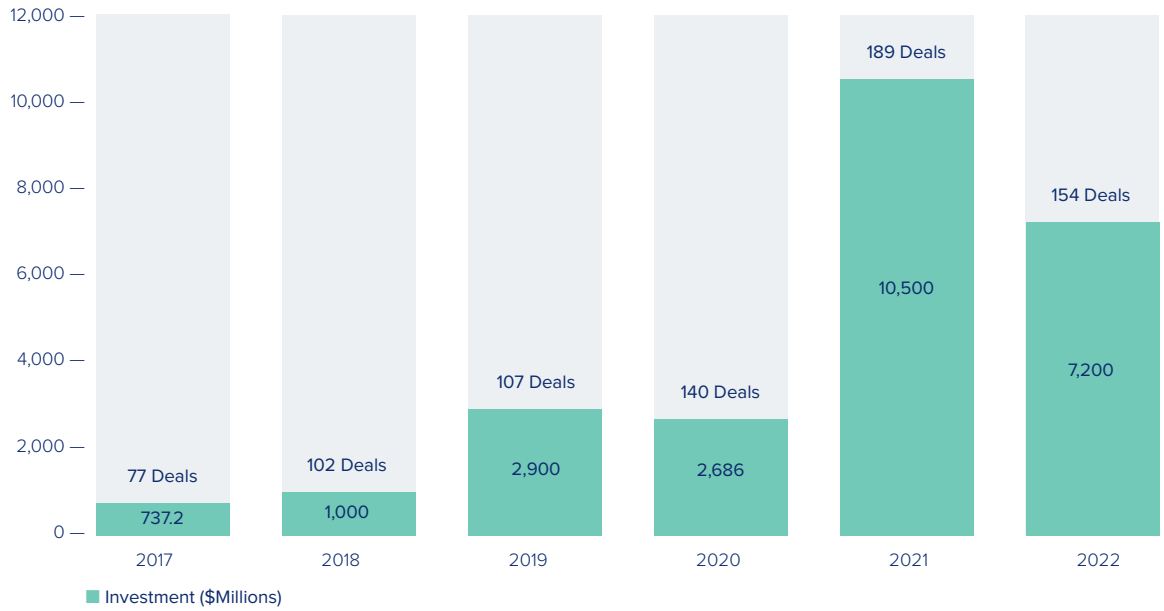
Source: SelectUSA, U.S. Department of Commerce, https://www.trade.gov/sites/default/files/2023-03/Energy.pdf. Data as of October 2022.

The U.S. and EU share both interest and capacity to accelerate innovative frontier technologies that can provide abundant, affordable, clean energy and manufactured goods. The potential is significant. According to the International Energy Agency, the global clean tech market is set to triple by 2030 to around $650 billion annually.[32]

Technological innovations, such as promising new approaches to energy storage, could reduce U.S. and European dependencies on critical materials or batteries found elsewhere. Advances in artificial intelligence promise to halve the time it takes to develop new battery materials.[33] New cobalt-free iron-phosphate based battery technologies have helped to reduce the price of cobalt by 60% since 2022. Sodium-based batteries are beginning to compete with traditional lithium batteries; the price of lithium has fallen 75% since 2022. Tesla, Mercedes-Benz and Porsche are adopting a silicon anode powder that replaces graphite in traditional lithium-ion batteries. Nonetheless, out of 20 sodium battery factories now planned or already under construction around the world, 16 are in China, according to Benchmark Minerals. In two years, China will have nearly 95% of the world's capacity to make sodium batteries. The challenge now is to scale the technology to compete with Chinese battery producers.[34]

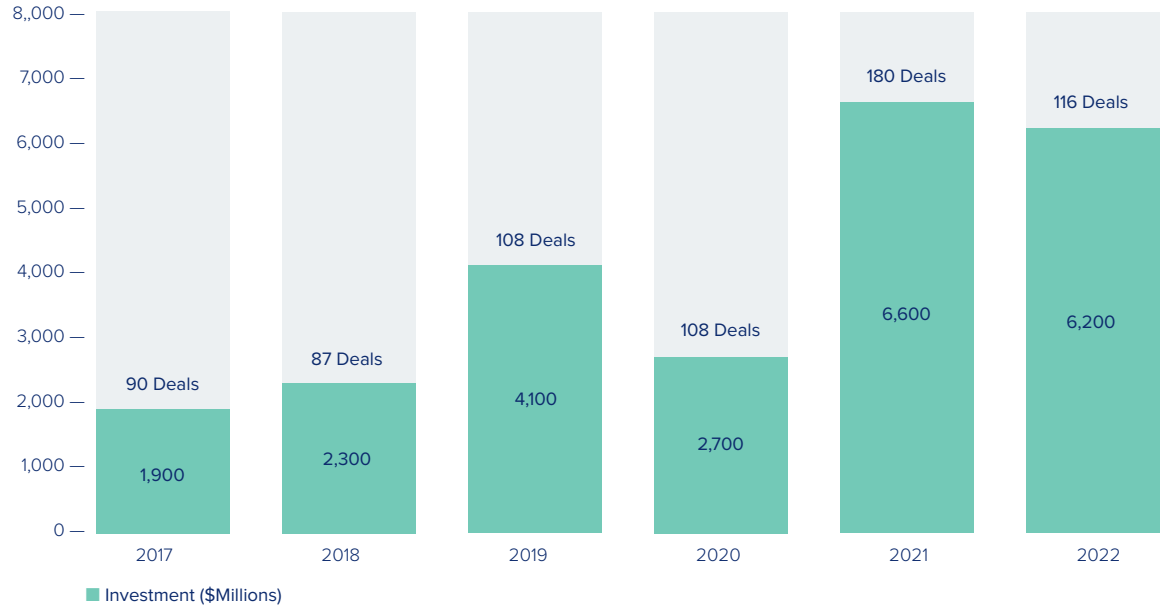
Transatlantic flows of risk capital are critical to cleantech innovation. EU investors are tapping into U.S. innovation and U.S. venture investors are providing scale-up capital for EU startups. Between 2017 and 2022, U.S. investors participated in 758 EU-based cleantech deals and EU investors joined 682 U.S.-based cleantech deals, according to CleanTech Group analysis (Tables 7 and 8). On average, U.S. and EU companies that received transatlantic investments reached growth stage, and received growth funding, faster than those that did not: 20% faster for EU-based companies; 8% faster for U.S.-based companies (Tables 9 and 10). Deal sizes for EU innovator investment rounds that included U.S. risk capital were significantly larger than those that did not involve a U.S. investor. 31% of EU deals that included U.S. investors were over $100 million. Only 8% of EU deals without a U.S. investor were over $100 million (Table 11).[35]

Table 7. **U.S. Investment in EU Innovators** ($ of Investments Represent Total $ Raised in the Rounds By Innovator)



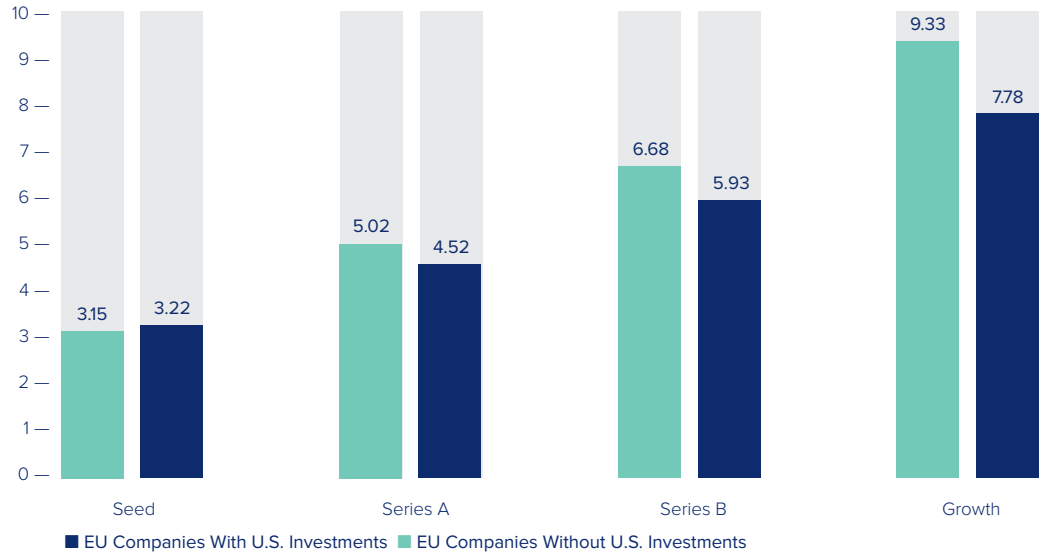
Source: Cleantech Group analysis.

Table 8. **EU Investment in U.S. Innovators** ($ of Investments Represent Total $ Raised in the Rounds By Innovator)



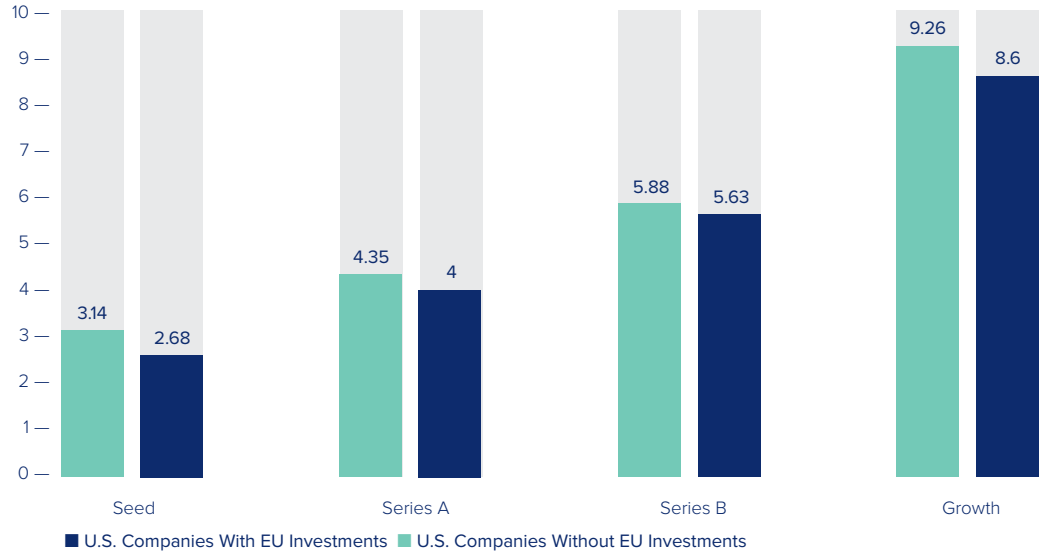
Source: Cleantech Group analysis.

Table 9. **Average Growth Timeline for EU Companies With and Without U.S. Investments** (Time from Founding to Investment, Years, Average)



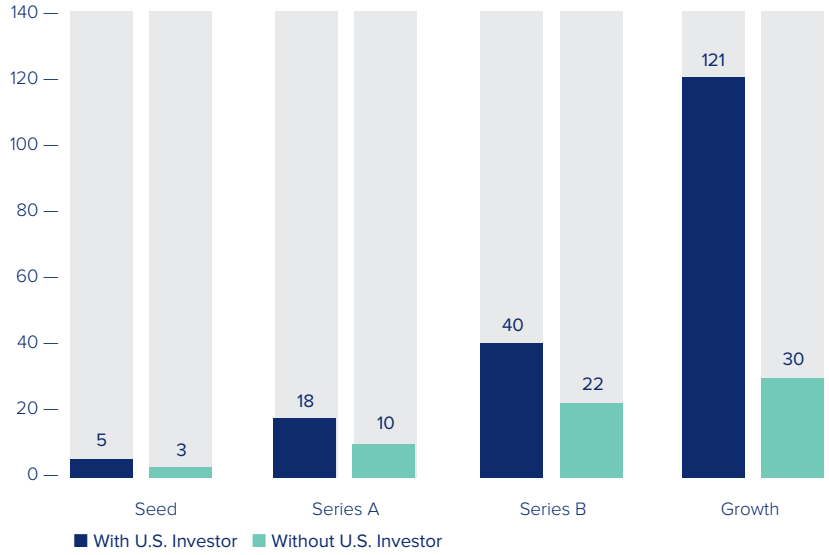
Source: Cleantech Group.

Table 10. **Average Growth Timeline for U.S. Companies With and Without EU Investments** (Time from Founding to Investment, Years, Average)



Source: Cleantech Group.

Table 11. VC Investment in EU Innovators: Average Deal Size (2017-2022, $Millions)



31% of EU deals that included US venture investors were over $100mn.

Only 8% of deals without a US investor were over $100mn for growth stage.

Source: Cleantech Group.

The potential for transatlantic cleantech investment is great on each side of the Atlantic. The carbon and energy sector, which includes cleantech, accounted for 27% of all capital invested in European tech in 2023, more than twice its share of investment in 2021. In the United States, companies boosted their investment in clean energy production by 41%. At the end of 2023, U.S. and European investors were sitting on a combined total of $419 billion worth of dry powder, or unspent cash.[36]

Clean transport technologies (CTT) offer special promise. The United States and the EU lead the world in terms of international cooperation on CTT inventions. CTT patenting cooperation between Germany and the U.S. alone accounted for around 45% of global high-value co-applications between 2010 and 2019.[37]

Advancing a Transatlantic Clean Tech Alliance

These figures underscore that transatlantic risk capital can be deployed successfully by venture investors to advance clean technologies at the innovation frontier. As we discussed in last year's survey, transatlantic synergies could be catalyzed more effectively if the U.S. and the EU moved forward on the pledge they made at the June 2021 U.S.-EU Summit to "work towards a Transatlantic Green Technology Alliance that would foster cooperation on the development and deployment of green technologies, as well as promote markets to scale such technologies." As a platform for officials, demand owners, and the investor/innovation community to share perspectives and identify priorities, a transatlantic cleantech alliance could highlight and support synergies among existing EU and U.S. cleantech efforts, identify and close gaps, and prioritize innovations that reduce, rather than exacerbate, their critical materials dependencies.[38]

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