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Report on the Future of the Union

Charlemagne Prize Academy 2023

Europe's Path to Strategic Sovereignty – How Do We Achieve an Equitable and Resilient Reset?

Charlemagne Prize
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Introduction: Embarking on the Path to More European Sovereignty

Dr. Jürgen Linden, Chairman of the Charlemagne Prize Board of Directors

The continent has been facing numerous crises in the past years, and most recently, two wars. While support for Ukraine has solidified the unity among EU and NATO members, the EU is actively seeking influence and a cohesive strategy in the Middle East. Due to both conflict zones, the formulation of a European foreign policy is now more crucial than ever. This imperative remains relevant even after Taiwan's election concerning China and in anticipation of the next American election, which is expected to have global ramifications.

In addition to the American election, the upcoming European Parliament election in June 2024 is anticipated to serve as a pivotal juncture, precipitating shifts that will reverberate throughout all European member states and the international arena. Will Europe be able to hold its own against populist and far-right forces? What will the future transatlantic relationship look like?

Another challenge for the EU lies in striking a balance between fostering expansion and maintaining the cohesion among existing member states. Internally, the EU faces the imperative of reforming its structures and processes to better adapt to the evolving needs of its member states. The complexities of a diverse economic landscape and social disparities underscore the urgency for internal cohesion. Strengthening the EU's institutions, enhancing economic resilience, and fostering social solidarity are critical elements in ensuring the Union's continued success. Additionally, the introduction of the majority principle in the Common Foreign and Security Policy is crucial in reducing the number of veto players, enabling compromises, and ensuring Europe is heard on the international stage.

The EU must strive for greater unity, strength, and above all, sovereignty.

In this comprehensive report, our primary objective is to underscore the critical importance of promoting and investing in Europe's path towards enhanced sovereign capabilities across diverse sectors and societal dimensions. Our annual focus aims to shed light on pivotal aspects of Europe's future - with this year's spotlight on its role in the space sector, the energy sector, and the support of deep-tech innovation. It is of utmost importance to acknowledge innovation as the linchpin for fortifying Europe's sovereignty, especially in an era characterised by rapid technological advancements, climate change, and various crises.

The Charlemagne Prize Academy Report derives inspiration from the research endeavours of our 2022/23 Charlemagne Prize Fellows, who have demonstrated exceptional dedication and scholarly rigor in probing these critical domains. We wish to express our sincere gratitude to the esteemed authors whose valuable insights and contributions have significantly enhanced the depth and scope of this report. By consolidating these experts' findings, this report seeks to illuminate areas where the EU must make judicious investments to ensure a fortified position in the global arena, and a future characterised by equity and resilience.

The challenges ahead for the European Union require not just political prowess but our collective commitment to unity and resilience. In the face of upcoming elections and a shifting transatlantic landscape, let us remember that our strength lies in innovation and nurturing young talent, which will be our driving force in successfully embarking on the path to Europe's future.

Navigate Through Times of Crisis

Navigate Through Times of Crisis

Europe Must Win This War

Oleksii Makeiev, Ambassador of Ukraine to Germany

Oleksii Makeiev commenced his diplomatic service as the Ambassador of Ukraine to Germany in October 2022, marking a career that started at the Ministry of Foreign Affairs of Ukraine. Rising from an Attaché to the position of Political Director, he played pivotal roles, including serving as Counselor at the Embassy of Ukraine in Germany from 2005 to 2009. In May 2020, he was appointed as the Special Representative for Sanctions Policy, significantly contributing to efforts to counter Russian aggression.

"We are all peacemakers. Making peace is our primary obligation towards our countries, towards Europe and towards our history. But to leave a legacy of peace, we have to reach the day on which we can say that, through our collective victory, we have won this war."

These were the words of Volodymyr Zelenskyy, President of Ukraine, on receiving the International Charlemagne Prize of Aachen, which was awarded to him and the People of Ukraine, one year ago. It was a good day in the history of Europe. A good day during a difficult time.

Since the Award Ceremony in Aachen, Ukraine has achieved key successes in the Black Sea – the Russian Fleet has been driven back; the sea route for grain exports re-opened.

On land, however, our young men and women are experiencing a gruesome "trench warfare", a repetition of the First World War – the only difference being that FPV drones can, at any time, transform these trenches into mass graves. Basically, nothing new on the Eastern Front – except for modern technology.

Just like a year ago, there is no lack of determination to win. But there is a shortage of munitions, of air-defence and long-range weapons. Whenever the Ukraine troops are forced by such shortages to abandon a position, the Russian Army advances another few kilometres closer to the border with the European Union.

I am writing this article while Russian terrorists are attempting to turn Kharkiv into a second Mariupol. This is a war of extermination that Russia is waging with genocidal intent.

So, when some people discuss 'territorial concessions' as a temporary solution, they should bear this in mind: we are not talking about square kilometres; we are talking about human lives. And the Russian occupation is just another form of Russian warfare – a form that includes daily acts of torture, refusal to recognise the identity of Ukraine and the People of Ukraine, as well as child abductions and acts of rape.

When some people suggest 'freezing' the war, they should bear in mind that Russian hate cannot be frozen – and that this hate is directed not only at Ukraine, but also at the whole of Europe.

It is in the best of European and German interests that such hate does not turn into a war against the European Union, and that Russia – after invading Ukraine – does not decide to test NATO's mutual defence policy.

The reality of today and tomorrow is fraught with dangers. Once again, the issue is deterrence, since easing of tensions has lost its magic.

It is in the best of European and German interests that such hate does not turn into a war against the European Union, and that Russia – after invading Ukraine – does not decide to test NATO's mutual defence policy.

Assassination attempt on Europe

In the current edition of the Worldview Dictionary, "Russia" ought to be listed as an antonym to "Europe". The issue is not even about different values – it is about a demonstrative negation and mockery of everything that defines Europe.

As the old Russian saying goes: "What's good for Russians is lethal for Germans." And this is how Russians see it today. As little as Germany wants to be party to a war, it has long since become one in the minds of the Russians. "Never again is now!" is the reaction in Germany to the most terrible war in Europe since 1945. "We can do it again!" is what they are saying on Russian TV. And they do not mean resistance against Nazis; they mean the vindictive violation of Berlin in May 1945.

And, so that such a violation of today's rule- and value-based world order does not appear unjustified, Russia simply invents new Nazis and declares itself 'threatened' by NATO. If that is sufficient rationale for its genocidal war against Ukraine – and it succeeds – what is to stop Russia from waging further wars?

If Ancient Greece was the cradle of European civilisation, Russia sees itself as its grave. Mythology has been replaced with propaganda, and Zeus with Putin (who is more of an Anti-Midas – with a lethal touch).

And if it was love that moved Zeus to abduct Europa, it will be hate that moves Putin to murder her.

Europe must once again win the war

With this mindset, Russia is not only denying Ukraine the right to exist. And Europe will only be able to feel secure when Russia loses this war – and learns to lose. When excessive wiggle room is countered with the effectiveness of law. When international law is not just viewed as a topic for panel debates, but also has its norms validated through action. The aggressor must be punished.

At stake is the security of tomorrow – and also financial security. War is expensive; defeat is even more expensive. This needs to be told honestly to tax payers, along with an explanation that every "saved" Euro today – as the populists suggest – will cost 10 Euro tomorrow. In the long term, victory in Ukraine is a guarantee of prosperity. Otherwise, there will be more than just heating costs to worry about.

A lot is being done, and Germany does – in fact – play a leading role in supporting Ukraine. But the basic attitude is crucial. Support "as long as necessary" is OK, but this sentence must be continued with the words: "as long as necessary and with every available resource to help Ukraine win this war – a victory clearly in the best of German and European interests."

"But, escalation..." they say in Germany, imagining a mushroom cloud replacing the cupola of the Reichstag building. In fact, escalation takes place exactly when aggression is met with no response. This Russia only knows the language of force. This Russia is an aggressor, in front of whom we must draw a clear red line – instead of keeping ourselves to ourselves.

The reality of today and tomorrow is fraught with dangers. Once again, the issue is deterrence, since easing of tensions has lost its magic. Trading with the enemy will not bring change, but dependency. Today, future viability calls for resilience.

In this sense, we should not waste any thoughts on a Third World War. Instead, we should view Russia's aggressive war against Ukraine as the first Eastern-European war of the 21st century. And it must be won, so that this war is also the last.

Europe has been and still is the most successful peace project of all time. But peace is not a gift from Heaven – it must be fought for, again and again.

This is why Europe must once again win the war. So that there will still be a Europe tomorrow.

A Europe of peace, social equity and freedom. Such a Europe is worth the struggle.

Navigate Through Times of Crisis

The Strategic Dimension of the “Zeitenwende”

Prof. Dr. Wolfgang Ischinger, President of the Foundation Council of the Munich Security Conference and Former German Ambassador to the United States

Ambassador (ret.) Ischinger was Chairman of the Munich Security Conference from 2008 until 2022 and is the President of its Foundation Council now. A German career diplomat, he was State Secretary (Deputy Foreign Minister) from 1998 to 2001. Afterwards, he served as the Federal Republic of Germany’s Ambassador to the U.S., and to the Court of St James’s. Today, he’s a Senior Professor at Hertie School of Governance in Berlin, and serves on the boards of companies as well as non-profit-institutions, including Atlantik-Brücke/Berlin, and the Atlantic Council of the United States/Washington D.C.

An interesting debate has broken out in recent months about the Russian war of aggression in Ukraine and its possible strategic consequences. In an article on "Zeit Online", Nico Lange and Carlo Masala have outlined the consequences for security policy that could result from a simultaneous attack by Russia on the Baltic states and China on Taiwan. The two authors link this to the outcome of the Russian war against Ukraine and explain that the horror scenario is realistic if Russian President Vladimir Putin wins his war of aggression: "We understand winning as a state in which, as part of negotiations or as a result of military realities on the ground, Russia is effectively permanently awarded the parts of the Ukrainian territory that it currently occupies or that it conquers additional territories."

Political scientist Thorsten Benner has contested both authors. In particular, he takes a critical look at the assumption that the current territorial status, if consolidated, would be tantamount to a Russian victory.

As interesting as this discussion about the definition of victory or defeat and the possible strategic implications may be, it misses the real core of the problem. This lies in the fact that the intensity and duration of the strategic challenge from Russia will not depend on the outcome of the current fighting in eastern Ukraine. There is no reason to believe that the current Russian policy, which is aimed at restoring the pre-1997 situation and re-subjugating Ukraine and Russia's other neighbors, could come to an end with an end to the current hostilities in Ukraine. Instead, we must assume that Russia's revisionist and expansionist policy will continue more or less unperturbed at least as long as there is no fundamental change of policy in Russia. Whether such a fundamental change in policy could result from a future end to the Putin era is a question to which no one knows a reliable answer today.

> There is no reason to believe that the current Russian policy, which is aimed at restoring the pre-1997 situation and re-subjugating Ukraine and Russia's other neighbors, could come to an end with an end to the current hostilities in Ukraine.

> In order to be credible, the nuclear part of deterrence must of course meet modern requirements.

What does this mean strategically for the German government and its partners in NATO and the EU?

Firstly, it must of course remain our goal to enable Ukraine to regain as much of the territory occupied by Russia as possible. After all, Ukraine has managed to liberate around half of the relevant parts of eastern Ukraine in the past 20 months.

However, this also raises the question of whether it makes sense to speak of "victory" or "defeat". Yes, Russia could suffer a military defeat in eastern Ukraine, and yes, Ukraine could perhaps achieve a victory in the sense of liberating eastern Ukraine. But that would still be far from a "victory" for Ukraine over the Russian Federation, which spans eleven time zones. Conversely, even if Russia were to successfully maintain the current territorial situation in eastern Ukraine, this would still be far from a real victory over Ukraine. Just think of Ukraine's EU membership prospects and the prospect of future NATO membership which has also been opened up. That is why we should not use blanket terms such as victory or defeat in this context.

Secondly, however, the strategic goal that goes beyond this must be to draw the consequences of Russian revisionism and the resulting long-term military threat. Regardless of the specific outcome of the war in Ukraine, Russia will pose an existential threat to its neighbors in the long term. For us as NATO members, this means that we must sustainably and credibly deter Russia from military incursions.

Thirdly, we cannot rely solely on the nuclear umbrella for Europe for this deterrence. In order to be credible, the nuclear part of deterrence must of course meet modern requirements - which is why, for example, the Bundeswehr's acquisition of modern F-35 carrier aircraft is years overdue. However, deterrence requires a strong conventional foundation in order to be sustainable. An alliance consisting of armies that, according to its own defense ministers, would not be sufficiently capable of defending itself in case of an attack, would hardly be capable of credible deterrence because the nuclear threshold would be crossed far too early. Who would believe that the American president would expose the existence of the United States to a strategic nuclear risk if our conventional armed forces were not even capable of stopping a Russian invasion of Estonia, for example, initially by conventional means?

Regardless of the outcome of Russia's current war against Ukraine, we must be prepared militarily and politically for an aggressive Russian expansionist policy that may last for many years.
We must keep one thing in mind: The Soviet Union of the Cold War was a status quo power whose objectives were limited to holding on to the territorial gains of the Second World War. Putin's Russia is a revisionist power and therefore more dangerous than the Soviet Union. Confronting this is the strategic and historical dimension of the "Zeitenwende".

Showcase Democracy

Reflections on the 2024 European Parliament Elections: Connecting the Green Deal, the Farm Crisis and an Emerging European Defense Industry

Claire Stam, Journalist and Columnist for Table.Media

Claire Stam is a journalist and columnist based in Brussels. After serving as Editor-in-chief of Euractiv's offices in Paris and Berlin, she is now the correspondent for the German media Table Media in the European capital. She writes on European affairs with a particular focus on the Green Deal.

Five years ago, a green wave swept through the European Parliament, driven by young people mobilised around climate marches. It was against this backdrop that the President of the European Commission, Ursula von der Leyen, presented the European Green Deal, a formidable package of measures designed to make the European Union carbon neutral by 2050 and ensure that the EU complies with the Paris Agreement. The ambition of this project can be measured by the rhetoric she used at the time: the Green Deal was no more and no less than "Europe's man on the moon moment".

That was five years ago. Since then, the world has changed dramatically - to put it mildly. The next European elections will no longer be decided against the backdrop of global warming, but in the light of Russia's war of aggression in Ukraine, the war between Palestine and Israel and the prospect of Donald Trump's possible re-election in Washington at the next American elections in November.

Emergence of a European defense industry

Caught between Putin and Trump, Europe will have to show itself capable of facing these challenges alone once the elections are over - if its American ally should fail. "We need a blow, a shock, a jolt to wake us up and take action. Otherwise, the situation will get worse in Ukraine, in Europe and in the rest of the world", said Gabrielius Landsbergis, Lithuania's Minister of Foreign Affairs, at the Munich Security Conference in February. Like him, it is the leaders of the countries most directly exposed to the Russian threat, in the north and east of the European Union, who have shown themselves to be the most proactive in dealing with Russia.

The message was received loud and clear by the European Commission. "If I am President of the next Commission, there will be a Commissioner for Defense", Ursula von der Leyen announced at the same conference. "What is the Commission's remit? Industry. That's our core business. We are a facilitator, not a buyer", she added. At present, the strategy for the European defense industry is based on two instruments devised by Thierry Breton, the European Commissioner responsible for industry, in the wake of the Russia's war of aggression in Ukraine in February 2022. These instruments make it possible to facilitate the acquisition, with European money, of armaments for Ukraine and to support the European defense industry so that it can meet the growing demand.

"First and foremost, we must strengthen our European defense industry", von der Leyen continued in a statement published with NATO Secretary General Jens Stoltenberg. This strategy for strengthening the European defense industry "must be closely coordinated with NATO", particularly with regard to planning processes and standardisation, she also stated. "It is not just a question of investing more, which is a given, but of doing so in a constant, viable and sustainable way", she explained from Munich.

Back in Brussels, Ursula von der Leyen reiterated her desire to create the post of Defense Commissioner when the European People's Party (EPP), her party, made her candidacy for a second term official. As soon as her candidacy was made official, the question of who should occupy this new Commissioner's post arose. When asked whether Kaja Kallas, Estonia's current prime minister, precisely one of these leaders of countries most directly exposed to the Russian threat and one of the most vocal about a firm European position against Russia, could be the right candidate for the post of defense commissioner, von der Leyen said it was "too early" to talk about personalities. It might be too early, but the name of Kaja Kallas is making a round in the Brussels bubble.

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The agricultural crisis, an unknown factor in the equation

If Ursula von der Leyen is re-elected, the question then arises as to how the former German Defense Minister will link this new project with the Green Deal, the major political project of this term of office. Energy-related issues can link the two themes of defense and the reduction of greenhouse gas emissions: energy independence, development of renewable energies, promotion of energy efficiency and lower energy consumption. The equation is quite different when it comes to the agricultural sector. And the farmers' anger that has spread across Europe is just the spectacular face of the problem.

The protests are in fact contributing to the hangover mood regarding environmental and climate protection in agriculture, which is also likely to characterise politics after the European elections. The Green Deal had indeed already hit the skids in the agricultural and food sector. In the Farm-to-Fork Strategy, the agricultural and food branch of the Green Deal, the Commission had set itself ambitious goals in 2020: Food was to be produced, processed and consumed in a more sustainable and healthier way, and it also wanted to limit food waste. Little has been achieved.

For MEP Pascal Canfin (Renew), Chairman of the influential ENVI Committee, the strategy of "depolarisation, which has worked for everything else", has failed in agriculture. And indeed, much has been achieved in terms of climate and energy in this legislature, such as the reform of European emissions trading (from which, incidentally, agriculture is excluded).

In addition, parts of the political spectrum have increasingly interpreted the Green Deal purely as a "climate deal". Agricultural dossiers, on the other hand, are often about the protection of the biodiversity and environment, such as the proposal on pesticide reduction (known with the acronym SUR in the bubble), but also the highly controversial proposal on Nature Restoration Law. Although this is not part of the farm-to-fork strategy, it directly affects agriculture. Whether the protection of biodiversity - in contrast to climate protection - should really be valued highly enough to accept restrictions on the (agricultural) economy is a controversial issue, particularly among the EPP, but also in parts of Renew.

However, the Commission itself also contributed to the fact that little remained of its ambitions in the end. Von der Leyen partly admitted this herself when she withdrew the SUR: the proposal had "polarised", she conceded. As it is, the farm-to-fork strategy was developed at the height of the green wave following the 2019 European elections. By the time the Commission could tackle the proposals linked to agriculture, the mood had changed: the pandemic and the war in Ukraine had brought the issue of food security more into focus.

Complicated post-election situation

Meanwhile, the political parties are now positioning themselves for the next election, meaning that making compromises on sensitive issues is a lot more difficult. Added to this are the farmers' protests, which are likely to make it even more difficult to reach a compromise on agricultural dossiers in the next legislative period. In addition, forecasts predict that the majority in parliament will shift to the right.

If the polls are to be believed, the European People's Party (EPP), to which Ursula von der Leyen belongs, will remain the largest political group in the Parliament. The polls are also predicting a sharp decline of the European Greens. At the next elections, they could lose up to twenty seats, which would be a real political setback: the group currently has 72 elected members, there have never been as many of them in the European Parliament as there are during this legislature. Above all, this drop in the number of Ecologists would be accompanied by an erosion of the centre and left groups to the benefit of the far right. This new configuration casts doubt on future majorities - and therefore on the future of the Green Deal.

"If there is no more democratic support for the Green Deal, it will end. That is one of the major challenges of the election," emphasises Pascal Canfin. The Greens are also worried: "In the last European elections in 2019, there were climate marches and it was politically expensive to oppose the Green Deal. Today it is politically profitable," says Philippe Lamberts, Green Group Co-Leader at the European Parliament. The Greens would therefore have to deliver "the game of their lives" in the election.

The U.S. Election in 2024 and European Security

Prof. Dr. John M. Owen IV, Professor of Politics at the University of Virginia

John M. Owen IV is Amb. Henry J. and Mrs. Marion R. Taylor Professor of Politics at the University of Virginia, and a Senior Fellow at the Institute for Advanced Studies in Culture and the Miller Center for Public Affairs. He holds degrees from Duke University, Princeton University, and Harvard University. Owen's latest book, "The Ecology of Nations: American Democracy in a Fragile World Order," was published in 2023 by Yale University Press.

At the time of this writing – in late January 2024 – Donald Trump appears close to securing the Republican Party's nomination for the American presidency. Recent polling shows Trump to be a slight favorite over Joe Biden to win in November. Both houses of the U.S. Congress look likely to continue to be nearly equally balanced between Democrats and Republicans in 2025. Much could change over the course of 2024, but in this essay, I shall assume that either Trump or Biden will be President in 2025 and that the Senate and House of Representatives will both have very small partisan majorities.

What will this narrow range of outcomes mean for America's commitment to European security? Students of democratic politics know that elections never change everything. Laws, treaties, norms, bureaucracies, and external pressures and opportunities all tend to keep countries on the same path under a new government as under an old. But elections do sometimes disrupt long-time policies and orientations. Trump is not a normal politician, and these are not normal times. A Trump victory in November 2024 could modify or even end America's decades-old commitment to European security. External and internal pressures on the United States to focus more on China are strong enough that even a Biden victory may not forestall a reduced commitment to Ukraine and increased American pressure on Europe to do more to defend itself.

A Trump victory in November 2024 could be modify or even end America's decades-old commitment to European security. External and internal pressures on the United States to focus more on China are strong enough that even a Biden victory may not forestall a reduced commitment to Ukraine and increased American pressure on Europe to do more to defend itself.

During his term as president (2017-2021), Trump was more skeptical of NATO and indeed of foreign alliances than any predecessor since the 1930s. But many analysts believed that the U.S. commitment to Europe had already been weakening and that Trump was more an exploiter than a cause of that weakening. Indeed, before Russia invaded Ukraine in February 2022, the thesis that the United States was detaching from Europe was becoming conventional wisdom in some quarters on both sides of the Atlantic. It was in late 2019 that French President Emmanuel Macron declared that NATO was on the way to "brain-death" – not prepared politically or operationally for new threats and too dependent on an unreliable United States. Many European politicians were calling on their countries to prepare for a world in which Europe was on its own, a world in which European countries spent more money on their militaries and in which Europe – the European Union and perhaps the United Kingdom – finally became a cohesive and independent military power.

Russia's massive invasion of Ukraine in February 2022 abruptly changed the discourse about the United States and NATO. Three things became clear immediately: the Russian threat to Europe was urgent, Europe still needed the United States, and Washington was still willing to pour immense resources into defending Europe. NATO had been training the Ukrainian military since Russia's illegal annexation of Crimea in 2014, but America responded to the 2022 invasion far more robustly than many, doubtless including Putin, would have expected. Through December 2023 Washington sent more than $44 billion in security assistance to Kyiv and more than $29 billion in non-military economic aid. The Biden administration, with bipartisan support, agreed to deploy more NATO assets in several countries closer to Russia, a country whose number of deployed nuclear warheads nearly equals its own (both have roughly 1,700).

These are not the actions of a country that is detaching itself from Europe. The quick and decisive decisions of Finland and Sweden to seek NATO membership, and Washington's eager agreement, are signs of a new European confidence in Washington. Russia, in effect, sent an electronic jolt through the North Atlantic Alliance, and it is far from brain-dead.

Yet notwithstanding, the questions must be confronted: Is the United States committed to Europe's security in the long run? And will the 2024 election pull America away from Europe? The answers are unclear, but the signs are ominous. In 2023 support in Washington for Ukraine began to wobble as it did in some European capitals. Some of the wobbling owes to partisanship: since Biden the Democrat is robustly in favor of helping Ukraine and containing Russia, some Republicans must at least appear to be against these things. But part of the story is the recent renewal of an old tradition in U.S. foreign policy, a tradition that was predominant from the country's founding in 1776 up to the Second World War. It generally goes by the label "isolationism," although the misleading nature of that term leads some to prefer "restraint" or simply "realism." Whatever we call it, it is a skepticism toward the U.S. commitment to European security. Isolationism nearly disappeared during the Cold War, but has gathered strength since the early part of this century.

It was George Washington, America's first president (1789-1797), who warned his fellow citizens to avoid "entangling alliances" with other states (mostly confined at the time to Europe). A generation later, the Monroe Doctrine of 1823 was an explicit

Isolationism nearly disappeared during the Cold War, but has gathered strength since the early part of this century.

call to keep Europe's "political system" far away from the New World, a call grounded in suspicion that Europe's great powers were plotting to invade the infant Latin American republics and force monarchs on them. U.S. expansion and imperialism in the nineteenth century looked like traditional European statecraft, but Americans believed they were doing something new and different: not amassing power but spreading liberty. It is no accident that the United States, for all of its economic interests and cultural ties to Europe, joined both of the twentieth century's world wars late (in 1917 and 1941), recoiled after the first one, and nearly did the same after the second.

The isolationists finally shrank in number and influence in the late 1940s thanks to another Russian jolt: after the Allied defeat of Nazi Germany, Soviet power and influence expanded into Central Europe and threatened to spread to Western Europe. As late as 1946, many U.S. politicians wanted to leave Europe on its own once again. The Truman administration warmed to the idea of guaranteeing Western Europe's security only as it became evident that Stalin was pushing Soviet influence as far westward as he could. Aid to Greece and Turkey, the Marshall Plan, the North Atlantic Treaty, and U.S. military redeployments in Europe followed. What won the isolationists over to a robust security commitment to Europe was a clear threat from an ideologically hostile Russia to become hegemonic over the Continent. (The U.S. commitment to Northeast Asia emerged at roughly the same time.)

The collapse of the Soviet threat in the late 1980s and early 1990s brought a minor revival of isolationism. But internationalists continued to hold the political center in Washington, and in the 1990s the United States assumed its position as the chief promoter of democracy, human rights, and economic openness. Internationalism was more popular than ever, as it went hand-in-glove with the sustained economic growth and peace dividend that ensued. The terrorist attacks of September 2001 pushed American internationalism in new directions, as the G.W. Bush administration tried to use military, economic, and management tools to extend liberal hegemony into the Middle East.

It was the failures of the Iraq and Afghanistan wars and the financial meltdown of 2008 that gave isolationism its opportunity in the United States. Today's isolationists come in two general types. Left-populists, exemplified by Senator Bernie Sanders and Representative Alexandria Ocasio-Cortez, are anti-militarist and anti-imperial. They want the United States to focus on global redistribution and protection of the natural environment. Their sensibilities are tend toward cosmopolitanism; they are only "isolationist" in the sense that they want nothing to do with great-power politics and want a far smaller U.S. military. Left-populists are not a major political force at present because Biden has managed to contain their influence over foreign policy (perhaps by granting them concessions on domestic policy).

It is the right-populists, exemplified by Trump, who have the wind at their backs. Trump and his followers are similar to the old American isolationists in a number of ways. They do not trust the outside world or multilateral institutions. They favor military strength, but only to punish and deter attacks on the homeland – not to promote democracy, human rights, or international order. Making America Great Again means always retaining complete freedom of action, not binding the country to international rules. Implicit is the notion that if America leaves the world alone but is heavily armed, the world will leave America alone.

The right-populists are not as pure as their intellectual ancestors. Popular support for Israel remains strong, particularly in its ongoing war against Hamas. And the new isolationists are markedly hostile to the Chinese Communist Party, a regime they distinguish sharply from Putin's regime in Russia. But while they cherish Western civilization, they do not cherish today's Europe, with its social liberalism, globalism, environmentalism, and large welfare states.

Which returns us to the 2024 election. What if Donald Trump reoccupies the White House in January 2025? Trump has no coherent ideology or foreign policy theory, and so he will always be unpredictable to some extent. But he made clear in his first term that he thought NATO was a nefarious scheme by Europeans to free-ride off of the United States. His actions as a businessman as well as a president suggest that Trump holds the peculiar view that bargaining is always zero-sum. Even among friendly countries, what economists call Pareto-improving or win-win transactions do not happen; there is always a winner and a loser, and in NATO the United States has always lost. It also is clear that Trump admires Putin (and other autocrats), a trait that has inspired much political and psychological speculation.
When he was president, Trump's skepticism about NATO and affection for Putin were moderated by cabinet members, senior military officers, and the White House staff who remained internationalists – people such as John Kelly, James Mattis, Rex Tillerson, Nikki Haley, John Bolton, and Mark Milley. But Trump and his circle of advisors learned from those years and have plans to make sure he gets his way next time. They plan to populate key positions with genuine MAGA loyalists and to replace government employees who stand in the way of the changes he wants.

In 2025 and beyond, inertia may prevail; the U.S. orientation toward Europe may remain largely unchanged. But Europeans would be wise to hedge their bets and continue to take concrete steps toward a more robust defense capacity that is less dependent on the United States.

America's commitment to European security still has robust bipartisan support in Congress and deep backing in the military and bureaucracy. Trump may find himself thwarted if he wants to leave NATO or even cut off Ukraine. But those mainstream Republicans who are still in Congress – many have retired since 2016 – have shown a remarkable willingness to change their minds under pressure from Trump and his media supporters. There may be struggles between the executive and legislative branches of the government, and within the executive branch itself, but it is entirely possible that a Euro-skeptical Trump will eventually get his way.

Should Biden win re-election instead, Europeans should expect his strong Atlanticist preferences to continue. Biden is an internationalist in his bones. But he would face similar pressure in Congress to cut aid to Ukraine, and general pressure to reduce foreign commitments and multilateralism (except with respect to Israel and containing China). With the national debt unusually high, perceptions of a poor economy persisting, and Trump probably remaining de facto head of the Republican Party, political pressure on Republicans and Biden to reduce the commitment to Europe may continue. If the Republicans enjoy a majority in at least one chamber of Congress, Biden will have to bargain with a Congressional leadership that itself is under heavy MAGA pressure toward isolationism.

In 2025 and beyond, inertia may prevail; the U.S. orientation toward Europe may remain largely unchanged. But Europeans would be wise to hedge their bets and continue to take concrete steps toward a more robust defense capacity that is less dependent on the United States. That is, in fact, what Trump wants. But that does not make it wrong.

The Far-Right Challenge to Western Democracies in 2024

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This year, almost half of the world's population is eligible to vote in more and less democratic elections. The far-right will play a central role in many of these elections, including in Europe, India, and the US. While the victory of the far-right in India is almost certain, given the BJP's stranglehold on the Indian state, the situation in the EU and US is less clear. Still, whatever the outcome, it is clear that the far-right will remain the main political challenge to western democracies across the globe and that liberal democratic parties continue to struggle with finding an adequate political answer to this challenge.

Given the country's continued economic, military, and political power, the US elections are the most important. At stake is not just the presidency but also control of Congress, in particular the Senate. Should Donald Trump return to the White House, he will almost certainly have full control of the entire federal political system, with the House of Representatives already under Republican control, the Senate probably going that way, and the powerful Supreme Court also with a solid "conservative" majority. It is chilling to think what a Trump 2.0 administration will look like.

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Within the US itself, Trump has already announced to weaponize the state to go after his "enemies", which means pretty much everyone who has ever either criticized him or not supported him when he asked for it. This includes both Democrats and Republicans, such as the Georgia Governor Brian Kemp, who refused to change the presidential election results in his state to give Trump the presidency in 2021. Unlike in his first period, Trump will come in with a large number of loyalists, who will be appointed to key positions throughout the federal bureaucracy, while weakening opposition from career bureaucrats by threatening to make them "at-will employees" that can be fired without cause. Moreover, he will no longer face serious opposition within the Republican Party – as he did from Senate Speaker Mitch McConnell in his first period – which has completely fallen in line with his authoritarian leadership and far-right program.

But a Trump presidency will also have disastrous consequences for the rest of the world, including the two main conflicts of the moment. Trump will withdraw US support for Ukraine, which will decisively change the power balance to Putin's Russia. And while President Joe Biden has supported Israel almost unconditionally in its brutal retaliation war in Gaza, Trump will truly give carte blanche to the country, with potentially devastating consequences for not just Gaza but the whole region. Beyond these two conflict zones, Trump will either support far-right leaders, like Indian Prime Minister Narendra Modi, as well as other authoritarian leaders he likes, such as North Korean dictator Kim Jung-un, or at least shield them from US and UN sanctions.

That said, a second Trump presidency is far from certain. Although satisfaction with President Biden is currently at record low levels, and polls predict a Trump victory, November is still far away. Moreover, the US economy is doing well and Trump remains highly controversial within the country. But even if Biden is re-elected, US democracy is not necessarily safe. First, it could lead to another violent insurrection, although this time without support from the White House. Second, the Supreme Court will continue to frustrate his political agenda. And, third, the Republican Party will probably gain control of the Senate and try to block virtually every major Biden initiative at the federal and state levels.

In Europe, the far-right is set to do well not just in the European elections but also in several national elections. For instance, both Austria and Belgium hold parliamentary elections and the far-right is leading the polls in both countries. The situation is more complex for the European elections of June, which really are a combination of 27 national elections for the same legislative body, the European Parliament. Current polls show losses for all progressive political groups in Brussels, i.e. the center-left S&D, the Greens, and the liberal Renew Europe. In contrast, far-right parties will win again, as they did in 2019 and 2014. Most importantly, they will win big in large EU member states, such as France, Germany, Italy, and Poland. But the main question is not so much which parties will win, but how they will collaborate in the Parliament.

At the moment, most far-right parties are members of either the Identity & Democracy (ID) or the European Conservatives and Reformists (ECR) group, with a few others in mainstream groups or in the Non-Inscrits (NI) non-group. Although only the fifth-largest group according to the current polls, the ECR will probably be the most decisive for the political direction of the next European Parliament. Founded by the British Conservative Party in 2009, the ECR rapidly drifted rightward as conservative parties like the Polish PiS radicalized and new far-right parties like the Sweden Democrats and Vox joined. Still, it is considered (more) respectable by particularly the "center-right" European People's Party (EPP), which is openly flirting with an EPP-ECR alliance in the next Parliament. Moreover, by putting opposition to immigration and the European Green Deal at the center of its 2024 campaign, the EPP is making the ECR into its "natural partner."

But the ECR has another option too, which could take it away from the EPP. For years, the far-right has been a large but powerless force in Brussels. The main reason is its organizational division, which has ideological, personal, and strategic reasons. But with the mainstreaming of the far-right throughout Europe, most parties have changed from permanent opposition to government(-seeking), and from Euroreject to Eurosceptic. Rather than wanting to leave the EU, they want to shape it in their own ideological image. To do this, the far-right needs to bring as many like-minded parties together as possible, in an ECR+ group. This seems to be the strategy of Italian Prime Minister Giorgia Meloni, president of the ECR Party, who is trying to get Hungarian Prime Minister Viktor Orbán on board. Should they be able to overcome their issues, which are mainly his pro-Russian position, there is a change some of the more successful ID parties could switch to the ECR, as well as some of Orbán's influential regional allies – such as Andrej Babiš (ANO) in Czechia, Janez Janša (SDS) in Slovenia, and Robert Fico (Smer-SD) in Slovakia, all currently facing pressure from their mainstream group in the European Parliament.

Although both an EPP-ECR alliance and an ECR+ group are still just scenarios floating around, facing significant practical challenges, it is clear that the far-right will be a more important player in the next Parliament. At the very least, the EPP will use the possibility of an alliance with the ECR (and other far-right parties) to pressure the other mainstream groups to implement its agenda – itself already heavily influenced by far-right ideas. At worst, the EPP will actually collaborate with the far-right to block progressive policies and even implement reactionary ones. This would make the EU an even less important actor in the international arena, where it already is divided on Israel-Gaza and at times hesitant on Russia-Ukraine, and possibly further stall the little progress made on EU enlargement and reform.

If we combine the two worst case scenarios, a return of Trump in the US and a far-right shift in Europe, the world looks really grim. This is not to say that the EU and US have always been a force for good in the world, but their flawed approach to democracy and human rights promotion is still much better than what we can expect from countries like China, India, and Russia. Unfortunately, if we combine the two best case scenarios, we don't get much further than the world today – with the exception of, likely, a Labour government in an increasingly isolated and weakened UK. In short, it is going to be a long and trying year.

For years, the far right has been a large but powerless force in Brussels. The main reason is its organizational division, which has ideological, personal, and strategic reasons. But with the mainstreaming of the far right throughout Europe, most parties have changed from permanent opposition to government(-seeking), and from Euroreject to Eurosceptic.

Invest in Space

Europe's Path to "Strategic Sovereignty": Strengthening Europe's Competitive Advantage in the Outer Space Domain

Lisa Becker, Charlemagne Prize Fellow 2022/23

The Fellow: Lisa Becker works at the German Institute for International and Security Affairs (SWP) in Berlin. A graduate of Security Studies, she previously worked at the EU, in strategic management consulting, the UN Office for Outer Space Affairs and in security and risk advisory. Her research focuses on topics in international security on Earth and in Space.

Research Question: How can the EU leverage space to contribute to resilience, sustainability and security on its path to strategic sovereignty?

Scientific Mentor: Prof. Dr. Kai-Uwe Schrogl, Senior Political Advisor at the European Space Agency (ESA), Paris

Russia's invasion into Ukraine in February 2022 was preceded by a cyberattack on satellite modems used by the Ukrainian military; German wind turbines were incapacitated as collateral damage[1]. It was a reminder that outer space is the backbone of modern societies, economies, and militaries and not immune to conflict. Without space there cannot be a sovereign Europe, hence the need to ensure the uninterrupted access to space and space-derived services. Europe is well-equipped to do so but must strengthen its capacity to act in the increasingly contested environment. The aim of the project was to use the momentum to extend the debates on "strategic sovereignty" and not only provide a definition for the space domain, but also assess where Europe currently stands and elicit what can be done to strengthen Europe's competitive advantage in space.

1. European "Strategic Sovereignty" - a terrestrial concept

The concept of "strategic sovereignty" emerged in 2017, when President Macron first called for a sovereign Europe "able to think itself as a common and relevant entity to decide for itself"[2]. He was reviving the ongoing debate about Europe's role in the world and gave it new momentum not only in Brussels, but also in the Member States' capitals[3]. The quest towards a more assertive Europe translated in the agendas for "strategic autonomy" and "strategic sovereignty"[4] and more recently "open strategic autonomy"[5]. They express an underlying awareness that Europe is facing a plethora of challenges, whether at that time an anti-transatlanticist President Trump, systemic competition or dependencies in energy and technologies. The definition of these concepts has been the locus of contentious debates[6], thereby obscuring that they all share a common vision of a more assertive and capable Europe. And although mostly associated with the European Union (EU), they can be conceived as a wider pan-European effort to improve Europe's capacity to act in different areas, from foreign and security to economic policy. Space policy, however, has long been a niche and has received little attention until recently.

1] Matt Burgess: A Mysterious Satellite Hack Has Victims Far Beyond Ukraine, WIRED, 23.03.2022. https://www.wired.com/story/viasat-internet-hack-ukraine-russia/

2] Emmanuel Macron: Initiative pour l'Europe - Discours d'Emmanuel Macron pour une Europe souveraine, unie, démocratique, Elysée, 26.09.2017. https://www.elysee.fr/emmanuel-macron/2017/09/26/initiative-pour-l-europe-discours-d-emmanuel-macron-pour-une-europe-souveraine-unie-democratique

3] See for example Germany's coalition agreement, in which the three parties commit to "increas[ing] the strategic sovereignty of the European Union by making our foreign, security, development and trade policies based on values and as a basis for common European interests." in Mehr Fortschritt wagen - Bündnis für Freiheit, Gerechtigkeit und Nachhaltigkeit, Koalitionsvertrag zwischen SPD, Bündnis 90/Die Grünen und FDP, Bundesregierung, 10.12.2021. https://www.bundesregierung.de/resource/blob/974430/1990812/1f422c60505b6a88f8f3b3b5b8720bd4/2021-12-10-koav2021-data.pdf?download=1) Also see Olaf Scholz: Rede von Bundeskanzler Scholz an der Karls-Universität am 29. August 2022 in Prag, Bundeskanzler, 29.11.2022. https://www.bundeskanzler.de/bk-de/aktuelles/rede-von-bundeskanzler-scholz-an-der-karls-universitaet-am-29-august-2022-in-prag-2079534

> Space is as an enabler for Europe's economy, society and security and defense policy[9]; the freedom of access and operation in space is thus of vital interest.

2. European "Strategic Sovereignty" in Space

As the importance of space increases and the nature of space activities continues to shift, space has emerged on political agendas as a strategic domain. The following trends catalyzed this evolution:

- Space has become more accessible and the number of countries with space capabilities has multiplied. The domain is no longer confined to scientific and state-sponsored activities: private companies now provide commercial services for governments and militaries alike.
- The dependence on space systems for national security (e.g. early warning, intelligence) establishes them as a vulnerable and valuable target. Anti-satellite weapons tests hint at the proliferation of counterspace capabilities aiming to degrade or deny services [7].
- The acknowledgement that space is not immune to terrestrial power politics and strategic competition is reflected in the adaptation of national space and defense governance postures (doctrines, strategies, policies) to account for the new realities in the operational domain[8].

Space is as an enabler for Europe's economy, society and security and defense policy[9]; the freedom of access and operation in space is thus of vital interest. To ensure that these principles are upheld, Europeans must think about how to meet these

4] EEAS: Shared Vision, Common Action - A Stronger Europe, A Global Strategy for the European Union's Foreign And Security Policy, June 2016. https://www.eeas.europa.eu/sites/default/files/eugs_review_web_0.pdf; Council of the European Union. A Strategic Compass for Security and Defence - For a European Union that protects its citizens, values and interests and contributes to international peace and security, 7371/22, 21 March 2022. https://data.consilium.europa.eu/doc/document/ST-7371-2022-INIT/en/pdf

5] Spanish Presidency of the European Council: Programme, 2023. https://spanish-presidency.consilium.europa.eu/media/e4ujaagg/the-spanish-presidency-programme.pdf

6] A more general definition was provided by the European Parliament: (Strategic sovereignty for Europe, EPRS Ideas PE 652.069, September 2020). https://www.europarl.europa.eu/RegData/etudes/BRIE/2020/652069/EPRS_BRI(2020)652069_EN.pdf.
For debates see Claudia Major and Nicolai von Ondarza: Zeitenwende (auch) für die Europäische Souveränität, in BPB: Festung Europa?, Aus Politik und Zeitgeschichte 42, 14.10.2022, pp. 47 53; Nicolai von Ondarza and Marco Overhaus: Rethinking Strategic Sovereignty, SWP Comment C 31, 28.04.2022. https://www.swp-berlin.org/publikation/rethinking-strategic-sovereignty; Daniel Fiott (ed.): Strategic Sovereignty – Strategy and interdependence, EUISS Chaillot Paper 169, July 2021. https://www.iss.europa.eu/sites/default/files/EUISSFiles/CP_169.pdf; Bart Szewczyk: Scholz and Macron Have a Perilous Ambition for Europe, Foreign Policy, 8.09.2022. https://foreignpolicy.com/2022/09/08/european-strategic-autonomy-eu-security-macron-scholz-ukraine-defense-nato/.

7] Kari Bingen, Kaitlyn Johnson, Makena Young: Space Threat Assessment 2023, CSIS, April 2023. https://csis-website-prod.s3.amazonaws.com/s3fs-public/2023-04/230414_Bingen_Space_Assessment.pdf?VersionId=oMsUS8MupLbZi3BISPrqPCKd5jDejZnJ; Secure World Foundation: Global Counterspace Capabilities, April 2023. https://swfound.org/media/207567/swf_global_counterspace_capabilities_2023_v2.pdf

8] Jana Robinson: Space Security Policies and Strategies of States - An Introduction, in Schrogl, K.-U. (ed.). Handbook of Space Security. Springer, 2020, pp. 359-365.

9] Daniel Fiott: The European space sector as an enabler of EU strategic autonomy, European Parliament - Directorate General for External Policies of the Union, PE 653.620 - December 2020.
https://www.europarl.europa.eu/RegData/etudes/IDAN/2020/653620/EXPO_IDA(2020)653620_EN.pdf

challenges. Here, the “strategic sovereignty” concept offers its application to space.

Strategic sovereignty in space is understood as the ability to develop, launch, operate and secure space assets autonomously or by engaging with partners and being able to use space-derived services without interference, in fulfillment of strategic political objectives.

In the following sections, the concept will be operationalized based on the four-dimensional model proposed by Major, Saakov and Jarvenpää, namely (1) political sovereignty, (2) institutional sovereignty and (3) capabilities developed by (4) a robust industrial base[10]. The insights are informed by interviews conducted with national and international officials, and representatives from industry and academia.

2.1 Political sovereignty

Political sovereignty builds on a strategic and long-term vision, and depends on the leadership to implement these ambitions. This raises the question of the point of reference, for there are three tiers of space actors in Europe – the European Space Agency (ESA), the European Union (EU) and its institutions, and an overlapping pool of respective Member States. Each has its own mandate, competences and responsibilities in the space, security and defense domains:

ESA is not a traditional security actor, but serves as a platform to harmonize its Member States’ space programs to develop civilian space capabilities with a security dimension included by design, such as Space Situational Awareness (SSA)[11].

The EU was vested with shared space competences in 2008[12] and developed communitized assets under the EU Space Program (ESP) that have been employed for missions within the framework of the EU’s Common Security and Defense Policy[13]. It is the 2022 Strategic Compass that first linked security and defense explicitly to the space domain[14] and culminated in the publication of the 2023 EU Space Strategy for Security and Defense, which outlines actions to "defend the EU’s strategic interests and to deter hostile activities in and from space”[15]. It seems appropriate for the EU to take the lead in space policy just as it was foreseen in the 2007 European Space Policy that created a political framework for European space activities[16]. However, the more they venture into the security and defense realm, the more the EU is constrained by competences the Member States detain the ultimate authority over[17]. Some of them have a legacy of space programs (France, Germany, Italy) whereas others only possess a limited space portfolio.

It would be intuitive for one of the bigger space nations to pioneer and advance Europe’s space ambitions. France, for example, has been driving the space agenda in the EU context[18] and held military space exercises in which partners were invited to participate[19]. Germany is the top contributor to ESA[20] and has shown interest in taking the lead on SSA. The German-French duo could be advancing European space efforts jointly and make the case for the pan-European project if it were not for frictions and competition[21]. The UK is a prominent space actor, though it is just finding its way back to the ESP ever since it withdrew from the EU.

10] Pauli Järvenpää, Claudia Major, Sven Sakkov: European Strategic Autonomy - Operationalising a Buzzword, ICDS, October 2019. https://icds.ee/wp-content/uploads/2019/10/ICDS_Report_European_Strategic_Autonomy_J%C3%A4rvenp%C3%A4%C3%A4_Major_Sakkov_October_2019.pdf
11] European Space Agency: Accelerators - A Vision and Call for Action, Protection of space assets, 2023. https://vision.esa.int/protection-of-space-assets/
12] European Union. Consolidated Version of the Treaty on European Union, Official Journal of the European Union, C155, 9.05. 2008, §189.
13] European Parliament: Space and Security - The Use of Space in the Context of the CSDP, Directorate-General for External Policies of the Union, PE 433.834, November 2011.
https://www.europarl.europa.eu/RegData/etudes/etudes/join/2011/433834/IPOL-SEDE_ET(2011)433834_EN.pdf
14] Council of the European Union. A Strategic Compass for Security and Defence - For a European Union that protects its citizens, values and interests and contributes to international peace and security, 7371/22, 21 March 2022. https://data.consilium.europa.eu/doc/document/ST-7371-2022-INIT/en/pdf.
15] European Commission/High Representative of the Union for Foreign Affairs and Security Policy. Joint Communication to the European Parliament and the Council – European Union Space Strategy for Security and Defence, JOIN(2023)9, 10.03.2023.
16] Commission of the European Communities: Communication from the Commission to the Council and the European Parliament – European Space Policy, COM(2007)212, 26.4.2007. https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2007:0212:FIN:EN:PDF
17] European Union. Consolidated Version of the Treaty on European Union, Official Journal of the European Union, C155, 9.05. 2008, §189.
18] Joshua Posaner: Brussels Playbook: Germany vs France on cars — MEP cool down — Space plan explained, Politico, 14.03.2023. https://www.politico.eu/newsletter/brussels-playbook/germany-vs-france-on-cars-mep-cool-down-space-plan-explained/
19] French Ministry of Defense. The French Military Space Exercise – AsterX, 2023. https://air.defense.gouv.fr/sites/default/files/public/2023-02/AsterX_2023-ENGLISH.pdf
20] ESA Budget 2023, 23.01.2023. https://www.esa.int/ESA_Multimedia/Images/2023/01/ESA_budget_2023
21] Schnitzler, Gaspard. La coopération spatiale franco-allemande, entre compétition et volonté de consolidation, Revue internationale et stratégique 127:3, 2022, pp. 131-137.

The competition between the space institutions and actors curbs the formulation of a shared vision and therefore undermines European unity. Promoting a unified European approach to space demands greater inter-institutional alignment.

Security and defense dimensions of European space activities are inherently linked to NATO, which remains the main framework for defense in Europe. The Alliance acknowledged space as an operational domain in 2019. A stronger European pillar within NATO will have to factor in the question on how the collective defense provisions apply to communitized EU space assets and its potential to impact response mechanisms and the division of tasks with the EU[22]. It is not impossible that minilateral formats emerge; already, ad-hoc formations assemble nations willing to engage in space security beyond institutional boundaries[23].

Although all European space actors share the commitment to the use of space for “peaceful purposes”, principles codified in the 1967 Outer Space Treaty, there is no overarching European strategy for space. The competition between the space institutions and actors curbs the formulation of a shared vision and therefore undermines European unity. Promoting a unified European approach to space demands greater inter-institutional alignment. Europe will need to gain clarity about its ambitions; she has the potential to be a global space power with a distinct value proposition based on the self-conception of a norms-based, principled and reliable partner amidst strategic competition and Sino-American rivalry on Earth and in space.

2.2 Institutional sovereignty

Delivering on “strategic sovereignty” in space requires institutions that can implement the political ambitions. Caught between communitarianism and intergovernmentalism, the current European space governance structure risks running into inefficiencies and makes it difficult to ensure decision-making in a fast-paced domain.

To bridge the constellation of actors, a division of responsibilities was codified in the 2004 ESA-EU Framework Agreement establishing an ESA-EU Space Council[24]. And while ESA’s role is clear, special attention should be paid to the EU where several bodies are involved in different aspects of the ESP[25]. It also has existing structures for security and defense decision-making (e.g. Military Committee, Political and Security Committee) and for pooling national space capabilities for multilateral action

22] European Council: Joint Declaration on EU-NATO Cooperation, Press release, 10.01.2023. https://www.consilium.europa.eu/en/press/press-releases/2023/01/10/eu-nato-joint-declaration-10-january-2023/
23] e.g. the “Combined Space Operations Initiative” with participation of the US, UK, Canada, France, Germany and Australia, see Combined Space Operations Vision 2031, US Department of Defense, 2022. https://media.defense.gov/2022/Feb/22/2002942522/-1/-1/0/CSPO-VISION-2031.PDF
24] European Union: Framework Agreement between the European Community and the European Space Agency, Official Journal of the European Union, L 261, 6.8.2004. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:22004A0806(03)
25] European Union: Regulation (EU) 2021/696 of the European Parliament and of the Council establishing the Union Space Programme and the European Union Agency for the Space Programme, Official Journal of the European Union, L 170, 12.5.2021.

(EU Satellite Center). As the EU started playing a more prominent role in space by introducing the EU Agency for the Space Program that administers the satellite navigation program Galileo and the ESP's downstream applications, the EU-ESA arrangement was extended to now account for a triangular configuration. The added layer of complexity translated into the introduction of a Joint Office for Galileo, which pools the oversight of the three agencies to better respond to the program's needs[26]. By the same token, the European Council, aware that decision-making needs to be adapted to reflect the new realities, strengthened the mandate of the High Representative of the Union for Foreign Affairs and Security Policy, who has the authority to "issue the necessary provisional instructions" in emergency situations that the Council can ad-hoc confirm, revoke or modify[27]. These band-aid solutions are an improvement albeit far from establishing sustainable coordination between the European Commission, the European External Action Service and the Council.

Brexit highlighted the need for the institutional set-up to allow for cooperation with third parties. Here, the European Defense Agency, the EU agency that facilitates military cooperation and development of defense capabilities could provide an interface for collaboration on military space projects. Only if building on the existing institutions turns out to be unmanageable could a new entity, e.g. a European Space Command, be considered.

2.3 Sovereign capabilities

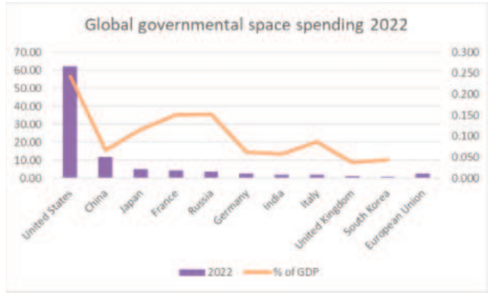
To be able to credibly implement political decisions, they have to be underpinned by concrete capabilities and financial investment. The core space capabilities identified include space launch vehicles, SSA, secure satellite communication, navigation, Earth Observation, as well as means to secure its assets, e.g. cybersecurity[28].

The reality is that between ESA, the EU and their respective Member States, Europe lacks basic space capabilities to engage in space activities autonomously, first and foremost launchers. Europe gambled with its autonomous access to space by phasing-out the Ariane 5 rocket without ensuring continuous launching services. The successor, Ariane 6, is delayed and not competitive enough on the launch market dominated by commercial providers that offer cheaper and cost-efficient solutions. To meet the requirements for "responsive space"[29], Europe needs a diverse portfolio of launchers and launching sites. Other significant gaps, e.g. in secure satellite communication, are being addressed via the GovSatCom secure connectivity program[30]. Efforts to improve SSA, for which Europe is largely dependent on American data, are divided between capability-building with ESA's Safety Accelerator and capability-pooling within EU Framework for Space Surveillance and Tracking[31]. Europe seems to be on track to achieve greater autonomy, although doubts are cast about the ability to meet the ambitious timelines within the allocated budgets.

Existing capabilities like Galileo for navigation or Copernicus for Earth Observation are globally unmatched, though do not meet defense requirements and can for now only complement national assets[32]. The new generations promise to be more resilient but will take further investment to be of added value for Member States. In the current geopolitical environment those who can, seem to prefer the development of national capabilities[33], which exacerbates the cleavage between advanced space nations and smaller countries with limited space programs who primarily benefit from the access to space via the ESP[34].

An Achilles heel is the security for space assets that are vulnerable to physical and non-kinetic attacks. European countries rank high in the ITU's Global Cybersecurity Index[35] and the EU has the regulatory competences to lead efforts in further strengthening cybersecurity for critical infrastructure[36]. However, attacks become more sophisticated and frequent. Space infrastructure remains prone to electronic warfare, e.g. signal jamming or spoofing; to make capabilities fit for defense purposes, the technical requirements for cutting-edge software, hardware and (quantum) encryption are high. Other means to deter attacks, such as anti-satellite weapons, currently receive little consideration in European debates. Ultimately, the development of capabilities depends on the political choice of defense instruments to protect space assets.

This will require substantial financial investments. On the one hand, overall spending in space in Europe has been on the rise: Member States' pledges to ESA grew by 17% and the share of space in the EU budget increased to 16bn EUR. On the other hand, even the collective impact of European space budgets does not catch up with those of the US or China.



(based on Euroconsult and World Bank data[37]; in $bn)

Space investments are fragmented between the multinational civilian programs and national military capabilities. Cooperation promises more cost-efficiency for capital-intensive space technology, yet remains an exception. The EU incentivizes joint development and procurement via the Permanent Structured Cooperation and the European Defense Fund[38]. Although space is deemed a "pressing, needed and promising" focus area, only 2% of investment was allocated to space projects as opposed to 64% for the traditional domains[39]. Member States do not seem to use these institutions to magnify effects they could achieve on a national level. Without fresh money and political and financial incentives, it will be difficult to bridge the capability gaps in the short- to medium-term.

26] Inside GNSS: New Galileo Joint Office Pools Oversight Efforts of EC, ESA and EUSPA, Inside GNSS; 14.10.2021. https://insidegnss.com/new-galileo-joint-office-pools-oversight-efforts-of-ec-esa-and-euspa/
27] European Union. Council Decision (CFSP) 2021/698 of 30 April 2021 on the security of systems and services deployed, operated and used under the Union Space Programme which may affect the security of the Union, Official Journal of the European Union, L 170, 12.5.2021, Art. 4.
28] Identification of core capabilities considered as enablers of "strategic sovereignty" based on 25 interviews conducted as part of the research process with representatives from government, EU, ESA, industry and academia; also: see Strategic Compass 2022; Bleddyn Bowen: Original Sin, Oxford University Press, 2023, p. 336.
29] Responsive space designates more generally the ability to launch payloads on short notice to react to incidents and replace or complement existing satellites. There is no uniform definition; some reference points are summarized by Wolfgang Jung and Tim Vasen: Responsive Space for NATO Operations, The Journal of the JAPCC 31, Winter/Spring 2021, pp. 58-63. https://www.japcc.org/wp-content/uploads/JAPCC_J31_screen.pdf
30] GovSatCom builds on existing national and accredited commercial providers, as well as an indigenous EU satellite constellation IRIS². European Union. Regulation (EU) 2023/588 of the European Parliament and of the Council of 15 March 2023 establishing the Union Secure Connectivity Programme for the period 2023-2027.
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34] For example, not all EU/ESA Member States have proper space programs, a Space Strategy say a Space Security/Defense Strategy, and space responsibilities are usually scattered across different ministries and government agencies. For a comprehensive review see Christina Giannopapa, Maarten Adriaensen and Ntorina Antoni: Strategic Overview of European Space and Security Governance in Kai-Uwe Schrogl (ed.): Handbook of Space Security, Springer, pp. 359-365.
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2.4 Space industry

In order to develop the required sovereign capabilities, it takes a strong industrial and technological base. Europe has a sizeable space industry that accounts for more than 8bn EUR in sales with 57 000 employees[40]. Apart from big corporations such as Airbus and Leonardo, it also counts small and medium enterprises, from manufacturing to application development. Despite companies being concentrated within a few nations, ESA's industrial policy ensures equal distribution of nationally awarded contracts ("geo-return principle"). This institutional approach, however, thwarts the effects of market competition and stands in sharp contrast to the commercial "New Space", best epitomized by Elon Musk's SpaceX. Europe is facing difficulties to sustain a space sector that is not immune to more general challenges such as dependencies on semi-conductor chips, protectionism and economic recession. A change of paradigms is underway - both for softening the rules for industrial procurement within ESA[41] and for using EU single market competences to unlock synergies between civil, defense and space industries[42]. The challenge will be to retain an industry that is crucial to advancing Europe's ambitions of "strategic sovereignty" in space.

3. Recommendations

Against the backdrop of an increasingly competitive space environment, implementing "strategic sovereignty" in space is not optional, but a necessity. To strengthen Europe's standing in space, some recommendations are proposed hereafter:

1. Europe needs a long-term strategic vision for space

Europe should initiate a holistic reflection process on where it sees itself long-term in space, reconciling its ambitions in one bold pan-European "moonshot" strategy that spells out the interests, goals and objectives – from space launchers and human spaceflight to security and defense postures. In the meantime, the 2007 Space Policy can be updated as a first step.

2. European space governance can be further consolidated

To enhance cross-institutional coordination, the ESA-EU Council could be upgraded to meet regularly, also on a work level. To institutionalize intra-EU alignment, a coordinating body such as a Space Committee or Working Group can be configured. A European Defense Agency vested with a more robust mandate and budget can serve as the go-to platform for cooperation with third-parties.

3. Capability pooling, sharing and development can be further incentivized

Europeans need to get comfortable with increasing spending to be more autonomous in space. To bridge critical capability gaps, the EU in coordination with NATO can set a National Target Action Plan and promote the joint development of systems or the integration of national ones put at the disposal for e.g. NATO. Further synergies can be unlocked by harnessing the dual nature of space technology, anticipating the requirements of defense users in terms of technical specifications for ESA.

4. Europe needs to invest in its space industry

Europe can find its own way of doing "New Space" in which institutions support space companies as an anchor customer and leverage private capital. The EU's competences can be employed to advance integration in the space and defense market, but the Member States are ultimately responsible for fostering a competitive industrial base at home.

Conclusion

A "strategic sovereignty" agenda for space has the potential to unite Europe behind one common goal in the spirit of the Charlemagne Prize. It promises to provide an impetus for a pan-European approach to space to collectively define common interests and to proactively shape a peaceful and secure space environment. The awareness of the stakes is growing; to render the path to "strategic sovereignty" sustainable, Europe needs to invest in space - politically and financially - and accord more attention to the domain upon which much of the European way of life hinges. And while the stars are not perfectly aligned just yet, Europe has proven that it can find pragmatic solutions to seemingly unsurmountable challenges; space promises to be no different.

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42] European Commission: Action Plan on synergies between civil, defence and space industries, COM(2021), 22.2.2021. https://commission.europa.eu/system/files/2021-03/action_plan_on_synergies_en_1.pdf

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Independence in Unity - Europe’s Sovereignty in Space

Dr. Walther Pelzer, Director General of the German Space Agency and Member of the Board of the German Aerospace Center

Dr. Walther Pelzer is a member of the Executive Board of the German Aerospace Center and is responsible for the German Space Agency at DLR, located in Bonn. He studied Mechanical Engineering at RWTH Aachen University and obtained his Ph.D. from the Fraunhofer Institute for Production Technology. Following this, he held various roles in investment and value-added management, strategy, and technology control at Degussa AG in Frankfurt and Hanau, as well as FERRO Corp. in Washington, US. After working as CEO in the automotive and aerospace industries in Austria and the US, Pelzer joined the Research and Technology Department of the Ministry of Innovation, Science, and Research of the State of North Rhine-Westphalia. Since 2008, he has been responsible for the decommissioning and disposal of the AVR experimental reactor and its fuel elements, appointed by the state government to oversee their repatriation to the US. Currently, he also conducts guest lectures and seminars at universities on topics such as the balance scorecard, technology management, innovations based on technology platforms, and working with subsidiaries in the US.

Space exploration has become an indispensable infrastructure for our daily lives, supporting mobility, communication, and weather forecasting. Moreover, sectors such as energy transition, financial services, and agricultural services now rely heavily on satellite support. Since its inception, space exploration has driven innovation and advanced technological developments due to the extreme conditions of outer space and the vast distances from Earth, thereby placing high demands on materials and technology. For European states, whose key resources are the ingenuity and innovative capacity of their inhabitants, space exploration holds great relevance.

International collaboration plays a crucial role in space exploration today. By partnering with other countries, resources can be pooled to realize projects that would be unfeasible for any single state alone. Prime examples include Europe's world-leading space infrastructures, such as Copernicus, the largest Earth observation system globally, and the Galileo satellite navigation system, which provides more precise data than the well-known GPS system. Another example includes the ongoing development of the IRIS² communication constellation, offering Europe independent access to space. Furthermore, endeavours like returning to the Moon or exploring our solar system require international collaboration.

In the digital age and considering the geopolitical landscape, space capabilities are essential components of both German and European security. The Russian hacking attack on a U.S. satellite communication network at the onset of the conflict in Ukraine notably illustrates the importance of space in a security context for Europe. The disruption of these satellites prevented the remote control and maintenance of approximately 5,800 wind turbines in Germany.

All these factors underscore the need for independent action in space. In my understanding, "independence" means that Europe is capable of taking action without being dependent on individual third parties. This explicitly does not imply isolation or the endeavor to maintain every capability within Europe or Germany at an immense financial cost. On the contrary, we achieve independence through collaboration, specifically by increasing collaboration beyond previous levels. Therefore, we aim to enhance the number of our trust-based partnerships.

1. Bundling capabilities through international partnerships
A significant advantage in Europe is that we are accustomed to cooperating, which is inherent in the DNA of European space exploration. Our most important collaborators are European institutions, and through cooperation with the European Space Agency (ESA) and the European Union, we successfully manage many crucial missions. However, as the significance of space exploration grows, more nations are actively engaging in space activities. In 2010, there were 50 spacefaring nations, whereas today that number has doubled. This expansion unlocks opportunities for collaborations beyond Europe, which could include strategic partners like the US and Japan.

To be an attractive partner in the international space environment, Europe, and specifically Germany, must shine through technical and scientific excellence. The strategy of having few but excellent flagship projects is wiser than carrying a bag of mediocre quality. Examples of Germany's technological leadership include radar technology in Earth observation, as demonstrated by the TerraSAR-X and TanDEM-X satellites, providing the world's best radar data even after more than ten years in orbit. Laser communication is another strong example where Germany leads globally. In these areas, it is crucial for Germany to maintain its leadership.

2. Space as an instrument of diplomacy
Space exploration combines unique fascination with colossal and essential potential for societal progress. It unites humanity when we collectively venture beyond our planet, following in the tradition of explorers and pioneers. And with this, space exploration presents significant opportunities for foreign policy and international cooperation. The United States has even published a "Strategy for Space Diplomacy," utilizing space exploration as an instrument to pursue strategic interests, deepen partnerships, expand relationships, and address global challenges. The data and information generated by space exploration must be more extensively utilized by all government entities, presenting a strategic approach that would also be beneficial for Germany and Europe.

A significant advantage in Europe is that we are accustomed to cooperating, which is inherent in the DNA of European space exploration.

Germany is already advocating for space-related interests in international forums, such as the United Nations and through signing the Artemis Accords, the American program for the peaceful return to the Moon. With existing space infrastructure like Copernicus, Galileo, and soon IRIS², as well as national missions, Germany has the capacity to utilize space services and information for economic, societal, and political purposes. Space information serves as a foundation for information and decision support, covering aspects like extreme weather events, climate change, disaster risks, migration and refugee movements, border conflicts, arms control, and war crimes. Strategically utilizing this information can contribute to risk assessments and the development of preparation plans.

It is up to us to pursue these objectives more confidently, purposefully, and strategically than before. Following the example of the United States, we, together with our partners in Europe, would be wise to use foreign policy for space exploration and space exploration for foreign policy more extensively than before. Such a strategic approach can lead to a positive integration effect, serving overarching political goals of Europe.

3. German role in European space exploration

The "house of European space exploration" rests on three pillars: the first relies on the space activities of the European Union, which provides space infrastructures for its member states and oversees the use of space exploration. The EU plays a strong role in space exploration, as emphasized by the establishment of its own EU space program and the founding of the European Union Agency for the Space Program (EUSPA) as the operator of European satellites.

The second pillar is the European Space Agency (ESA), an intergovernmental organization since 1975 that serves as the backbone of European space exploration, the European space industry, and European space research. ESA's core competence lies in the development and execution of major missions that go beyond the financial capacity of individual states. ESA continues to play a crucial role in technology development, especially in countries with less developed space industries.

The third pillar comprises national space activities tailored to the individual needs of each country. In Germany, the national space program enhances the competitiveness of the German industry and science by integrating German technological developments into European and non-European missions. This elevates the importance of Germany as a technology hub for international collaborations, making industry and science globally competitive. The national budget also funds international collaborations and scientific instruments for ESA missions. Germany is a driving force in Europe, but the substantial increase in budgets of spacefaring nations worldwide poses a risk of falling behind internationally. For instance, the US increased its space budget by 9% from 2022 to 2023, Canada by 20%, Japan by 17%, the UK by 20%, Spain by 67%, and Italy by 34%. In contrast, Germany's space expenditures increased by only 3%, and the outlook for the German space budget in 2024 appears challenging, due to the envisaged reduction in the National Space Program for Space and Innovation.

For all three pillars of this "house of European space exploration," independent access to space is the foundation. However, with the launch of the last Ariane 5 carrier rocket in 2023, Europe lost this indispensable base. Unlike the United States, there is still no private European alternative to the Ariane carriers. This crisis results from the absence of competition in the carrier sector in Europe, where currently a monopoly on launch services exists. In 2024, however, things are expected to improve significantly: the Ariane 6 is set to make its inaugural launch in the summer, restoring European independence. Additionally, the first launch of a privately financed microlauncher is anticipated, introducing competitive structures into the European space exploration landscape for access to space. This development grants Europe greater resilience.

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“On the Way to the Moon” – How Space Travel Strengthens the Competitiveness of the European Industry

Marco Fuchs, Chairman of the Management Board of OHB, and
Prof. Dr. Ulrich Hermann, General Managing Partner of Einstein Industry Ventures

Marco Fuchs is one of the most prominent figures in the European space industry. Since 2000, he has served as the CEO of OHB SE, a leading European aerospace company with over 3,300 employees and a revenue of approximately 1.1 billion euros. Fuchs systematically expanded OHB's business and tapped into lucrative growth markets for satellite-based Earth observation, including the construction of six latest-generation Meteosat weather satellites and a total of 34 satellites for the European navigation system Galileo. Since 2017, he has held the position of Vice President of Space at the German Aerospace Industries Association (BDLI). His career began outside the family business in 1991 as a lawyer in Hamburg. From 1992 to 1994, he worked as an attorney in New York and Frankfurt. In 1995, he joined the emerging company of his parents, the then OHB System GmbH.

With a 20-year experience as CEO and board member in digital transformation, initially in the media industry and later in mechanical engineering, Prof. Dr. Ulrich Hermann has been an active investor in the emerging Internet of Things (IoT) economy since 2020. He serves as the General Partner and CEO of the late-stage growth fund Einstein Industries Ventures, focusing on investments in space-based software and information solutions for industrial applications. Before he was a member of the board of Heidelberger Druckmaschinen AG and served as CEO of Wolters Kluwer in Germany and Central Europe for over ten years. During his tenure, he led the company through mergers, acquisitions, and the digital transformation of its business. Ulrich Hermann studied mechanical engineering at RWTH Aachen and M.I.T., Cambridge. He earned his doctorate in 1996 at the University of St. Gallen (HSG) and currently holds an honorary professorship at Hochschule Allensbach, where he teaches courses on digital business transformation.

With the vision of American President John F. Kennedy to enable manned spaceflight and the landing of humans on the Moon, the first human set foot on the Lunar Surface on July 21, 1969, after a massive financial and personnel effort - an effort that would not be supported by any parliament on Earth today. The risks at all levels were enormous at that time and the available resources, such as information technology, were unimaginably primitive. Amid countless technological developments, one success was achieved above all: instilling the confidence in humanity that seemingly insurmountable hurdles could be overcome. The fascination for space travel and the mysteries of space, founded on this premise, persists through generations. Over time, and with the end of manned Moon missions of the Apollo program in 1972 due to a lack of financially viable opportunities, space travel established itself in the 80s and 90s with less visionary, but more useful commercial solutions, such as GPS navigation, telecommunications, weather forecasting, and satellite television. Naturally, respectable basic research programs in many areas were in operation, leading to key technologies in pharmaceutical research or material science. Particularly, state clients financed infrastructure such as rocket programs and space stations, and established satellite constellations that could be licensed for commercial applications.

However, in the last 10 years a new boom has emerged bringing space travel back into the spotlight. Entirely unexpected to the public and initially dismissed as the whims of wealthy billionaires, internet entrepreneurs like Jeff Bezos of Amazon, Richard Branson of Virgin, and above all, Elon Musk of Tesla and SpaceX, invested their billions earned in the internet boom - along with a large majority of venture capital funds - into space travel. Suddenly, rockets are launching daily, new privately funded satellite constellations are emerging worldwide and former state agencies are increasingly changing their strategy in favor of private space travel. In the 80s, it would have preposterous to imagine that agencies like NASA would operate state space missions entirely with private space companies like SpaceX. What exactly happened?

The origin of private commercial space travel traces dates back to the 80s. Initially, this was a profoundly European development, demonstrated by the agency history of the German OHB out of

Amid countless technological developments, one success was achieved above all: instilling the confidence in humanity that seemingly insurmountable hurdles could be overcome.

Bremen, which evolved from a small hydraulics company (Otto Hydraulik Bremen) into one of the leading European satellite manufacturers. The story of today's OHB began in the early 80s with the acquisition of the small hydraulics workshop by the Fuchs family. Influenced by the space experiences of the Apollo and post-Apollo era, OHB began the transition from space travel for state clients to private space travel. In a garage in Bremen-Hemelingen by the inland harbor with only a few employees, initial projects were developed in microgravity and experiments under weightlessness. By the early 90s, they had progressed to the building of microsatellites. OHB has become a niche player in the space industry with revenue exceeding 1 billion and over 3300 employees, working not only for space agencies but for the European Union, the German Armed Forces, and the Federal Government. They specialize in Earth observation, radar, and telecommunication satellites, particularly noteworthy are the Galileo satellites for the EU and satellites for CO2 measurement developed as a part of climate protection."

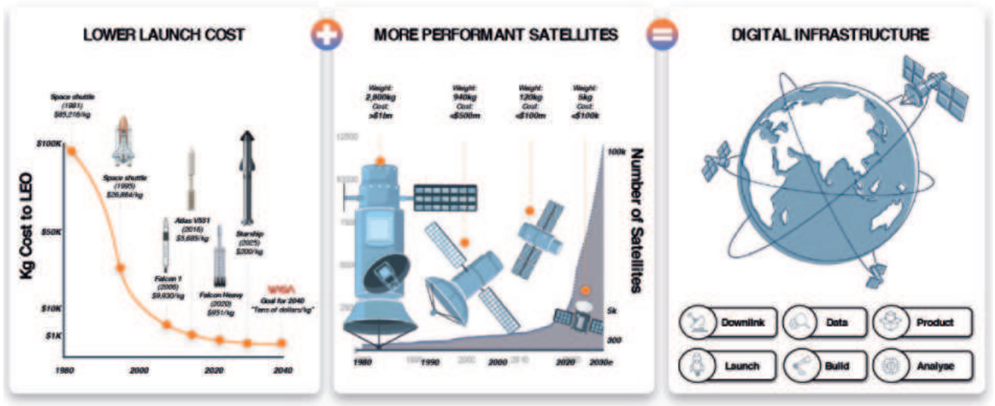
The basis for the current boom lies in the evolution of the IT and software industry. This marked the onset of disruptive developments, similar to what was observed in the media industry in the 90s with the internet boom. The convergence of disruptive technological advancements, private entrepreneurs, and capital providers is commonly referred to as New Space, which exponentially continues the trends of the 80s.

New Space

It would be surprising if the significant progress made in the IT and internet sectors over the past two decades had not influenced industries beyond software and communications.

Elon Musk pioneered once again by applying the principles of the internet economy and agile work methods to space when he founded SpaceX in 2002. The primary goals of SpaceX were to reduce the costs of space transportation, to eventually enable the colonization of Mars, and democratize space exploration. During this time, SpaceX served as a "Software-Defined-Vehicle" for the space industry, bringing about a fundamental shift by emphasizing cost reduction and developing, eventually, the concept of reusability.

With SpaceX's impetus, the space industry has transformed into a fiercely competitive commercial sector characterized by decreasing costs for satellite launch and manufacturing. To illustrate, the costs of the Space Shuttle in 1981, exceeding $85,000 per kilogram for reaching low Earth orbit, can be compared with the costs of the Falcon 9 in 2020, which were under $2,000. It is expected that SpaceX's Starship, the largest rocket ever launched, will further reduce costs towards $100. Since the 1980s, launch costs have decreased by a factor of 40, and it is anticipated that they will decrease by an additional 95% by 2040.



Termed "New Space," this phenomenon, driven by technological advancements, satellite miniaturization, the use of standard components, and the introduction of reusable launch vehicles, has led to a wave of startups in the established space industry.
In the past five years, substantial private investments, constituting 86% of the total invested capital of $36.7 billion, have flowed into the sector.

In addition to reducing launch costs, the space sector has witnessed a remarkable 90% decrease in manufacturing costs per gigabit per second (Gbps) between 2013 and 2021. The total data throughput per kilogram of satellite weight is expected to increase sixfold, primarily due to the increased deployment of High Throughput Satellites (HTS) and Very High Throughput Satellites (VHTS). Alongside cost reductions, the satellite industry has introduced mass production methods aimed at accelerating and cost-effectively manufacturing satellites, with a particular focus on large constellations.

This cost evolution has paved the way for formerly closed and exclusive platforms to become accessible to a broader range of participants. Termed "New Space," this phenomenon, driven by technological advancements, satellite miniaturization, the use of standard components, and the introduction of reusable launch vehicles, has led to a wave of startups in the established space industry. In the past five years, substantial private investments, constituting 86% of the total invested capital of $36.7 billion, have flowed into the sector.

Simultaneously, the space industry intersects with several long-term megatrends such as autonomous transportation, smart cities, climate protection, the Internet of Things (IoT), 3D printing, and artificial intelligence (AI). It is considered a crucial enabler for these technological changes across almost all industries. Looking at connectivity and Earth observation developments, it is evident that the industry's digital roadmap, on one hand, and its sustainability goals, on the other hand, are scarcely achievable without such enabling progress in New Space.

Against this backdrop, it is not surprising that the space industry surpassed a value of over $500 billion in 2023, representing over a 70% increase from a decade ago and part of an uninterrupted growth trend over the past five years. It stands as one of the fastest-growing industries globally, on the verge of a boom that will propel the space sector to a trillion-dollar valuation within a decade. More than 40% of this substantial economic volume is attributed to commercial satellite services (data), while satellite manufacturing comprises roughly 10%. The resulting new space-based information and software solutions (the downstream sector of the space economy) will not only offer crucial solutions for the growing data and connectivity needs of society but will also address the central challenges faced by European industry, namely: business restructuring, supply chain resilience, and sustainability.

A higher frequency and quality of Earth observation data will provide crucial information for human decision-making and the interaction of automated and connected products that

> A higher frequency and quality of Earth observation data will provide crucial information for human decision-making and the interaction of automated and connected products that autonomously engage with their environment.

autonomously engage with their environment. The requirements for system performance in terms of data management and analysis, bandwidth, and speed will continue to rise exponentially.

Combining vast amounts of space data with cloud-based data analysis and artificial intelligence will enable us to understand changes globally with unprecedented accuracy and almost in real-time. This will lead to increased automation and intelligent decision-making and provide insights into what would otherwise be invisible or hidden, allowing us to monitor and analyze the pulse of the world economy on both macro and micro levels.

Hence, space-based Software-as-a-Service (SaaS) solutions will find addressable markets in almost every industry, ranging from finance and insurance to energy, manufacturing, agriculture, etc. They will particularly shape and enable numerous industry-transforming applications such as autonomous driving, smart agriculture, and smart city solutions. Moreover, space-based solutions will contribute to addressing various challenges related to environmental and climate change by facilitating more efficient use of natural resources as well as their monitoring and management.

Lunar Economy

The digitization of industrial value chains on Earth is not the only factor contributing to growth opportunities in all industry sectors within the space industry. There is an emerging trend known as the "Lunar Economy," involving the commercialization and utilization of the Moon.

The cessation of the Apollo program in the early 70s was primarily due to political reasons, but also commercial reasons. It was mainly associated with the colossal effort, compared to commercial benefits, required to reach the Moon with manned spacecraft. With the inaugural launch of SpaceX's "Starship" in April 2023, the largest spacecraft ever, a 50-meter-high spacecraft will land on the Moon next year, capable of transporting more than 20 astronauts simultaneously to the lunar surface and back.

Similar to the current SpaceX carrier system Falcon 9 (with 96 launches in 2023 and around 160 planned for 2024), over 100 flights are expected for Starship. Each launch is designed for payloads of up to 100 tons, equivalent to a cargo capacity of up to 200 high-performance satellites per launch. Maintenance flights, space refueling, and the transport of building materials into orbit and onto the Moon will become routine. Overcoming this access barrier to the Moon, space engineers will once again focus on qualifying industrial value chains on the Moon. The Moon offers, despite challenges such as radiation and dust, significant physical advantages that Earth does not provide: one-sixth the gravity, no atmosphere, and minerals and oxygen embedded in the rock. A new technological boom involving established industries such as mining, mechanical engineering, automotive industry, energy sector, IT, and software industry, logistics, and their supply chains is foreseeable.

The Moon also presents itself as part of the solution to our environmental problems on Earth. On Earth, we are investing billions of dollars in the coming years to make our energy generation and production processes ecologically sustainable. With the upcoming growth of the world population and data consumption, even greater environmental burdens will arise. The rapidly growing battery industry is expected to cause entirely new, substantial damage to Earth's sensitive ecosystem. It is also anticipated that IT server farms, catering to the exponentially growing data consumption facilitated by artificial intelligence, will contribute to a temperature increase of up to 1.5 degrees Celsius in the Bay Area around San Francisco.

Plans are already underway to outsource server farms, generate solar energy, and mine minerals on the Moon. Companies like Trumpf are already exploring the space-worthiness of their 3D printing technology, which could be used to print spare parts on the Moon. SAP has placed "space" as a top theme on the agenda of its annual strategy conference.

The upcoming Economy of Things, our pressing environmental issues, the productivity of scarce resources for food production, water consumption in agriculture, the mobility transition, and many more topics will only be confronted through the developing space sector. In Europe, the right decisions must now be made, and the relevance must be recognized. Thus, with a strong European space sector and its deep integration into industrial value creation, growth and competitiveness for Europe can be secured.

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Space for Europe? Navigating Strategic Sovereignty and Security Challenges

Juliana Suess, Research Fellow and Policy Lead for Space Security at the Royal United Services Institute (RUSI)

Juliana Suess is the Research Fellow and Policy Lead on Space Security as part of the Military Sciences team at RUSI and is the host of the podcast "War in Space". She was previously Project Officer and Research Analyst at RUSI International. Her research interests include global space governance, sustainability, counterspace capabilities and space warfare. Juliana holds an MA in Conflict, Security and Development from King's College London and a BA in Politics and International Relations from the University of Reading.

Space, becoming the last operational domain to be identified by NATO, is of utmost geostrategic relevance for Europe. Its emergency services, banking, energy infrastructure and defence would look vastly different today without access to space. Russia's brutal invasion of Ukraine has highlighted the importance of satellites from both the civil and the military perspective: when satellite internet provider Viasat suffered a cyber attack on the morning of the invasion, a German energy company lost monitoring access to over 5,000 wind turbines.[1] Meanwhile the delivery of Starlink terminals to Ukraine enabled new avenues for military command and control and the operation of drones.

The geostrategic relevance of space

Space is vital for modern-day defence: satellites provide crucial missile early warning information, signals intelligence, imagery, navigation and communication services. But our civilian lives also rely on space to a great extent: emergency services, power grids and transportation infrastructure are just a few examples of how space forms an integral part of everyday life, often without being noticed.[2]

Space has experienced something akin to a revolution over the past 30 years. During the latter half of the 20th century, the use and exploitation of space was reserved for rich and powerful states whilst increasingly heavyweight launchers became a symbol of superpower status. Now, space launches have become almost routine – with more than 200 launch attempts in 2023 – contributing to the decreasing cost of launch.[3] The barriers to entry have been lowered significantly, allowing smaller companies and start-ups to become space players themselves. This also means that the Earth orbits are becoming busier – with figures in January 2024 listing over 9000 satellites in the Earth orbits.[4] This also brings its own set of problems, including sustainability concerns for orbits and an increased risk of collisions.

With the orbits filling up, concerns are rising among states that arenot yet active in space. The fear of space filling up physically, but also in terms of frequencies, and the worry about not being part of the space market, is accurately summed up with a quote from space governance expert Timiebi Aganaba: "Once you get left behind in the space age, you're never catching up."[5]

There are distinct factors that make new efforts in space especially important for Europe, chiefly among them defence and deterrence. As mentioned above, space already performs a number of vital functions for the military. As the German Security Strategy mentions, "[t]he free and unimpeded use of outer space is vital for our security."[6]

Investing in space capabilities, and ensuring that space assets are resilient, is more important than ever before, as space is increasingly seen as a battleground in itself.

Investing in space capabilities, and ensuring that space assets are resilient, is more important than ever before, as space is increasingly seen as a battleground in itself. As international norms and rules are challenged on Earth, this behaviour is observed in space as well. The most prominent example of this was perhaps in November 2021, when Russia tested a direct-ascent anti-satellite missile, creating a debris field that put not only satellites in the lower earth orbit at risk but also the humans co-habiting the space, a group which included two Russian nationals at the time.

The elephant in the room – European reliance on the US

Europe, including NATO and the EU, have clearly begun thinking about space in a strategic context. NATO declared space an operational domain in 2019 and published its overarching space policy in 2022. The Vilnius Summit in 2023 further reiterated

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3] Jonathan McDowell, "Space Activities in 2023", 5 January 2024, https://planet4589.org/space/papers/space23.pdf, accessed 14 January 2024
4] Orbiting Now: active satellite orbit data, 14 January 2024, https://orbit.ing-now.com/, accessed 14 January 2024
5] nterview with Timiebi Aganaba "Once you get left behind in the space age, you're never catching up", IPS, https://www.ips-journal.eu/interviews/once-you-get-left-behind-in-the-space-age-youre-never-catching-up-5474/#:~:text=Interviews%2011.10.2021-,'Once%20you%20get%20left%20behind%20in%20the%20space%20age%2C%20you,and%20the%20future%20space%20economy, accessed 14 January 2024
6] Federal Government of Germany, "Integrated Security for Germany: National Security Strategy", June 2023, p. 15

that an attack to, from and in space could trigger the Article 5 of the Alliance. NATO policy states that it will not acquire space capabilities itself, or act as an autonomous space power, but will instead rely on the capabilities of its member states. In this way, within NATO space is treated like any other domain in that the willingness to contribute space assets is an individual decision for member states. The assets are volunteered via different initiatives set up for each capability, such as NATO SATCOM Services 6th Generation (NSS6G). A memorandum of understanding between the US, UK, Italy and France thereby guarantees satellite communications for the Alliance through their sovereign assets until 2034. Similarly, crucial ISR (intelligence, surveillance and reconnaissance) capabilities are provided on a joint basis, with current plans for an Alliance Persistent Surveillance from Space (APSS) initiative. Unlike SATCOM, which consists of sovereign space capabilities only, the digital constellation "Aquila" is set to incorporate data from commercial companies in Luxembourg, aiming to not only bring different sets of data together but further enabling a smoother data and information sharing process as well. Both early warning satellites as well as GPS (navigation services) are provided through the US. NATO has further set up a Space Centre of Excellence in Toulouse, which provides an educational focal point within NATO alongside the operational centre at Allied Air Command in Germany.

The EU followed NATO, considering space a strategic domain as part of its Strategic Compass and subsequently publishing a Space Strategy for Security and Defence, highlighting that the Union is aware of the space threats being faced. The fact that four PESCO projects include military space capabilities is further encouraging.[7] The EU, unlike NATO, has sovereign capabilities: Galileo, a satellite navigation constellation and Copernicus for earth observation. The Union is further planning a new constellation, called IRIS2 (Infrastructure for Resilience, Interconnectivity and Security by Satellite) which is set to provide secure communications for governments and businesses. The EU Satellite Centre makes use of commercial data and provides geospatial intelligence to support EU foreign policy and defence decision making. Meanwhile EU Space Surveillance and Tracking uses both space- and Earth-based sensors to track and survey space assets.

While it is clear that both EU and NATO have incorporated space into their defence structures, the reliance on the US is still heavy and consequently Europe lacks strategic autonomy in space. One clear capability gap is Space Situational Awareness (SSA), a crucial tool to identify what is happening in orbit. While NATO has made agreements to develop capabilities (through the 3SAS programme), it will be important for the Alliance to have a holistic picture of the assets providing services to NATO. The increasing diversity of networks, including commercial providers, highlights this need. Ultimately, the attack against ViaSat in February 2022 demonstrated that commercial providers are not exempt from counterspace attacks.

Ongoing challenges concerning intelligence sharing barriers are further hindering Europe from acting as a capable and resilient space actor. This has been documented within NATO but also more widely among European partners.[8] Significant improvements in this area have been implemented in response to the Russian invasion of Ukraine, when the US made space data that was previously classified available to Ukrainian allies. However, obstacles around routine cooperation persist, as much space data remains highly classified. Difficulties observed in other sectors, such as overly complicated bureaucracy and old-fashioned tendering processes, pose similar problems for the space industry and specifically for New Space firms. This has hindered their integration and productive collaboration in Europe. Inadequate levels of public investment and shortages of space-trained personnel are further structural hindrances.

7] Paul Taylor, "Running Out of space: European security in space", Friends of Europe, 20 June 2022
8] Paul Taylor, "Running Out of space: European security in space", Friends of Europe, 20 June 2022

How to enhance European security cooperation

The importance of space lies in the terrestrial capabilities it enables and supports – for example space-based intelligence collection and space-enabled communications. European reliance on the US is inconvenient and cumbersome in peacetime but could develop into a real crisis in wartime. If there is a change in US government following elections in November 2024, or if China decides to take further measures in the Taiwan Strait, American focus could divert from Europe, leaving the continent in a particularly dangerous position. Russia has signalled its defiance of international rules and demonstrated the capability to disrupt and destroy space capabilities and unlike China, it has far less to lose in space. Defending against Russian counterspace measures and building resilient systems should be a priority for the continent if it wants to be able to continue to use its capabilities to their fullest extent.

Europe has already undertaken steps to decrease its dependence on the US and the mammoth projects of Copernicus and Galileo highlight what can be achieved with funding and focus. Further bilateral projects, such as on remote sensing between Germany and France, and on communications between France and Italy, show that collaboration is possible and effective. But further communication and collaboration is necessary. A reliable European launch capability is needed to ensure sovereign access to space, as are resilient systems. Given the cost of becoming a resilient space actor, joint endeavours are the only practical way forward. No European country has the luxury of a budget like the US, which is why taking on large projects in isolation often poses insurmountable budget and capacity challenges. Even when such national programmes do proceed, they risk building redundant systems with costs and utility that could have been shared amongst allies. Systems sharing should become more routine, allowing for intelligence and data sharing, which is especially needed in real-time when it comes to assessing and reacting to threats in space. Europe must become a strong, resilient actor in space not only to avoid falling behind, but also to enable deterrence of current and future threats, whether terrestrial or in orbit.

The importance of space lies in the terrestrial capabilities it enables and supports – for example space-based intelligence collection and space-enabled communications.

“Partnerships on Eye-Level, Not Just as a Junior Partner”

Interview with Nicola Winter, ESA-Reserve Astronaut and Aerospace Engineer

Nicola Winter is part of the ESA Astronaut Reserve, for which she was selected in November 2022. Previously, she was Germany's second female fighter pilot, flight instructor, and staff officer. Winter also works as a project manager at the German Aerospace Center (DLR e. V.) and as a lecturer in emergency and crisis management at Carl Remigius University. She is currently pursuing a Ph.D. in space sciences and obtaining a professional helicopter pilot's license. Additionally, Nicola is involved as an emergency medical technician and is a mother to a young daughter.

1. In November 2022, you were appointed as a reserve astronaut of the European Astronaut Corps. How do you assess the importance of space exploration for the European Union, and how can European space programmes contribute to strengthening Europe's strategic sovereignty?

Space exploration is pivotal for the European Union, not just for scientific discovery but also for enhancing strategic sovereignty. The European Space Programme, by advancing in areas like satellite communications, Earth observation, and navigation technologies, plays a crucial role. These advancements not only boost Europe's technological independence but also fortify its position in global geopolitics. It's essential for Europe to invest robustly in space exploration to maintain a competitive edge and secure its interests in the rapidly evolving space domain. Relying on the US, it’s potential presidents and eclectic billionaires for our critical infrastructure is a grave error, we might pay heavily for in the future. But we have the chance now to rectify this situation!

2. In your career, you participated in the "Die Astronautin" project, aiming to make a German woman an astronaut for the first time. How do you think private space initiatives can influence the future of (European) space exploration?

The ongoing growth of the new space economy and the whole private sector symbolizes a transformative shift in space exploration, where private initiatives complement traditional state-led programs. Such ventures democratize space access, fostering innovation and accelerating technological development. By integrating private enterprises in European space exploration, we can harness diverse talents, spur economic growth, and enhance Europe's global standing in the space sector. It's a call for Europe to embrace these collaborations, enabling a more inclusive and progressive space future. Being able to get a return on our investments will be the key to sustainable space usage.

3. As a project manager in the field of Responsive Space and Air-Launch at the German Aerospace Center (DLR), you are directly involved in innovative space technologies. What current developments do you see as particularly promising for the future of space exploration, especially in terms of technologies that can advance Europe in space?

At DLR, our focus on Responsive Space and Launch technologies represents the cutting edge in space exploration. These developments, including a European Responsive Space network and advanced satellite technologies, are set to revolutionize how we access and utilize space. Emphasizing these innovations is crucial for Europe to remain at the forefront of space exploration, ensuring not just participation but leadership in the next era of space advancements.

4. Your experiences as one of the few female fighter pilots in the German Bundeswehr provides you with a unique perspective. What is needed to craft an effective partnership between the civil and the military sector, and what key elements should be prioritised to strengthen Europe's security and defense capabilities in space and on the ground?

In my experience, Europe as a whole needs to wake up to reality really quick. Freedom isn’t free and the tolerance we value so highly is not secured by tolerating the intolerant and the fanatics. We must take full ownership over our own security and defence realms – sea, land, air, and space. And we must hold all stakeholders, each and every single one accountable. We need a striving, accountable, efficient and goal-oriented industry (which we have in parts). We need politicians willing to explain uncomfortable truths in understandable terms. We need a resilient and educated population, willing to take charge of their own destiny and we need capable militaries. For Europe to strengthen its security and defense capabilities, there needs to be shared technological advancements, joint training programs, and collaborative strategic planning. Prioritizing these elements will bolster Europe's defense posture, ensuring a secure and resilient continent.

5. How can economic and technology companies drive the space industry, and which partnerships between the private sector and space agencies do you think are particularly promising?

Economic and technology companies are the engines of innovation in the space industry. Partnerships between these companies and space agencies can lead to groundbreaking advancements. NASA was a and still is the single most important customer of SpaceX for example. Europe should focus on fostering these collaborations, particularly in areas like propulsion and rocket technology, satellite manufacturing, and space exploration. These partnerships not only propel technological progress but also ensure economic benefits and job creation, reinforcing Europe's position in the global industrial landscape.

6. Looking at the future plans of the European Space Agency (ESA) and other space actors worldwide: What role could international collaborations and partnerships play in space exploration, especially in the context of current geopolitical developments?

In the face of the grave current geopolitical turmoil, international collaborations are more important than ever. For ESA and other space actors, forming strategic partnerships can lead to shared resources, diverse expertise, and mitigated risks. Whenever it is practiced, international collaboration, leads to better understanding, more sustainable success and leaps in technological readiness. Collaborations are essential for large-scale missions, be it Mars exploration or establishing lunar bases. Europe should actively seek and nurture such partnerships – on eye-level, not just as a junior partner, ensuring a cooperative, peaceful and united approach to space exploration.

7. What advice would you give to young people, especially women, aspiring to a career in space exploration, based on your own experiences and challenges in this field?

For those dreaming of a space career, especially women, my advice is to persevere and embrace challenges. Space exploration demands resilience, creativity, and a continuous thirst for learning. Don't be deterred by obstacles or setbacks; they are stepping stones to your success. Remember, every small step you take is a step forward, even if the end goal is not what you initially thought out. It’s better to aim high and miss slightly, then to aim low and hit!

By integrating private enterprises in European space exploration, we can harness diverse talents, spur economic growth, and enhance Europe's global standing in the space sector. It's a call for Europe to embrace these collaborations, enabling a more inclusive and progressive space future.

Invest in Energy

Pipeline Power Shifts: Prospects for Europe's Energy Sovereignty

Christoph Erber, Charlemagne Prize Fellow 2022/23

The Fellow: Christoph Erber is an Associate Fellow of the Center for Geopolitic, Geoeconomics and Technology at the German Council on Foreign Relations (DGAP). Previously, he served as the Chief of Staff to DGAP's Director. As part of his Fellowship with the Charlemagne Prize Academy, his research focused on the topic of European energy security and related policy issues of strategic and economic (inter) dependency.

Research Project: European Pipe(line) Dreams & Realities: Assessing Future Energy Partnerships and the EU's Diplomatic Toolkit

Scientific Mentor: Prof. Dr. Guntram Wolff, then-CEO of the German Council of Foreign Relations

Introduction

Russia's invasion of Ukraine has triggered a substantial transformation of the European Union's (EU) energy landscape. At the outset of the conflict, the EU found itself heavily reliant on Russian gas and oil. In response to Russia's heinous attack on Ukraine in February 2022, EU leadership declared the Union's commitment to completely "phase out our dependency on Russian gas, oil and coal imports as soon as possible," later specifying 2027 as a firm end date.[1] Restricting coal and petroleum imports from Russia and imposing sanctions on Moscow, EU member states swiftly explored alternative energy sources. Indeed, since the beginning of the conflict in early 2022, the EU and its member states have concluded more than 120 energy cooperation agreements - both deepening existing energy partnerships as well establishing new forms of cooperation.[2]

Compelled to secure substantial non-Russian fossil fuel supplies, particularly natural gas, the EU has remained committed to transitioning to a net-zero emission economy while also assisting other nations in fulfilling their climate commitments under the Paris Agreement.[3] In its energy diplomacy, the EU has sought to fill its short and medium-term energy needs, while also fostering enduring partnerships that align with its long-term energy transition goals.

1] "The Versailles Declaration," European Commission, 11 March, 2022, https://www.consilium.europa.eu/en/press/press-releases/2022/03/11/the-versailles-declaration-10-11-03-2022/.
2] Susi Dennison et al., "EU Energy Deals Tracker," European Council on Foreign Relations, November, 2022, https://ecfr.eu/special/energy-deals-tracker/.
3] "2023 State of the Union Address by President von der Leyen," European Commission, 13 September, 2023, https://ec.europa.eu/commission/presscorner/api/files/document/print/en/speech_23_4426/SPEECH_23_4426_EN.pdf.

In this regard, balancing supply contract duration, avoiding the risk of stranded assets, and moving away from fossil fuels with urgency are pivotal considerations for decision-makers.

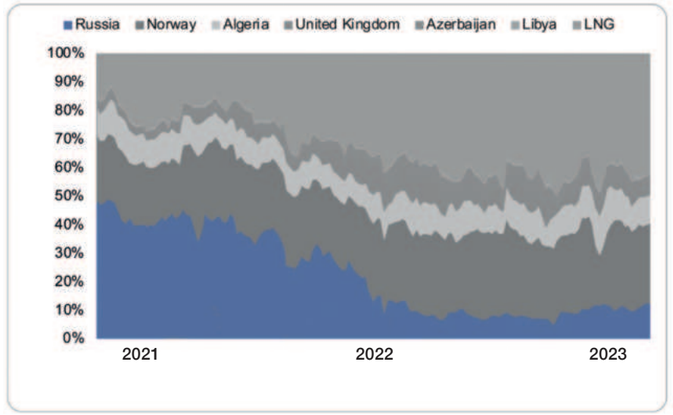
Establishing and maintaining the right partnerships is crucial in this regard. Accordingly, this policy brief assesses the capacity of the EU's (potential) energy partners to bolster supply security in the short term as well as beyond the ongoing crisis, as the bloc transitions away from fossil fuels towards greener energy sources. Norway, the United Kingdom and the United States stand out as best partners in both the short and the long term. In addition, Algeria, Morocco, and other partners in North Africa and the Eastern Mediterranean could play a key role for European energy security, provided that certain challenges are overcome to tap their renewable energy potentials. In this regard, balancing supply contract duration, avoiding the risk of stranded assets, and moving away from fossil fuels with urgency are pivotal considerations for decision-makers.

The Role of Energy Partnerships During the Crisis

Amid Russia's invasion of Ukraine and the subsequent imposition of sanctions on Moscow, intensive energy diplomacy by the EU and its member states led to a host of gas and oil deals with partners around the globe. Germany, Italy, and Poland were particularly active deal-makers, thus contributing to a rapid - albeit not full - replacement of Russian oil and gas imports to Europe in 2022.[4] The result: thanks to domestic demand cuts, alternative supply routes and the green energy rollout, the EU has succeeded in securing its gas and oil needs for the foreseeable future, even if Russian supplies are cut completely.[5] This shift in European energy imports was facilitated by the adaptability of numerous established energy partners, which met heightened gas and oil demands from EU states in times of crisis (see chart below).

Pipeline Shifts – Evolution of European Natural Gas Imports

"Weekly extra-EU27 natural gas imports, share of total by source*, 2021-2023**"



Source: Bruegel, based on ENTSO-G[6]

4] Susi Dennison, and Pawel Zerka, "Tracking Europe's energy security: Four lessons from the EU's new energy deals," European Council on Foreign Relations, 24 November, 2022, https://ecfr.eu/article/tracking-europes-energy-security-four-lessons-from-the-eus-new-energy-deals/.
5] Ben McWilliams et al., "The European Union is ready for the 2023-24 winter gas season," Bruegel, 10 October, 2023, https://www.bruegel.org/analysis/european-union-ready-2023-24-winter-gas-season.
6] *Note that LNG includes all gas transported by ship from around the world to EU27 and United Kingdom indicates net imports from the UK to EU27, all data from 3 January 2021 to 16 December 2023. Source: Ben McWilliams, Giovanni Sgaravatti, and Gregor Zachmann, "European natural gas imports,' Bruegel, 20 December, 2023, https://www.bruegel.org/dataset/european-natural-gas-imports.

The EU will depend on fossil fuels, particularly gas, for the foreseeable future as it transitions to net zero. Due to domestic demand, member states are compelled to maintain energy cooperation with existing suppliers. Energy deals struck since January 2022 also underscore this, as the majority of deals focused on securing gas supply for the short to medium term.[7] Still, increased cooperation on fossil fuel imports between the EU and its suppliers faces a number of challenges, ranging from partner states' domestic production capacity constraints, policy shifts, supply uncertainties, to investment considerations. Among the EU's hydrocarbon partners, a few stand out to play a pivotal role going forward.

Norway, a tried and trusted energy supplier for decades, has emerged as the EU's primary gas provider following the decline in Russian gas imports. As Oslo has increased gas production permits and investments in new gas fields over the past years, Norway is set to remain a reliable source of fossil fuels to Europe while simultaneously aspiring to become a "renewable energy superpower".[8] Indeed, statements from Norwegian officials have not only underscored the country's commitment to provide a steady oil and gas supply to the EU, but to also drive the green energy transition together with the Union.[9]

The role of the transatlantic partnership in facilitating Europe's energy transition cannot be overstated either. As the world's largest exporter of liquified natural gas (LNG), the United States rapidly increased its supply to Europe during the crisis. Adding 37 billion cubic meters (bcm) year-on-year, LNG shipments from the US to the EU increased by more than 135% in 2022 and dwarfed the combined 28 bcm of Europe's additional LNG imports from all other sources.[10] Having realized the commercial opportunities of LNG early on, the US is racing to commission additional export infrastructure in the near term.[11] On track to add five new LNG terminals by 2027, its export capacity is projected to more than double until 2027.[12] Having signaled a "need for American energy" over the next decades, the EU recently concluded a number of binding agreements and indicative deals for long-term gas supply with the United States.[13]

Several other energy-exporting countries have shown flexibility in aiding their EU counterparts in response to rising EU energy demands post-Russia's Ukrainian invasion. Oil and gas deliveries from countries like Algeria, Angola, Azerbaijan, Egypt, Nigeria and Qatar were crucial in enabling Europe's prompt dismissal of Russian fossil fuel imports. These partners were flexible in adapting to unexpected changes in demand and redirected significant volumes to the European market. However, most of these partners will struggle to significantly augment their fossil fuel export capacities to Europe long term.[14]

Challenges range from partner states' domestic capacity constraints and policy shifts to supply uncertainties and investment considerations. While most of the EU's key energy suppliers have significant proven fossil fuel reserves, only the United States has the ability to increase its supply to Europe with relative ease, in particular with regard to LNG. With the majority of its gas exports bound by long-term contracts, Qatar can only significantly increase LNG shipments to Europe once its planned additional export capacities are fully operational over the next few years.[15] Other partners, such as Azerbaijan and Nigeria (as well as Turkey as a possible energy transit hub) face barriers to raising exports that include both infrastructural challenges and problems related to the upstream sector.[16] For Libya, political

7] Susi Dennison, and Pawel Zerka, "Tracking Europe's energy security: Four lessons from the EU's new energy deals," European Council on Foreign Relations, 24 November, 2022, https://ecfr.eu/article/tracking-europes-energy-security-four-lessons-from-the-eus-new-energy-deals/.
8] Brett Simpson, "Norway Is Planning to Profit From Climate Change," Foreign Policy, 31 January 2023, https://foreignpolicy.com/2023/01/31/norway-is-planning-to-profit-from-climate-change/.
9] "European Green Deal: New EU-Norway Green Alliance to deepen cooperation on climate, environment, energy and clean industry," European Commission, 24 April 2023, https://ec.europa.eu/commission/presscorner/detail/en/ip_23_2391.
10] Leslie Palti-Guzman, Joseph Majkut, and Ian Barlow, "U.S. LNG: Remapping Energy Security," Center for International and Strategic Studies, 17 January, 2023, https://features.csis.org/us-lng-remapping-energy-security/.
11] Scott Divasino,"US LNG project approvals on track for record new volumes", Reuters, 16 June, 2023, https://www.reuters.com/business/energy/us-lng-project-approvals-track-record-new-volumes-2023-06-23/.
12] Victoria Zaretskaya, and Max Ober, "LNG export capacity from North America is likely to more than double through 2027", U.S. Energy Information Agency, 16 November, 2023, https://www.eia.gov/todayinenergy/detail.php?id=60944.
13] Amanda Chu, Jamie Smyth, and Alice Hancock, "Top EU energy official says US gas will be needed for decades," Financial Times, 24 September 2023, https://www.ft.com/content/7e94bc82-c358-4a8c-b539-781d62dbc3c9.
14] Szymon Kardaś, "Keeping the lights on: The EU's energy relationships since Russia's invasion of Ukraine," European Council on Foreign Relations, 4 May, 2023, https://ecfr.eu/publication/keeping-the-lights-on-the-eus-energy-relationships-since-russias-invasion-of-ukraine/.
15] Pier Paolo Raimondi, "A Scramble for Gas: Qatari LNG and EU Diversification Plans," Istituto Affari Internazionali, 22 April 2022, https://www.iai.it/en/pubblicazioni/scramble-gas-qatari-lng-and-eu-diversification-plans.
16] Szymon Kardaś, "Keeping the lights on: The EU's energy relationships since Russia's invasion of Ukraine," European Council on Foreign Relations, 4 May, 2023, https://ecfr.eu/publication/keeping-the-lights-on-the-eus-energy-relationships-since-russias-invasion-of-ukraine/.

> Some of the EU's current leading oil and gas suppliers – particularly in North Africa and the Eastern Mediterranean – could emerge as key producers of low-carbon hydrogen, given their geographic proximity, existing infrastructure, and large renewable energy potential.

instability, corruption, and insufficient infrastructure constitute serious obstacles to increasing the supply of fossil fuels to Europe.[17] Algeria is highly dependent on hydrocarbon export revenues and aspires to boost shipments to the EU. Delivering on its reputation as a reliable energy partner to many southern European countries, Algeria played a key role in restocking European gas storages for the past winters.[18] But the mature state of its existing fields as well as a backlog of upstream investments and outdated technology have led to stagnating production levels, while a fast-growing domestic gas demand further curbs Algeria's future export potential.[19]

Still, the crisis revealed that the EU could count on most of its existing network of gas and oil suppliers when in a pinch. Norway and the US have particularly stood out in terms of their absolute contributions, while the UK stepped up as a transit hub facilitating LNG imports to the continent.[20] Sound crisis management and active energy diplomacy at the European and national levels have solidified relations with existing suppliers and also established new energy links.[21] Against this backdrop, policy-makers now face the task of which energy partnerships should be prioritized, as the Union seeks to establish long-term energy security while also achieving its ambitious climate and sustainability targets.

Squaring Energy Demand and Climate Policy Objectives

The EU's own climate legislation could prove a major obstacle in securing its short to medium term fossil fuel needs. To reach net zero, the EU is expanding both its renewable energy capacity as well as reducing its emissions from power generation and industrial activity. In diversifying its fossil fuel imports away from Russia to become more energy independent, the EU must simultaneously contend with its intention to accelerate energy transition processes and achieve climate neutrality by 2050.

Replacing imported fossil fuels with hydrogen has emerged as a key component of the Union's climate and energy sovereignty strategies.[22] The clean-burning gas can be produced from renewable energy and electrolysis ("green" hydrogen) or sourced from natural gas either straight ("gray" hydrogen) or while also capturing and sequestering the resulting carbon emissions ("blue" hydrogen). Given its virtues, it is a favorite to decarbonize fossil fuel-reliant industrial sectors like steel and chemicals, as well as long-distance transport where electrification is not yet feasible. Thus, to meet its industrial ambitions and its 2050 climate targets, Brussels has channeled significant investments into hydrogen-related projects since 2020.[23]

17] Ariel Cohen, "Political Risks and Hobbesian Warfare Complicate Libyan Gas Supply for Europe," Forbes, 11 February, 2022, https://www.forbes.com/sites/arielcohen/2022/02/11/political-risks-and-hobbesian-warfare-complicate-libyan-gas-supply-for-europe/.
18] Nnenna Amobi, "Algeria Proves Key to Europe Hitting 90% Full Gas Storage," Bloomberg, 31 August, 2023, https://www.bloomberg.com/professional/blog/algeria-proves-key-to-europe-hitting-90-full-gas-storage.
19] Mostefa Ouki, "Algerian Gas in Transition: domestic transformation and changing gas export potential," Oxford Institute for Energy Studies, 1 October 2019, https://www.oxfordenergy.org/publications/algerian-gas-in-transition-domestic-transformation-and-changing-gas-export-potential/.
20] Marshall Hall, "LNG and UK Energy Security," Oxford Institute for Energy Studies, 1 May 2023, https://www.oxfordenergy.org/publications/lng-and-uk-energy-security/.
21] Giovanni Sgaravatti, Simone Tagliapietra, and Cecilia Trasi, "National energy policy responses to the energy crisis," Bruegel, 15 December 2022, https://www.bruegel.org/dataset/national-energy-policy-responses-energy-crisis.
22] "Hydrogen," European Commission, accessed 6 January, 2024, https://energy.ec.europa.eu/topics/energy-systems-integration/hydrogen_en.
23] America Hernandez, "Go big or go green? The EU's massively expanding hydrogen bet," Politico, 19 October 2022, https://www.politico.eu/article/go-big-or-go-green-the-eus-massively-expanding-hydrogen-bet/.

This policy shift will impact many of the EU's current energy partnerships. Lacking infrastructure and a favorable environment, the majority of Europe's future hydrogen requirements will need to be met by imports.[24] Some of the EU's current leading oil and gas suppliers - particularly in North Africa and the Eastern Mediterranean - could emerge as key producers of low-carbon hydrogen, given their geographic proximity, existing infrastructure, and large renewable energy potential. The World Energy Council expects future hydrogen pipelines will connect the EU with Morocco, Algeria, Tunisia, Egypt (via Greece), Norway, and the UK.[25] While recent energy cooperation with many of these countries has focused primarily on hydrocarbons, synergies for exports and domestic decarbonisation could be unlocked if the cooperation is expanded to include hydrogen development.[26]

For many fossil fuel exporter states going forward, hydrocarbons will remain an important source of revenue. Examining some of the EU's leading fossil fuel suppliers makes this clear: for the United States, the value of its oil and gas exports represents 21 percent of its total good exports, while this number is 77 percent for Saudi Arabia, 79 percent for Norway, 82 percent for Qatar, 91 percent for Nigeria, 94 percent for Libya, and 96 percent for Algeria.[27]

Managing relations with these supplier countries will be no easy task for the EU. With little to no existing production capacities, incentivizing hydrocarbon producers to change their profitable business model and switch to producing low-carbon hydrogen will be expensive - both in terms of financial and political capital. As Brussels seeks to build a market for this commodity, it needs to present prospective hydrogen producers with a business case that offers long-term profitability to justify the costly entry investments. But so far, the hydrogen revolution is lagging behind its ambitious goals. The EU has targeted 20 million tonnes of domestic hydrogen demand by 2030, but current industry predictions only account for 8.5 million tonnes.[28] The dilemma: there is little hydrogen demand because current market supply is low - but production volume is low due to little demand.

Promotion of Europe's future hydrogen economy could be further complicated by the EU's new carbon border adjustment mechanism (CBAM).[29] While trade in fossil fuels is not affected directly, the mechanism introduces a tax on other EU imports based on the embedded carbon emissions of covered goods. Currently in a transitional phase, the CBAM will fully enter into effect by 2025 and cover the import of electricity and hydrogen, as well aluminum, cement, fertilizers, iron and steel. The impending regulations have already caused worry among businesses within the Union and abroad over increasing supply chain costs and global market competitiveness.[30] Hence, prospective hydrogen suppliers will face varying degrees of additional costs, depending on if they consider supplying the EU with blue, gray, or green hydrogen.

Looking Ahead: Policy Recommendations for EU Energy Diplomacy

Navigating the fault lines of the global energy map will provide both opportunities and challenges. In this new environment, building an increasingly global and diverse network of energy partnerships will be key. As the EU seeks to strengthen its collective resilience to future energy market shocks, it should heed the following priorities for sound and strategic energy partnerships.

Strengthen Energy Relations with Traditionally Close Allies

First and foremost, the EU and its member states should strengthen relations with countries that have fulfilled their role as dependable partners since the start of Russia's war on Ukraine. Norway, the United Kingdom, and the United States are among the principal countries with which the EU should continue to build lasting energy alliances.

Set on becoming an international pioneer in low-emission energy supply, Norway is not only a reliable supplier of fossil fuels to the EU for the time being, but also a valuable ally on future renewable and hydrogen energy projects. Currently lacking specific obligations for the signing parties, the recently established EU-Norway Green Alliance should be converted into a detailed action plan, specifying future EU demand volumes for the supply of fossil fuels. It should also address how Norway's advanced expertise in carbon capture and storage technology and its extensive hydropower potential could be further utilized to upgrade the European energy grid.

In the case of the United Kingdom, both sides are – still – strongly aligned in their ambition and objectives on energy and climate policy. But Brexit has (re)introduced a set of policy obstacles that should be overcome promptly to form a more powerful energy partnership. To this end, the EU's North Seas Energy Cooperation group should be further developed as a multilateral platform to include the UK for political and regulatory discussions. This is key to advance European grid interconnectedness and to harness the UK's massive off-shore wind potential. Similarly, streamlining efforts in carbon pricing and border adjustment regulation could help promote green investments and facilitate a smoother transition towards a low-carbon economy on both sides of the Channel.

Lastly, with regard to Europe's short to medium-term fossil energy needs, the United States is key. A dependable ally for decades, the US recently has become one of Europe's leading gas suppliers. With gas trade set to grow even further across the Atlantic, public-private port partnerships between Europe and the United States could strive to alleviate the carbon impact of LNG exports and drive decarbonization of shipping itself. The expanding energy trade should evolve into a deeper strategic cooperation around climate and energy using existing institutional links such as the EU-US Task Force on Energy Security and the EU-US Energy Council. After all, the transatlantic energy and climate agenda offers many cooperation opportunities, with both Europe and the United States interested in promoting hydrogen, carbon capture and sequestration, methane reduction, geothermal energy, offshore wind, and other green technologies.

Communicate European Energy Needs with One Voice

Secondly, to maintain reliable supply channels for fossil fuels, EU and member state policymakers should build energy partnerships based on the balance of interests of the parties involved. This means acknowledging both the medium- and long-term interests of the EU and member states on the one hand, and the interests of fossil fuel suppliers on the other. Although the EU has already reached some binding agreements with key fossil fuel suppliers to Europe (such as with the US and Azerbaijan), it has only concluded indicative agreements with Algeria and Norway. Provided that such deals align with the EU's foreign policy goals, the Union should continue its efforts to conclude more binding arrangements with key fossil fuel suppliers. Aggregating fossil fuel (especially gas) needs at the EU level and communicating these clearly with one European voice decreases the risk of fossil fuel traps, because prospective partners can adjust their investment and production targets accordingly and provide the needed fuel volumes.

Presenting a more united front when negotiating with supplier countries will pay off financially, too. The Energy Platform launched by the European Commission in 2022 is a case in point. It was originally intended as an emergency tool to coordinate filling Europe's gas storage facilities as the Union decoupled from Russian imports.[31] Already at its inception, policy experts recognized the platform's potential as a "cornerstone of the new European energy security architecture".[32] Indeed, further developing and using this mechanism to pool member state's demand for energy purchases would strengthen the EU's bargaining power over suppliers, thus lowering purchase prices. As suppliers will have difficulties playing member states against each other like in the past, this will further strengthen European energy sovereignty.

Steer Investments towards Hydrogen and Renewables

Thirdly, the EU and its member states should avoid subsidizing future hydrocarbon project investments, especially in third countries. Given that the current increase in gas demand in the EU is likely only short to medium-term in nature, holding off on new investments in upstream oil and gas will avoid the creation of stranded assets. Moreover, such investments are incompatible with the EU's ambitious climate goals over the long term and could damage the EU's image as a global green policy leader.

Instead, sustained investment in renewables and the hydrogen sector will strengthen the EU's energy sovereignty. Facilitating industry and infrastructure adaptation within the Union, the REPowerEU initiative has already pooled around €300 billion

24] Abdurahman Alsulaiman, "Renewable Hydrogen Import Routes into the EU," The Oxford Institute for Energy Studies, 1 May, 2023, https://www.oxfordenergy.org/wpcms/wp-content/uploads/2023/05/Renewable-Hydrogen-Import-Routes-into-the-EU-ET24.pdf.
25] Marco Baroni, "Decarbonised hydrogen imports into the European Union: challenges and opportunities," World Energy Council - Europe, 8 October, 2021, https://www.weltenergierat.de/wp-content/uploads/2021/11/Presentation_H2-Import-Study_Oct-2021-1.pdf.
26] Laurent Ruseckas, "Europe and the Eastern Mediterranean: the Potential for Hydrogen Partnership," German Institute for International and Security Affairs, 29 August, 2022, https://www.swp-berlin.org/10.18449/2022C50v02/.
27] "Fuel exports (% of merchandise exports)", The World Bank, accessed 5 January, 2024, https://data.worldbank.org/indicator/TX.VAL.FUEL.ZS.UN.
28] Nikolaus Kurmayer, "EU's hydrogen economy struggles to pick up pace," EurActiv, 7 September, 2023, https://www.euractiv.com/section/energy-environment/news/eus-hydrogen-economy-struggles-to-pick-up-pace/.
29] "Carbon Border Adjustment Mechanism," European Commission, accessed 5 January, 2024, https://taxation-customs.ec.europa.eu/carbon-border-adjustment-mechanism_en.
30] Dave Keating, "As EU carbon border levy looms, businesses scramble to get ready," Energy Monitor, 11 September, 2023, https://www.energymonitor.ai/carbon-markets/as-eu-carbon-border-levy-looms-businesses-scramble-to-get-ready/?cf-view.
31] "EU Energy Platform," European Commission, accessed 2 January 2024, https://energy.ec.europa.eu/topics/energy-security/eu-energy-platform_en.
32] Walter Boltz et al., "How to make the EU Energy Platform an effective emergency tool," Bruegel, 16 June, 2022, https://www.bruegel.org/policy-brief/how-make-eu-energy-platform-effective-emergency-tool.

When considering the possibilities of supporting energy projects in third countries, the EU should equally prioritize the ones conducive to decarbonising those countries' economies and energy sectors.

until 2027 to facilitate fossil fuel independence from Russia.[33] Of this, approximately €113 billion is to be spent on investments in renewable energy sources and hydrogen infrastructure within the Union.[34]

At a similar magnitude of €300 billion, the EU's Global Gateway project supports, among other sectors, investments to achieve clean energy transition across the world.[35] When considering the possibilities of supporting energy projects in third countries, the EU should equally prioritize the ones conducive to decarbonising those countries' economies and energy sectors. Accelerating renewable energy and digital infrastructure development through investment projects like the Global Gateway, most importantly in Europe's southern neighborhood, is crucial in supporting the EU's green transition.[36] In this regard, energy partnerships with African countries, such as Algeria, Egypt, Morocco, and Tunisia are key to reduce both oil and gas consumption and boost renewable energy generation.

Secure Critical Raw Materials for Low-Carbon Technologies

Lastly, the EU should build more partnerships with those countries that have significant critical raw material resources. These critical elements are essential for the development of low-carbon technologies, from batteries to solar cells. Deposits of raw materials used to produce clean technologies are located all around the world, but are particularly abundant in Africa.

Having recognized the need for a secure, diversified, affordable and sustainable supply of critical raw materials, the EU passed the European Critical Raw Materials Act (CRA) in 2023.[37] The EU could leverage the external dimension of the European Green Deal to secure agreements on critical raw materials. While this regulation is a crucial step in the right direction, policy experts have called on the EU at once to expand on the initiative, as it falls short of providing substantive funding, administrative support, and achievable diversification requirements for European companies.[38] Indeed, industry representatives have been vocal about the high energy and regulatory costs, which undermine investment incentives.[39] To compete with China and the US for critical raw material access, the CRA should be complemented with a strategy to diversify the EU's supply chains and promote diversification by incentivizing European companies to source critical raw material from more alternative suppliers.

If the Union plays its cards right, Europe's energy mix will emerge from this crisis more diversified than ever, with new sources of imports, points of entry, delivery routes, and types of energy.

Conclusion

The ongoing power shifts in the global energy market have created momentum for the EU to become an even stronger advocate of the green energy transition. Europe's main challenge is to make this transition part of the solution rather than part of a new problem by avoiding the creation of new dependencies. If the Union plays its cards right, Europe's energy mix will emerge from this crisis more diversified than ever, with new sources of imports, points of entry, delivery routes, and types of energy.

For this to happen, the Union needs to remain proactive regarding its shifting energy relations. Hence, EU and member states policymakers should seize this opportunity for energy diplomacy, not only to secure energy supplies, but to also support partner states in their pursuit of sustainable energy solutions and a clean energy transition. Deepening energy partnerships - particularly with African states - should include a sustainability dimension that is financially feasible and enhances partner countries' decarbonisation ability. By developing long-term strategies targeting third countries and moving from a fossil-interdependent and risky paradigm, the EU can use its foreign policy instruments to become an exporter of technological and regulatory standards that will have a lasting impact on the changing energy industry. With this in mind, continuing to pursue an active energy diplomacy will be key in boosting both European energy security as well as the Union's efforts to contain climate change.

33] "REPowerEU: Affordable, secure and sustainable energy for Europe," European Commission, accessed 2 January, 2024, https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/repowereu-affordable-secure-and-sustainable-energy-europe_en.
34.] "Financing REPowerEU," European Commission, accessed 2 January, 2024, https://ec.europa.eu/commission/presscorner/api/files/attachment/872551/FS%20Financing%20REPowerEU.pdf.pdf.
35] "International Partnerships: Global Gateway," European Commission, accessed 2 January, 2024, https://international-partnerships.ec.europa.eu/policies/global-gateway/global-gateway-overview_en.
36] Alberto Rizzi, and Arturo Varvelli, "Opening the Global Gateway: Why the EU should invest more in the southern neighbourhood," European Council on Foreign Relations, 14 March, 2023, https://ecfr.eu/publication/opening-the-global-gateway-why-the-eu-should-invest-more-in-the-southern-neighbourhood/.
37] "European Critical Raw Materials Act," European Commission, accessed 2 January 2024, https://ec.europa.eu/commission/presscorner/detail/en/ip_23_1661.
38] Francesco Findeisen, and Yann Weinert, "Meeting the costs of resilience: The EU's Critical Raw Materials Strategy must go the extra kilometer," Hertie School Jacques Delors Centre, 30 June, 2023, https://www.delorscentre.eu/en/publications/eu-critical-raw-materials.

39] Frederic Simon, "EU's critical minerals act welcome but falling short, say green groups and industry," EurActiv, 7 December, 2023, https://www.euractiv.com/section/circular-economy/news/eus-critical-minerals-act-welcome-but-falling-short-say-green-groups-and-industry/

Paving the Way to a Carbon Neutral Future – Together.

Kristina Haverkamp, Managing Director of the German Energy Agency (dena)

Kristina Haverkamp has been the CEO of the German Energy Agency (dena) since October 2015, overseeing the business administration and focusing on sustainability in transportation and international collaborations. She studied law in Germany, Switzerland, and the US. Her career began at the German Foreign Office as a specialist in international environmental policy and later as a rapporteur for the transportation sector at the Federal Cartel Office. She has also worked at the Federal Ministry of Economics, the Federal Ministry of Finance, and the Permanent Representation of Germany to the EU. As a Ministerial Director, she headed the Economic Affairs Department, overseeing energy and environmental policy, as well as industrial and SME policy. She is a member of the scientific advisory board of the French Energy Agency (ADEME) and serves on the board of the European Renewable Gas Registry (ERGaR).

Climate change, Russia's continued war of aggression against Ukraine, Europe's energy crisis – the past years were not short of challenges. While Europe's green trajectory was tested numerous times along the way, it has become increasingly obvious for policy makers, industry and the general public in Europe that an even faster energy transition is not part of the problem, but a crucial element of the solution.

Especially energy efficiency and the expansion of renewable energy sources (RES) are pivotal for diversifying the EU's supply sources and strengthening its energy system's resilience vis-à-vis geopolitical ramifications whilst serving the climate targets; scaling up low-carbon markets and strengthening Europe's innovation capacity are key prerequisites for the single market to remain a competitive business location and to build resilient and sustainable value chains.

While becoming more efficient and self-reliant in terms of energy production and consumption, Germany's and the EU's commitment to climate neutrality remains strong. In this context, promoting a green energy transition both within and outside of the EU is a cornerstone both of Germany's and the Union's climate action.

Germany's energy transition in the European context

Germany has been promoting climate action and renewable energies for more than two decades. Today, it is the first industrialised state committed to phase out coal and nuclear power within a short time-frame. Based on market integration and cross-border cooperation, the German Federal Government is designing an interconnected energy system that is not only secure in terms of energy supplies, but also competitive and environmentally friendly.

Committed to the Paris Agreement, the German government aims to limit global warming to ideally 1.5 degree Celsius but certainly well below 2 degrees. Germany set itself ambitious climate targets: By 2030, the share of renewable energies of gross electricity consumption should increase to at least 80 percent, while GHG emissions should be cut by 65 percent.[1] Aiming at climate-neutrality by 2045, Germany reached the lowest point of its CO2 emissions in 70 years in 2023.[2]

1] Compared to 1990 levels.
2] Agora Energiewende, "Die Energiewende in Deutschland: Stand der Dinge 2023. Rückblick auf die wesentlichen Entwicklungen sowie Ausblick auf 2024," 2024, 11.

Practical questions, such as the extent to which import and balancing options for electricity are available and which infrastructure and regulatory standards this implies, require close coordination both among European transmission grid operators and among the EU's Member States to ensure systemic stability as well as a politically coherent transition in terms of supply, regulation and market design.

Moving towards climate neutrality requires a fundamental transformation of the entire energy system which impacts all economic sectors, including industry, buildings, transport, and agriculture. In order for Germany to remain an innovative and competitive business location on its pathway towards a climate neutral, resource-efficient circular economy, public and private entities must pull together - both across sectors and across borders. This also applies to the electricity sector. Practical questions, such as the extent to which import and balancing options for electricity are available and which infrastructure and regulatory standards this implies, require close coordination both among European transmission grid operators and among the EU's Member States to ensure systemic stability as well as a politically coherent transition in terms of supply, regulation and market design. Germany's energy transition is therefore firmly embedded in Europe and closely coordinated with the climate and energy policies of its European partners.

Both REPowerEU and the EU's hydrogen strategy reflect the power of such coordinated action, not only in times of crisis, by providing a common strategic approach towards reducing energy demand whilst increasing the domestic supply of renewable energy and supporting the market ramp-up of hydrogen. For their implementation, EU instruments such as Projects of Common Interest (PCI) and Important Projects of Common European Interest (IPCEI) play a crucial role by politically and financially incentivising cross-border projects of strategic importance to the European energy market, such as, for instance, the PCI project H2Med. The corridor from the South-West is set to transport hydrogen between Portugal, Spain and France with an extension to Germany. It is against this backdrop that the German Federal Government is presently developing a hydrogen import strategy as part of its national hydrogen strategy update.[3] Encompassing both European and Member State's strategies and financial instruments, such coordinated strategic approaches and the political support that comes with them can play a key role in facilitating investment decisions and accelerating the market ramp-up of green tech.

The energy transition toolbox: How to strengthen European and international cooperation?

The European Union and its Member States build on a large variety of policies and instruments that are jointly to increase the Energy Union's supply security, competitiveness, and sustainability. These instruments and policies need to be well governed to ensure a coherent market and governance design that allows both public and private actors to plan well ahead with regards to investment decisions and technological innovations, that are crucial for the transition's success.

3] Federal Ministry for Economic Affairs and Climate Action, "National Hydrogen Strategy Update" (Berlin, 2023), 2.

Neither Germany, nor other EU Member States would be successful on their own. The energy transition rather demands for an integrated and interconnected European market incorporating a variety of closely coordinated tools and cooperation formats to foster green lead markets and make carbon-neutrality a reality in the European Union and beyond.

In this connexion, the diversity of actors, interests, and instruments may be considered as one of the Union's challenges, as illustrated by debates about the hydrogen terminology and future role of nuclear energy. However, this diversity is also one of the EU's strengths when it comes to designing an increasingly decentralised and diversified energy system. Neither Germany, nor other EU Member States would be successful on their own. The energy transition rather demands for an integrated and interconnected European market incorporating a variety of closely coordinated tools and cooperation formats to foster green lead markets and make carbon-neutrality a reality in the European Union and beyond.

Energy Partnerships

As highlighted by the Federal Government's climate foreign policy strategy, decarbonization through renewable energy and energy efficiency is a key pillar of Germany's climate foreign policy. The bilateral climate and energy partnerships of Germany with more than 30 countries worldwide are important means to this end, as they provide space for a regular bilateral exchange on climate targets, governance, and best practices between governments and stakeholders, fostering projects and dialogues between the public sector, industry, and civil society.

By the same token, the EU is intensifying its energy relations by the means of bilateral partnerships and Memoranda of Understanding (MoU), such as its strategic partnership on renewable hydrogen with Egypt signed at COP27. Moreover, it promotes the Green Deal in regional formats such as the Eastern Partnership (EaP).

To fully realize the potential of bilateral and regional partnerships, dialogue and coordination between national and EU partnerships should be further enhanced by means of a concerted planning and reporting as well as a mix of formal and informal consultations. A stronger coordinating of the different Member State and the EU's initiatives would strengthen the coherence and effectiveness of EU (climate) foreign policymaking, as it would generate political synergies as well as facilitate the external engagement of third countries with the EU and its multiple entities.

Sustainable value chains

Besides promoting the energy transition and the deployment of renewable energy abroad, building sustainable value chains becomes an increasingly important element of bilateral energy partnerships. As the global demand for critical raw materials, such as rare earths and metals necessary for renewable technologies, increases, building diversified and resilient supply chains is of utmost importance to the energy transition's success.

Given the geographic concentration of raw materials in an increasingly contested environment, the EU took important first steps to ensure its future supply and scale up green lead markets – from the Critical Raw Materials Act and Net Zero Industry Act to the EU's partnerships such as with Chile on sustainable raw materials value chains.

A decarbonisation of value chains cannot be based on sustainability standards and regulations alone. It is indispensable to tackle the difficult question of how to ensure both a politically and socio-economically just transition in exporting countries. Ensuring an intergovernmental dialogue at eye level to learn about each other and, at the same time, from each other, is a crucial first step in the direction of creating lasting and mutually beneficial relations.

In this regard, multilateral initiatives outside of the existing European and international structures, such as the Global Environment Facility (GEF) or the Climate Club launched by Germany and Chile at COP28, have an important role to play. Besides providing for a platform for dialogue on equal terms, their flexibility makes short reaction times possible. They may even enable faster support for a socio-economically just and viable transition in countries affected by environmental, social and climatic challenges, while helping to scale up green lead markets for low-carbon technologies across the globe.

Outlook

The European Union and its Member States together remain well-equipped with effective tools to promote the energy transition both locally and globally. It is especially the interplay of national and EU instruments as well as bilateral and multilateral initiatives that are essential to make carbon-neutrality a reality. Such a fundamental transition, however, will not succeed in a top down-manner only. It relies equally on concrete projects across sectors and borders from within the civil society and business community to further interconnect national energy markets and scale up low-carbon technologies. For that, a facilitating market environment with minimal red-tape and bureaucratic boundaries but a high availability of skilled workers and access to capital for innovative ideas to strive needs to be built. This remains a fundamental political task.

The European Parliament elections in 2024 have the potential to provide the Union with a breath of fresh air with regards to further bundling the tools and expertise on the energy transition already present in the EU and its member states. Enhancing the single market's competitiveness and effectiveness of climate action eventually contributes to scaling up the green lead markets and sustainable value chains necessary for the successful decarbonisation of energy systems across Europe and beyond.

The European Parliament elections in 2024 have the potential to provide the Union with a breath of fresh air with regards to further bundling the tools and expertise on the energy transition already present in the EU and its member states.

Energy Diplomacy, Energy Imports and the Role of Green Hydrogen

Dr. Stefan Kaufmann, Member of the German Bundestag

Stefan Kaufmann is a member of the German Bundestag. Before that, he was appointed as the Innovation Commissioner for "Green Hydrogen" at the Federal Ministry of Education and Research in 2020, tasked with implementing the German government's National Hydrogen Strategy. He was responsible for aligning the research and development activities of the Ministry and transferring them into practice in collaboration with stakeholders from politics, industry, and academia. Additionally, the Innovation Commissioner brought promising innovative approaches and insights from research into the political arena and public discourse.

Russia's war of aggression has painful put into focus how vulnerable our energy supply is. It has shown us just how dependent we are on fossil fuels. And it has reminded us that we must act swiftly. This was the time for a turning point in history.

Europe and the countries with whom we share the same western values have closed ranks. The path we take out of the climate crisis is also the path to independence from Russian gas and oil. It is also an opportunity for us to design the energy system of the future together and to do it quickly. Our aim in Europe, in terms of how we do business and how we live, is to achieve climate-neutrality by 2050 the latest. To realize this aim, we first need a climate-neutral energy supply based on renewable sources.

But a commitment to developing renewables is only a first step. The current energy system needs to be diversified overall, because although a number of applications and processes can be electrified straight away, some others – certain industries, aviation and maritime trade, for example – are difficult or even impossible to electrify.

This is where green hydrogen (or renewable hydrogen) comes into play. With green hydrogen, we can help energy-intensive industries in particular to become more environmentally friendly. With green hydrogen, we can store, transport and import renewable energy independently of power lines.

Our high-performing industry has a high demand for energy. However, we have only limited potential to produce energy from sun and wind at home. We therefore already know that Germany and Europe will have to continue importing energy – renewable energy, of course – in large volumes. Green hydrogen will play a decisive role in this process.
It is plain to see that we must think on a global scale when it comes to the hydrogen-based economy. If we really aim to curb climate change, we must establish an age of renewables worldwide. This is why Germany and Europa are following a twin-track strategy, which consists of

· The export of hydrogen technologies and the development of sustainable energy systems in regions with an abundance of sun and wind on the one hand,

It is plain to see that we must think on a global scale when it comes to the hydrogen-based economy. If we really aim to curb climate change, we must establish an age of renewables worldwide.

· And the import of green or at least low-carbon hydrogen and establishment of an entirely climate-neutral industry on the other. The European Union wants to import 10 Mio. tons of renewable hydrogen in 2030 (which needs 10 GW of electrolyser capacity)

To do this, we need strong partners who will pave the way to a green hydrogen economy together with us. Partners with whom we can build strong, high-capacity supply partnerships. Germany closed its first hydrogen partnerships with Australia and Namibia already in 2021. In the meanwhile we built up a lot of other hydrogen partnerships based on our worldwide energy partnerships – f.e. with Canada or South American countries. The German government is working right now on a hydrogen import strategy to highlight several countries for closer hydrogen partnerships. In this strategy not only the hydrogen production potential will play a role, but also our shared values and the conditions of hydrogen production in the several countries around the world. A very good example of Energy diplomacy. And one thing we can say is that Europe will never become similarly dependent on its energy supply, as a large number of countries worldwide will produce green or low-carbon hydrogen.

And there is something else: supply partnerships on an equal footing make it possible to do more than just import sustainably produced energy and green hydrogen; they are also the key to new markets. Green hydrogen is a once-in-a-lifetime opportunity for Europe. As the lead market and lead supplier of hydrogen technologies, ramping up the European hydrogen economy will create plenty of new jobs. And we have the unique opportunity to shape the energy landscape of tomorrow.

But let's also remember that our rivals never rest! China, South Korea and Japan have also started working towards the hydrogenbased future. That's why we in Europe must work together and pool our strengths. To keep up with the competition, Europe needs energy and enthusiasm as well as a strong network between all of the relevant key players. Only two very important examples: We have to work very fast on the about five hydrogen pipeline corridors, to bring the hydrogen as a gas from the closer regions with abundant renewable capacities (Nordics, Southeast Europe, North Africa etc.) – and we have to work on an infrastructure to crack the green ammonia, which will arrive by ship at our European energy hubs (Rotterdam, Antwerp, Wihelmshaven, Hamburg, Rostock, Krk etc.)

We have already achieved a great deal. But there is still a lot to do before we have a functional hydrogen economy. If our aim is to create a global market for green hydrogen where Europe takes

the lead, we need also the right conditions and we need them fast. Many of the technologies are still in their infancy.

We should take advantage of the opportunity to shape their norms, standards and safety regulations. Although we won't be able to chart the course of regulations overnight, we do need a clear plan and a clear objective at the European level, too. We need to start thinking about

· First, what should the green hydrogen economy look like in 2030, in 2040 and in 2050? The EU's Hydrogen Strategy has already laid the foundation for this.

· Second, what are the key legal parameters which need to be adjusted in order to realize this green hydrogen vision?

The European strategy on international energy engagement can provide some crucial points of reference from an international perspective. And we need global solutions for a global scale-up of a green hydrogen economy.

Our objectives are very ambitious indeed. But we can achieve them if we take decisive action now. In doing so, we must think as Europeans. With the Green Deal, the European Recovery Fund, the European Hydrogen Bank and various national programs, we have considerable funds at our disposal for this forward-looking project. Let us seize these opportunities together. Let us work on an European Hydrogen Union in the framework of an European Energy Union!

> To keep up with the competition, Europe needs energy and enthusiasm as well as a strong network between all of the relevant key players.

> If our aim is to create a global market for green hydrogen where Europe takes the lead, we need also the right conditions and we need them fast. Many of the technologies are still in their infancy.

Invest in Technology

Europe's Path to Enable Tech-Driven Startups On Its Path to a New, Cleaner and Fairer Economy

Sabine Kerssens, Charlemagne Prize Fellow 2022/23

The Fellow: Sabine Kerssens orchestrates startup ecosystems in the Netherlands and Europe. Empowered by the 4500+ experts at TNO, she enables DeepTech founders to scale big. She worked as strategy manager at Techleap.nl, and is a Charlemagne Academy Fellow researching DeepTech for Europe's strategic position.

Research Question: How can the EU leverage the scientific knowledge through deep tech startups, to strenghten its position & achieve an equitable resilient reset?

Host Institutions: Techleap.nl and TNO Vector

Scientific Mentor: Prof. Dr. Eric Stam, Professor of Strategy, Organisation & Entrepreneurship and Dean of the Utrecht University School of Economics

A unified approach for Europe to enable disruptive startups on its path to a new, cleaner and fairer economy.

" 'Deep' Technology was impossible yesterday, is barely feasible today, and will quickly become so pervasive and impactful that it is difficult to remember life without..." by Siegel & Krishnan.

The pace at which research and innovation activities emerge has transformed in several ways digitalization has renewed the DNA of innovation, and the convergence of the digital and physical worlds has enabled a deeptech wave of science-based, digitally enabled innovations [7]. Deeptech companies aim to address humankinds' biggest challenges. Such a company brings transformative technology from the lab to the market, and thus far, the generated democratized research infrastructure and increased available funding has led to the rise of deeptech companies globally, including in emerging markets [18]. However, commercialisation is critical to realizing the benefits of deeptech solutions, and deeptech firms often struggle to successfully commercialize and scale their breakthroughs [19].

The state of deeptech today

The latest database research reveals that over 40,000 startups today are classified as deeptech companies. Over 2 million jobs are generated in startups with another 1.5 million in public or subsidiary companies. More than 6000 companies have already raised 10 million USD, and the total predicted valuation of this group was above 7 trillion USD in 2021 [10]. However, recent years have not matched the growth seen in 2021.

While the United States remains the front runner when it comes to both regular and deeptech startups, in several ways founders are better supported in their early growth elsewhere. It is possible that leading high-level tech businesses influencing the economy of tomorrow are European.

The United States remains the front runner when it comes to both regular and deeptech startups, thus creating an atmosphere of winner takes all, leading to the high-level tech businesses influencing the economy today. When examining per capita deeptech activity in particular, Israel stood apart. Before the war, totalling $395 per capita, Israel outperformed the U.S five times.

The buzz around deeptech is growing and large numbers of stakeholders are getting involved in the scaling of deeptech innovations. This paper aims to find the venturing hurdles for startups and the policies that are implemented in Europe and in extraordinary hubs like the U.S., Singapore or Israel which have found ways to ease those hurdles. It searches for practical and tested solutions in enabling deeptech to scale, to turn the value of top-quality research into a successful commercialized sector which will enable the EU to create global competitiveness and economic safety and stability for the next generation. Valorisation and deeptech has so-far been a missed opportunity to turbocharge the European economic footing [4].

How to research one single deeptech startup ecosystem?

In this new field of research, it can be complicated to know what's in a word. Deeptech are startups with an impact focus; they have long research and development cycles which result in long valleys of death. There can be ambiguity. Quite often they are a university spinoff, though this is not necessary to be classified as deeptech, and vice versa: not all spinoffs will be deeptech. They are not limited by one discipline and can be active in a variety of industries, including but not limited to AI, quantum and power electronics. For this research we said deeptech is: "Companies based on early-stage technologies deriving from scientific or engineering advances, requiring long development times, systemic integration, and sophisticated knowledge to create a downstream offering with the potential to address grand societal challenges" [22], which aligns with the above conclusions. A variety of databases record deeptech, for example Dealroom, CB Insights, Pitchbook or Crunchbase. Terms like "frontier tech" or "emerging tech" can also be found overlapping deeptech. It is not guaranteed that businesses will be classified equally in different databases. Due to the use of different definitions - and the fact that not every company is currently registered as either deeptech or non deeptech - there is a lot of uncertainty in analysis. To increase reproducibility and replicability, Dealroom is used as the main database [17]. Other databases and qualitative knowledge by local experts are used for validation and enriching the final insights and recommendations. In this way, a pragmatic view of today's deeptech landscape is possible. In essence, the key takeaway is that what is deeptech today is not necessarily deeptech tomorrow [12]. Once the technology or product is no longer novel and as the company scales, what was once deeptech becomes regular tech. Especially this disruptive character of deeptech is what can help Europe on its path to a new, cleaner and fairer economy.

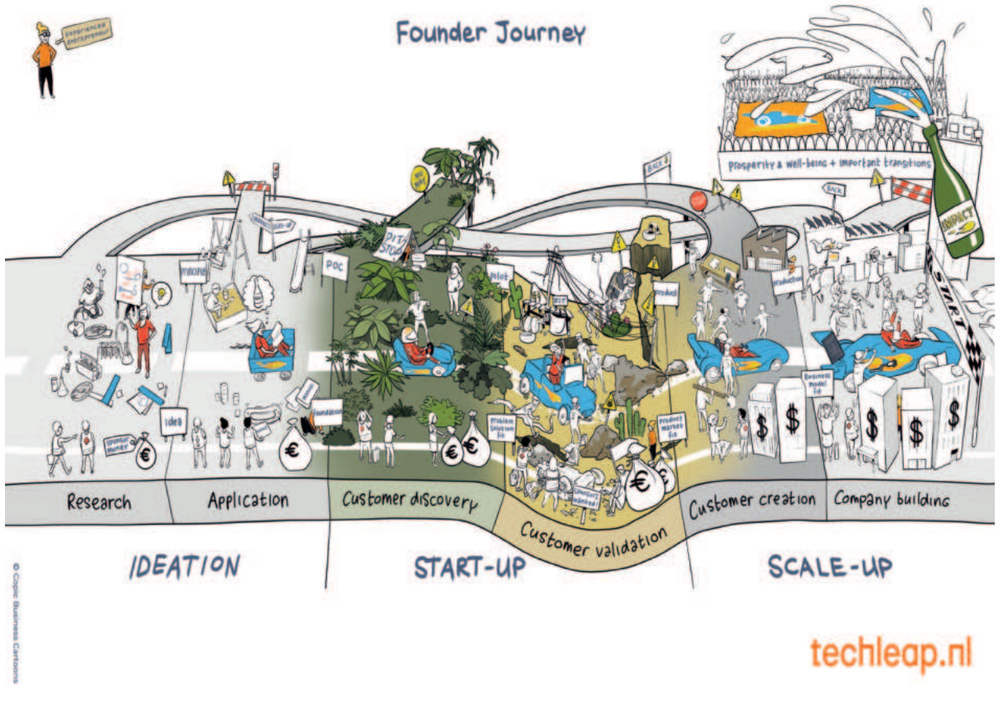
Quantitative and qualitative approach

In 2023, Techleap.nl launched the founder journey, which illustrates the steps founders will experience in order to create a significant impact with their business. It includes an ideation phase of research and application, a start-up phase where a forest of difficulties to find support in the customer discovery and a deep valley of death during customer validation is visualised. Finally, in the scale-up phase, customer creation and company building bring new hurdles to the table. To support the founder journey, as is partially already shown in Figure 1 below the line, the development and growth of new ventures, the elements mentioned by Stam [25, 26], are key. Understanding and leveraging these elements as policymakers can help build a thriving entrepreneurial ecosystem for deeptech startups and is therefore the basis of this research. Here, the six different phases of a startup journey have been mapped out against the ten Entrepreneurial Ecosystem Elements in both a quantitative and a qualitative fashion. This is the first time this combination of founder focused research and ecosystem research is combined. A research paper will be published to further dive into the methodology and this innovation. For readability, only outcomes will be shared in this publication.

Empirical measures of the Entrepreneurial Ecosystem Elements [26]

Elements	Description	Variable name	Empirical indicators	Data sources
Formal institutions	The rules of the game in society, in particular the quality of government	QUALGOV—quality of government	Four components: corruption, rule of law, government effectiveness and voice & accountability	Quality of Government Survey
Entrepreneurship culture	The degree to which entrepreneurship is valued in a region	NEWFIRM—new firms	New firms registered per 1000 inhabitants	CBS (Netherlands Census Bureau)
Physical infrastructure	Physical infrastructure and the position of a region	ACCESS—accessibility	Three components: accessibility via road, accessibility via railroad, accessibility via airports (number of passenger flights within 90 min drive); relative to EU average	EU Regional Competitiveness Index
Demand	Potential market demand	DEMAND—demand	Three components: purchasing power per capita, regional product, total human population; relative to EU average	EU Regional Competitiveness Index
Networks	The connectedness of businesses for new value creation	INNOCOL—innovation collaboration	Percentage of firms in the business population that collaborate for innovation	EU Community Innovation Survey
Leadership	Leadership that provides guidance for and direction of collective action	PROLEAD—project leaders	Leadership is measured with the prevalence of innovation project leaders per 1000 businesses, derived from a database with information on all the innovation projects in the Netherlands that received (Dutch or European) public subsidies in the period 2010–2013. The geographical origin of these project leaders is established by taking the province of the main applicant or principal firm	Birch Consultants (see Stam et al. 2016)
Talent	The prevalence of individuals with high levels of human capital	EDU—education	Percentage of higher-educated in the adult population	CBS (Netherlands Census Bureau)
Finance	The amount of venture capital (start-up and growth) invested in the region	VC—venture capital	Amount of venture capital per 1000 establishments (3-year lagged average)	National Association of Private Equity
New knowledge	Investments in new knowledge	RD—R&D	Percentage of gross domestic product invested in R&D (by public and private organizations)	CBS (Netherlands Census Bureau)
Intermediate services	The supply and accessibility of intermediate business services	BUSSERV—business services	Percentage of business service firms in the business population	CBS (Netherlands Census Bureau)

Founder Jouney by Techleap.nl & Copic Business Cartoons



Where is Europe on DeepTech today?

The analysis in the EU Industrial Strategy confirms that the European Union's competitive position appears to be weaker in strategic fields such as artificial intelligence, high performance computing, big data, cloud, industrial biotech and micro-electronics (including semi-conductors) [16]. New research shows that European Deeptech startups raised 22% less than the 2021 investment total, though still 60% more than in 2020 [10]. The funding decline of 9% in the second half of 2022 compared to the previous year is less than in other sectors and will most likely be negatively biased with a reporting lag. Deeptech is following the line of other non-deeptech investment markets. As the U.S. has a greater amount of capital available for this capital-intensive branch, the performance of their deeptech businesses are better with a scaleup rate 3 times higher than in Europe [11]. However, with 1,372 funding rounds in 2022, Europe is participating in the deeptech game too [11]. In a very different economy far more strengthened by its SME sector, entrepreneurship has a different cultural position. Its $17.7B in funding this year still outpaces the Chinese economy, which was predicted to speed up growth before the Covid crisis [10].

Specific data per focus area might include artificial intelligence startup activity or patenting activity, which is behind American and Chinese activities [9]. The U.S. and China also lead in blockchain startups, with the European Union accounting for only 15% of these startups [2]. Moreover, funding for blockchain startups also appears more readily available in the U.S. than

in the European Union. When it comes to quantum computing, the largest number of applicants are headquartered in the U.S, followed by Japan, Canada, and then Europe [29]. Currently, the market for cloud infrastructure is US-centric, with the top three cloud providers accounting for around 60% of the market.

A region's quality of research and patents are two indicators to begin to ascertain the location of deeptech hubs. While this has its limits, for example about half of patents classify as software [6], it allows us a first indication on interesting hubs to dive into, but none point towards the European Union. The 2022 global startup ranking [27] reveals Silicon Valley, NYC, Boston and LA as hubs where research turns to knowledge and innovation within North America, matched and challenged by London, Beijing and Tel Aviv. Another method of assessing the potential of this field is by combining startup, investment and talent data. Dealroom.co has done this to highlight Eindhoven, Munich and Zurich as "science hubs" within Europe [12]. According to the FT 1 000: Europe's fastest growing companies report for 2023, the regions with highest number of fast-growing companies in the technology sector are London, Paris and Milan. France dominates the lab ecosystem, almost doubling in number compared to Spain, the U.K. and Germany [13].

European initiatives

The toolkit of EU innovation policy has expanded over the years and the institutional landscape has changed with it. This chapter looks at Europe's current position in collaborating on deeptech, and illustrates the individualistic character of much of the deeptech efforts in its participating countries. It focusses on France, the United Kingdom and the Netherlands as deeptech enabling countries.

Europe aims to look at startups from both an individual company level, as well as an ecosystem point of view. Europe has given rise to both existing and new tools to support start-ups, scale-ups and SMEs through its Innovative Europe pillar, Horizon. Additionally, the European Innovation Council (EIC), established in 2021 with a budget of €10 billion, aims to support innovation throughout the whole innovation lifecycle, from the early stages of research to proof of concept, technology transfer, and the financing and scaling up of start-ups and SMEs. One example is their EIC Tech to Market Programme. Via the European Innovation Ecosystems initiative, the EU also aims to create more connected and efficient innovation ecosystems to support the scaling-up of companies, encourage innovation and stimulate cooperation among national, regional and local innovation actors. The European Institute of Innovation and Technology (EIT) took on additional tasks by establishing new Knowledge and Innovation Communities. Overall, Europe's plans lack critical volume. To give an example, the European Strategy for Artificial Intelligence was launched in April 2018 and was backed by €1.5 billion in funding. Post-2020, the Multiannual Financial Framework for 2021-2027 will be key for the development of the technology. Europe's budget for promoting and fostering AI development is relatively low compared to the U.S. and China, whose governments have announced 10 figure budgets to win the AI race [13]. Even bottom-up initiatives such as the Deeptech Alliance cannot withstand such forces. This leads to a European Union that trails behind the U.S. and China in the number of active deeptech startups.

Ideation

In the first phase of the startup journey (Ideation), the Netherlands is a frontrunner when it comes to certain deeptech research. In the past years, the Netherlands has invested approximately €610 million in quantum technology research and development and its academic culture is stimulated on deeptech, with the Delft team being the first to win Elon Musk's hyperloop competition in 2017. Though looking at startup numbers alone, the Netherlands has a significant focus on research instead of commercialisation of deeptech. With this in mind, the U.K. and French governments have launched several initiatives to support future deeptech ventures, such as grants for premises expansion or the purchase of plant, machinery, and equipment, are available regionally for up to £100k.The U.K. government has also launched new Prosperity Partnerships to develop transformational new technologies, with £59 million of investment from industry, universities, and government to support business-led research projects. Generally, France has made a commitment to prioritize research and innovation through the 2021-2030 Research Programming Act, with plans to allocate 3% of its national budget towards research and innovation with an additional €25 billion over the next ten years and the offer of a Research Tax Credit (CIR). Furthermore, the country also plans to invest €20 billion in higher education, research, innovation, and innovative companies through Programme Investissement d'Avenir 4 (2021-2025), giving valorisation of this research priority on a national level. The SBRI program "calls for proposals" for up to £100k on feasibility studies and up to £1 million for full R&D projects. This exemplifies a program that is open to SMEs based both in the U.K. as well as the European Economic Area (EEA), though the projects must be carried out in the U.K.

Startup Growth

In the second phase of the startup journey (Startup growth), several national initiatives endeavor to increase the startup to scaleup rate. La French Tech, Techleap.nl and the former Tech Nation are examples of this, touching many of the elements in the entrepreneurship ecosystem. This has also enabled startup/government alignment and important new policies are starting to bear fruit. The U.K. government has introduced the EMI scheme, The Seed Enterprise Investment Scheme (SEIS) and the Enterprise Investment Scheme (EIS). The gains made by employees under the option scheme are subject to Capital Gains Tax at a rate of 10%, which is typically lower than income tax rates. Another key policy promoting deeptech in France is the French Tech initiative, which aims to create a favourable environment for startups in the tech sector. The initiative provides support for startups and entrepreneurs, including access to funding, mentoring, and incubation programs. Internationally, the government initiative called "territoires d'industrie" has been launched to boost industrial development in 146 locations. Nationally, France offers the Young Innovative Company (JEI) status and tax credits. Evidently, the national government has a clear vision and financially supports deeptech through BPI France. The JEI status provides exemptions from employers' payroll taxes for research personnel salaries, tax relief on corporate income tax, and exemptions on two local businesses taxes. To acquire the JEI status, companies must be less than 8 years old, be a SME according to the General Tax Code, be independent, practice an authentically innovative business, and dedicate at least 15% of the total company's spending in R&D. This makes it especially relevant for deeptech startups whose focus is on R&D by definition.

Scaleup Growth

In the third phase of the startup journey (Scaleup growth), again, national initiatives stand out.

The Dutch Ministry of Economic Affairs and Climate Policy and Invest-NL have jointly launched the Deeptech Fund (DTF) for co-financing to help steer deeptech investments in the right direction (€ 250 million of public financing). At a larger scale, in 2022, Bpifrance was involved in 107 deals accounting for €2.8bn of the amount raised by French Startups (24% of total). With 26% more deeptech startups created in 2021 compared to 2020, the Deeptech Plan was already showing promising results that seem to continue. In 2021, deeptech startups raised €2.3bn, (+91% compared to 2020), including €375 million invested directly by Bpifrance, which has also invested €401 million in Deeptech investment funds. Also, the U.K. is quickly becoming a hub for deeptech scaleups. An industry specific example is the allocation of £200 million through the British Business Bank's Life Sciences Investment Programme to target the growth-stage funding gap faced by national life science companies. We've seen $866m investments in Series A, $1.1b in Series B and $867m in late-stage funding, including IPOs in the U.K.

When capital is raised at a large scale, it's important to focus on other elements in the ecosystem such as talent or networks and (international) demand. With a supportive government, innovative funding mechanisms, and a growing pool of talent, the U.K. is creating a vibrant ecosystem for scaleups focused on cutting-edge technologies. The Tech Nation visa and Scale-up Worker visa help companies to attract international talent and The National Skills Academy, Skills for Life campaign, and Get the Jump campaign continue to support the development of entrepreneurs. Finally, the GREAT Tech campaign, which targets the U.S. west coast, is aimed at attracting startups and entrepreneurs to the U.K.

All of this may be enabled by the government's commitment to becoming a science superpower by 2030, through the Decade of Innovation and the Innovation Action Plan. France's government has taken a similar stance, and regional developments are rising. For example, Station F's activities (like the Founders Program) provide deeptech startups with a supportive ecosystem that assists them to overcome the challenges they face in developing cutting-edge technology. More regional initiatives in the Netherlands can be found in Brainport region, though often associated with the former consumer products of Philips, it is now mainly involving new tech and scaleups like ASML, NXP, VDL, Signify, and Prodrive Technologies, all of which develop advanced technical products and systems for B2B industrial markets, characterized by high complexity and low volumes [23]. Overall, the U.K.'s deeptech startup scene is vibrant and growing. The recent reconnection between the U.K. and Horizon Europe might spark interest in a further collaboration, which will lead to better alignment of initiatives.

International example cases

As above chapters on French, British and Dutch deeptech activities indicate, there is also still lots to improve. Many international case examples can inspire future approaches in orchestrating deeptech developments in the EU. Firstly, we will look at the venture building efforts of Singapore which, as shown in the empirical results above, have strengthened the ideation phase in the region. Secondly, centralized policy showed the growth of a rich startup ecosystem in Israel. Finally, the pay-it-forward culture in the United States shows an interconnected scaleup phase.

Venture building in Singapore

The venture studio sector has seen significant growth in the past few years, with hundreds of venture studio operations established worldwide in the last decade. It is estimated that by 2020, there were over 576 studio operations globally, with strong growth particularly in Europe in the past five years [1]. Notably, the government of Singapore, upon recognizing the benefits of the model, has taken significant steps to support the sector, including funding support, tax incentives, and co-investment schemes. The EDB (Economic Development Board) is an organization in Singapore that was established even before Singapore's independence. It has become a hub for venture building in Southeast Asia, with a growing number of venture studios and active government support for the sector. Some of the notable venture studios in

Singapore include Antler, Entrepreneur First, and Rainmaking. The government has established innovation centres and startup accelerators to support the growth of the startup ecosystem, and most notably created the Corporate Venture Launchpad 2.0 (CVL 2.0) and its own A*Star Venture Building division. The Singaporean government (EDB) acts as an enabler via CVL 2.0, a program with a budget of S$20 million. The program is designed to enable established corporates, regional family businesses, and high growth companies with Singapore-based operations to build new ventures, create new growth and revenue streams, and keep ahead of disruption through innovative products, services, and business models quickly and effectively. The participating companies will partner with EDB-appointed venture studios and are offered 50% co-funding for qualifying costs of each Concept Validation Sprint, up to S$500,000. Additionally, there is potential follow-on co-investment and value creation support by EDB New Ventures for ventures launched from this program. The government has allocated significant funds to support start-ups and venture studios, such as the Startup SG Equity scheme (DPM Heng stated a S$560 million in private-sector funding by co-investment until 2020 and committed of another S$300 million for the equity scheme in the following 5 years) and the Deeptech Investment Fund. Singapore's investment company, Temasek, will be pumping S$1 billion a year into funding the development of deep-tech innovation across a variety of domains. The investment by Temasek will be in addition to Singapore's Research, Innovation and Enterprise 2025 plan, which sets aside S$25 billion for the development of such cutting-edge technologies and solutions. A key take away for the European regions that aim to accelerate startups in the ideation phase is the importance of collaboration and commercial thinking as shown in Singapore.

Government support in Israel

In one country in particular, valorisation as a culture has been successfully initiated by government. In rankings done before the war, Israel comes out as best in the world for the number of researchers per 1,000 employed, as well as the number of engineers per 10,000 people. This shows a strong ideation base, but Israel is also home to over 350 R&D centres. Several initiatives and companies privately enabled the local startup ecosystem, and uniquely there has been a large governmental focus on entrepreneurship and specifically deeptech. Israel's efforts to attract multinational corporations to establish research facilities began with the creation of a venture capital (VC) industry through the YOZMA program in 1993. The government prompted venture investment in Israel by offering to provide 40% of the funding offered by private investors in combined funds. This program supported more than 40 companies and jumpstarted the Israeli VC industry. The value of YOZMA increased from $100 million in 1993 to $250 million by 1996, and the project is regarded as a rare example of government venture capital success. For decades, the State of Israel encouraged technological entrepreneurship and investment in industrial R&D through various programs it operated via the Office of the Chief Scientist, and continued to do so even more vigorously through the Innovation Authority. The Israel Innovation Authority is a government entity that offers know-how, experience, funding, policy support, governmental backing, and proven success to facilitate true international collaboration. Since the 1970s, the Authority has been streamlining a range of government efforts to boost Israel's technological economy. The Authority is not only supporting the mature knowledge "on the shelf," but also creating a sustainable and innovative deal flow of academic applied knowledge. In 2019, the operational budget for the IA was 50 million euros, with an additional 500 million euros in investment money (grants, etc.). Of this amount, 400 million euros went to growth, startup, and infrastructure, while 100 million euros went to participation in European R&D Horizon 2020. The Israeli government's support of technological innovation has had a significant bearing on the growth and prosperity of the Israeli innovation ecosystem. As new analysis on Israel are rolling in, we can see that the war is impacting the ecosystem significantly. Startups will no doubtingly be limited in their scaling phases. It underlines the importance of the context shaped by government that warrants founder impact.

Community building in the U.S.

On the other side of the world, the United States has developed a different approach in flourishing deeptech. Where other regions often flourish in ideation or startup activity, the U.S. is known for its impactful global companies. They also aim to dominate the deeptech scene. The MIT motto, "impact, not income," signifies the importance of raising the profile of research through either commercialisation or communication, thereby allowing academics to establish relationships and build networks both within and outside their field. As was written by the UIIN: Exchanging ideas and getting feedback encourages thinking in more practical terms. And the resulting conversations can lead to collaborations that advance research in ways that individual academics can't alone. While there is logic in making IP available for public use, doing so often kills the viability of a future business by allowing no way to protect a unique selling point. In the United States, the culture reveals that ideas at the root of a spinoff are only the very beginning: starting a business, thinking bigger and scaling are a whole new ball game. The founder journey is crucial to make an impact through scientific breakthroughs. IP rights, facilities such as clean rooms, capital, talent and the market, must all be aligned for a business to scale. While at UC Berkeley, we heard the estimation that roughly one third of professors had an interest in and actively contributed to valorisation, meaning that many professors were essentially super connectors: connecting founders with their network around a (deeptech) specialism. This requires a level of pride, business sense and ambition in academics, which may be problematic for European countries such as the Netherlands. Twenty years of historic Global Entrepreneurship Monitor (GEM) data shows that when compared internationally, the Dutch prioritize self-employment and establishing their own businesses rather than growing them successfully, which is surprising, as it is growing a business successfully which positively impacts the economy. A pay it forward culture, in which risk taking is enabled is key to make "the American model" succeed.

Call to Action

Growth is still in the pipeline for deeptech and is key to achieving a sustainable future. In 2021, Angels and LPs in Europe noted deeptech as the 2nd most promising segment in venture capital, behind only Planet Positive [12]. They may have been right, as France's growth in deeptech investments continued astonishingly in the past year, and in general since 2016. In pursuit of this goal, the key player in this field, the European Union and the EIC through Horizon, must begin to utilize cross-border venture building approaches and build startups 'the European way'.

The European way builds on a luxury position of top research, talent and commitment. More top 100 universities are located in Europe than in the U.S [21] and the percentage of graduates in STEM in Germany is double that of the U.S [31]. In a second phase, the valorisation of academic knowledge will be a key indicator to future successes. First rate research valorisation is a unique factor to be leveraged today, the U.K. already produced more than 1000 spinout companies while those policies continue to lack implementation in other European countries [3]. Finally, Switzerland, Sweden and Finland have doubled down on deeptech companies by setting focus on deeptech, through its raising percentages of private VC investment to more than 30%. Let's encourage these founder focused initiatives while also demanding a cross border collaboration.

Based on their individual benefitting factors, we see that individual countries, regions and states are rising to the top of deeptech. From an entrepreneurship-enabling culture to favourable policies and financial decisions, the benefits of deeptech businesses often limits itself to the region of implementation: rarely do we see these cross boundaries. Even on an American scale, collaborations that cross state lines are not yet benefitting all American academics to commercialize ideas and great the next deeptech. But which founder has ever stopped trying because it hadn't been done before? The scattering of resources following the different level financial streams can be a first step, becoming a venture builder ourselves a second. Seeing some of the earlier mentioned initiatives, change is on the horizon. The European Union is in the best position globally to orchestrate vision and a roadmap for a new economy. Let's commit and lead Europe to a single startup scaleup market.

From an entrepreneurship-enabling culture to favourable policies and financial decisions, the benefits of deeptech businesses often limits itself to the region of implementation: rarely do we see these cross boundaries.

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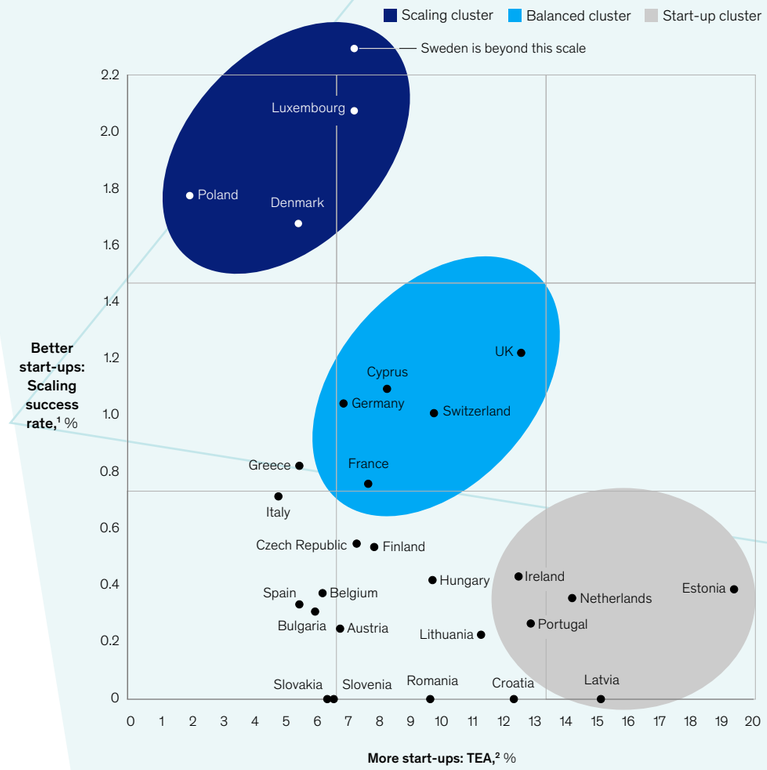
Throughput:
Quantity and scaling ability of start-ups

To raise the economic output of individual start-up ecosystems, an increase in the quantity and ability to scale start-ups is needed. Again, we see stark differences across European countries in their performance in both categories (see Exhibit). While Estonia shows a high number of active entrepreneurs6 fueling the high number of start-ups founded, adults in Europe generally are less inclined to found their own disruptive companies. Beyond the lower number of entrepreneurs, the high fragmentation of the European market appears to constrain the ability of start-ups to scale up.7 Except for Sweden, Luxembourg, Poland, Denmark, and the United Kingdom, most countries have a low share of start-ups that were able to scale beyond Series D or an IPO, as seen in the Exhibit.

European countries differ in their ability to enable the foundation and scaling of start-ups.

Scaling success rate vs total early-stage entrepreneurial activity (TEA), %



[1]Percentage of companies founded between 2010 and 2015 that have moved from below Series D to Series D+ or IPO.
[2]Percentage of adults (aged 18-64) who are starting or running a new business, 2021; if 2021 not available, 2022 data is used; no TEA score for Malta available.
Source: EU Industrial R&D Investment Scoreboard; Eurostat 2020; McKinsey Corporate Performance Analytics Tool

On an aggregated level, we see three clusters emerging across the region: the scaling cluster, the balanced cluster, and the start-up cluster. While countries in the scaling cluster show relatively low total early-stage entrepreneurial activity, they succeed at scaling up start-ups and tend to have strong sectors, such as gaming in Poland. Countries in the entrepreneurial cluster, on the contrary, show a relatively low scaling success rate but strong entrepreneurial activity and tend to exhibit founder- and start-up-friendly regulations. In the balanced cluster, countries don't outperform on either level but exhibit a fairer balance than the other two clusters. Countries in this cluster tend to be larger in terms of population and economic output.

McKinsey & Company presented by Tobias Henz

The European Innovation Council: Achievements and Challenges

Dr. Michiel Scheffer, President of the Board, and Dr. Sivasegaram Manimaaran, Policy Officer, European Commission

Michiel Scheffer is the President of the European Innovation Council (EIC) Board. A Dutch national, he has three decades of experience in business, academia, and public policy. He is equipped with a wide network in the world of research and innovation and has a remarkable professional experience of more than 20 years in the field of innovation, including on breakthrough technologies, disruptive innovations, start-ups impact investment.

Sivasegaram Manimaaran is a Policy Officer at the European Commission, working on matters of the European Innovation Council (EIC). Previously, he worked as a Policy Advisor at the European Innovation Council and SMEs Executive Agency (EISMEA). He held several science and innovation policy roles including as a Seconded National Expert at the European Commission, and at the UK's Department for Business, Innovation and Skills.

Deep tech innovation, which is rooted in cutting edge science, technology and engineering, often combining advances in the physical, biological and digital spheres has the potential to deliver transformative solutions in the face of global challenges.

Europe has a long and proud history in innovation and has the building blocks to be the leader in the current wave of deep tech innovation thanks to a world leading research base, its talents, growing startup ecosystems and supportive framework conditions. However, to deliver on this potential, we must address two fundamental weaknesses: turning excellent European deep tech research into innovations; and industrialising and deploying radical deep tech innovations at scale.

The former requires one to identify ground-breaking ideas emerging from the research base, build an ecosystem with a critical mass of capability that links researchers with innovators, investors, SMEs, and corporations amongst others to help bring these research ideas to the market. The latter requires patient investment at scale, something that has been missing in Europe where venture capital is too small and fragmented. It requires us to maximize the benefit of a single market for products, people and capital. European capital market in particular need to reach a scale that is in proportion to the level of economic activity to compete with the US and China amongst others. Furthermore, it requires incentives and connections to end users and customers such as public procurers and large corporates to approximate the power of the US and Chinese markets.

Spotting and supporting new and emerging technologies; building European companies that compete successfully in global markets; and deepening the pool of investors - these were the

We must address two fundamental weaknesses: turning excellent European deep tech research into innovations; and industrialising and deploying radical deep tech innovations at scale.

key driver for the then Commissioner Moedas to put forward the idea of establishing the European Innovation Council (EIC) back in 2018, with funding to close the gap from research to innovation.

Now in its fully fledged form since 2021 and with a budget of €10bn under the Commission's Horizon Europe programme, the EIC provides one stop shop capable of identifying high-risk/high-impact ideas and investing in the best researchers and companies to bring these ideas to the market. It builds on prior interventions under Horizon 2020, but also takes these a step further by introducing some novel approaches to the support on offer.

The first of these novelties is the introduction of Programme Managers. Experts in their respective fields, the Programme Managers are capable of leveraging their scientific background, understanding of the markets and their networks to enable the EIC to both identify emerging trends and inform future activities. Further, by applying a portfolio approach, the Programme Managers look to guide development of early-stage research projects towards future applications. The program and its participants can use business acceleration services, of which liaising with public procurement and with existing corporations is exemplary for an active support approach.

The second novelty surrounds the nature of financing. This sees the EIC supporting the most promising deep tech startups in Europe through a unique combination of traditional public grant alongside patient direct equity investment into companies. This investment component is designed to also crowd in private investment into these startups, and this has some important consequences. First, it helps build up a European deep tech investor base. Second, through crowding in, or syndication as it is more commonly known, we get to leverage the domain knowledge and expertise of more specialised funds. Finally, such private investment also ensures that our EIC beneficiaries will be viewed as credible propositions by the market when seeking additional financing in the future.

So, what have we achieved? As you can imagine, the fully fledged EIC is still relatively young, but there are some tangible impacts emerging from this and prior activity.

Each of the schemes for example boasts Nobel laureates past and present, including most recently Professor Anne L'Huillier

from Lund University, Sweden who won the 2023 Noble prize in Physics with two other scientists, Pierre Agostini and Ferenc Krausz for their work on generating ultra-short pulses of light to study how electrons move through matter. She is currently working as part of a consortium taking forward an EIC Transition project that is looking to develop the potential of ultrashort laser pulses as enabling tools for applications medical and industrial uses amongst others.

Pasqal, the French Quantum computing start-up provides a further illustration of the journey from groundbreaking science to scaling company. Pasqal's technology is based on the Nobel Prize-winning research of company co-founder Alain Aspect who in turn received support from both the ERC and EIC Pathfinder. The company was identified for support through the EIC Accelerator in 2020 and earlier this year, completed a EUR 100m funding round facilitated by investment from the EIC Fund.

And this investment leverage underlines a wider trend we are starting to see on the allocation of private assets across Europe thanks to the EIC. EIC funded companies have attracted well over EUR 10 billion in follow-on funding and the portfolio boasts several companies with Unicorn valuations and well over 100 with Centaur valuations. For example, EnduroSat, a Bulgarian Centaur valuation company funded by the EIC, is manufacturing small satellites and providing data services. They have won recognition for their team and innovation and recently partnered with Exotrail and Airbus Defense and Space for the spacevan™– 001 mission: a transport vehicle for Nano, Micro, and Small Satellites powered by EnduroSat avionics and scheduled to fly in 2024.

These are some examples amongst over 500 beneficiaries of the EIC Accelerator and the 300+ participants in the more exploratory Pathfinder and Transition projects. They have given rise to ecosystems of start-ups like quantum technologies in Delft (NL), or to a myriad of companies across Europe developing biomaterials such as Lixea for novel cellulose products in Estonia, or biobased breast implants by Lattice in Lille (FR), Fibritech from agricultural waste in Poland or MushLabs in Hamburg extracting proteins out of mycellium. All of them address challenges of material and energy transitions.
In November 2023, we also passed an important milestone: 180 investment decisions, worth well over EUR 1 billion have been made by the EIC Fund in just over one year. More than 80 of these deep tech companies have since been able to complete investment agreements and in a majority of the cases go to the market and raise capital, leveraging over Euro 3.5 of additional private investment for every Euro of investment via the EIC Fund. This means the EIC is now recognised as the largest deep tech investor in Europe with growing and exciting investments in deep tech research through to scaling companies in critical technologies such as Quantum Computing, Artificial Intelligence, Biobased Materials, Cell and Gene Therapy, Hydrogen and Battery Technologies amongst many others.

All these positives should not however blind us to the challenges that remain.

First, we must be viewed by innovators and investors alike as the go-to programme for breakthrough ideas and scaling companies across Europe. Our processes must be designed with innovators in mind and compatible with market requirements. Providing grants and equity, in so-called blended financing, is in itself an institutional innovation. And the EIC does it at a scale larger than any national, regional or private investor has done. We have made great strides in overcoming the delays encountered by Accelerator applicants at the beginning of the programme in 2021/22, but processes and decision making must continue to be optimised, to truly support the innovators journey.

This links to a second issues surrounding our reach. We have taken an increasingly pro-active role to increase awareness and support the engagement of female innovators and participants from what are known as Widening Countries1 in our programs, without losing focus on excellence. The results are however mixed. To date, around 25% of companies supported by the Accelerator and about 30% of all researchers supported under the EIC Pathfinder are women. Some Widening Countries such as Estonia also out-perform nearly all others if we normalise for success per-capita or GDP. Based on the increasing share of companies from Widening Countries applying to the EIC and demonstrating the requisite high risk and high impact ideas, it is clear we have no shortage of capability that can and must be unlocked to realise the full potential of innovators across all parts of Europe.

Third, it is true that private investment in deep tech start-ups in Europe has increased. A recent Atomico report noted that investment in deep tech reached a record-breaking 44% of total capital invested in 2023, up from just 15% of total investment volume a decade ago. However, overall investment stands at about a third of the level of the US. Further, European funds tend to be smaller in size, and due to investment limits, constrained in providing larger ticket sizes at later stages in the range EUR 15 - 100m that are needed for scaling and industrialisation. This can be contrasted with the presence of several large and established funds in the US, and the situation in China where both government agencies and private capital act as lead investors. The challenge here is to improve the syndication process, that is the process of engaging with private investors (venture capital, family offices, private holdings) to co-invest in firms in the Accelerator program. But

This means the EIC is now recognised as the largest deep tech investor in Europe with growing and exciting investments in deep tech research through to scaling companies in critical technologies such as Quantum Computing, Artificial Intelligence, Biobased Materials, Cell and Gene Therapy, Hydrogen and Battery Technologies amongst many others.

it is also requires creating a new class of funding in follow-on funding (commonly named Series-C) and larger tickets. This is also needed to address the next challenge.

The final issue we must focus on surrounds the balance of our portfolio and the role EIC must play in helping address key EU policy priorities including the European Economic Security Strategy, which is based on a three-pillar approach: promotion of the EU's economic base and competitiveness; protection against risks; and partnership with the broadest possible range of countries to address shared concerns and interests. This also requires the so-called follow-on investments to industrialise and commercialise home-grown innovations here in Europe to achieve the ambition of strategic autonomy in key technologies. We are already playing an important role in responding to these agendas by for example supporting the EU's Chips Act and complementing and adding unique value to initiatives surrounding our future Energy security through recent investments in companies such as Energy Dome in Italy, who are developing a low-cost and efficient system for long-duration electricity storage.

However, there is more to be done to ensure we can bring essential resilience to European supply chains and address policy priorities aligned with our economic security and competitiveness, which have risen to the top of the political agenda. Besides those mentioned above, the role and importance of skills cannot be over-stated.

The EIC is unique, and we must work together to ensure we provide effective support for the next generation of technologies and companies that will shape the future: to start from Europe but to reach out to the world.

“The EU Must Prioritize Lighthouse Projects within the Circular Economy”

Interview with Dr. Ing. Lilian Schwich, Founder of cylib GmbH

Lilian Schwich is the co-founder and CEO of the start-up cylib, offering a holistic lithium-ion battery recycling solution. cylib’s deep tech technology and proprietary end-to-end recycling process offers an efficient, resource- and climate friendly recovery of all relevant battery raw materials such as lithium, graphite, nickel, cobalt or manganese, from entire battery packs or production scraps. Dr. Ing. Lilian Schwich led the battery recycling team at the Institute for Metallurgical Process Technology and Metal Recycling at RWTH Aachen University, where she developed the proprietary process in collaboration with cylib’s co-founder and CTO, Paul Sabarny. Alongside the third co-founder and COO, Dr. Ing. Gideon Schwich, cylib has built an end-to-end battery pilot facility in under 10 months with a recycling capacity of one battery pack per day since September 2023 and set up a team of 45 professionals. Dr. Ing. Lilian Schwich recently won the renown “North Rhine-Westphalia Innovation Prize 2023” for her technological advancements, which cylib is currently scaling to an industrial level and serve the global battery recycling market.

1. You are one of the three founders of the Aachen-based startup cylib. Can you tell us more about your company's goals?

cylib is a research-based German startup for holistic battery recycling that was founded in 2022 by CTO, Paul Sabarny, COO, Dr. Ing. Gideon Schwich and me. Our proprietary deep tech and end-to-end recycling technology was developed over several years of research at RWTH Aachen University and offers an efficient, resource- and climate friendly recovery of all relevant battery raw materials, including lithium, graphite, nickel, cobalt and manganese from battery packs or production scraps. Our goal is to enable the green energy transition by ensuring the local supply of green battery materials for the battery industry and a true circular economy. ¬¬

In line with this mission, we aspire to scale our technology as fast as possible to be able to take up battery scraps on an industrial level. The more we recycle in a green way, the better for the carbon footprint!

2. How does cylib's holistic approach to battery recycling differ from conventional methods, and what innovative technologies does your company employ in this process?

Conventional battery recyclers implement unsustainable methods involving high levels of chemical additives. At cylib, we believe that a true circular economy can only be achieved through green battery materials. **Thanks to our superior technology, we have demonstrated it is possible to achieve high yields and a lower carbon footprint simultaneously, without any trade-offs.** Additionally, we are able to recover battery materials such as lithium, graphite and manganese, which are not recovered by conventional battery recyclers.

The battery recycling market is characterized by players that only cover a small part of the recycling value chain, mostly either companies shredding batteries to produce black mass, or companies sourcing black mass for its refinement into battery materials. The nature of such a fragmented and vertically disintegrated value chain, however, massively harms the end product in terms of the carbon footprint and quality.

The cylib process is capable of offering a complete end-to-end process from battery pack to green battery material by employing a combination of mechanical and thermal pre-treatments and an innovative water-based lithium and graphite recovery.

Unlike other recyclers, cylib stands out by effectively minimizing the main contributor to the carbon footprint in battery recycling—chemicals. This approach not only addresses environmental concerns but also guarantees our customers an enhanced product quality and transparency, achieved by having the entire process chain in one hand. The proprietary innovation was developed by the founding team and has been validated at pilot scale with great purities and yields.

3. To what extent does battery recycling play a key role in achieving a sustainable and strategically sovereign energy infrastructure in Europe?

Battery recycling is integral to building a sustainable and strategically sovereign energy infrastructure in Europe and is regarded as a lighthouse project by the EU to keep European industry competitive in the era of the worldwide electrification and net-zero commitments. Currently, none of the main countries for mining nor refining and thus supplying key battery materials include European countries (McKinsey & Company, 2023). To tackle geopolitical dependencies, the EU has determined the Critical Raw Materials Act with proposed regulations to address shortages and supplier concentration for a list of over 30 critical and strategic raw materials. The framework has set a minimum level of 25% of the annual consumption of critical raw materials to be sourced from domestic recycling and minimum level of 40% to be processed in the EU. All battery materials produced by cylib are part of the (strategic) critical raw materials listed by the EU and the framework underlines the importance of battery recycling in achieving a sustainable and sovereign European energy ecosystem. The framework also sets minimum recycled content levels for battery manufacturers in industrial and electric vehicle batteries. cylib not only meets all regulatory targets up to 2027 but also surpasses them, reaching all targets required in 2031.

4. What challenges do you currently see in the battery recycling industry, and how can Europe transform them into opportunities for sustainable economic transformation?

The battery recycling industry faces several challenges, both in terms of sustainability and economic viability. Regarding sustainability, the fragmentation of the industry and lack of end-to-end recyclers, mentioned earlier, leads to unsustainable battery materials with an untraceable and high carbon footprint. The disintegration also hinders the retention of material value within the EU, as conventional battery recyclers often export intermediate products to Asia, deepening our dependence and reducing domestic value. The problem is exacerbated by the lack of refining capacities in Europe.

To tackle these challenges, the EU must prioritize lighthouse projects within the circular economy, offering incentives to attract investment in the European battery recycling industry and develop refining capacities in Europe. By enhancing support for research and development, the EU can position itself as a competitive hub for innovation and pave the way for a more sustainable and economically resilient industry.

5. How do you evaluate the innovation landscape in Germany and the current regulatory conditions in Germany and Europe compared to, for example, the United States? What opportunities and challenges arise from this?

Regarding the current regulatory conditions in Germany and Europe compared to the United States, the EU's approach is characterized by a stronger emphasis on quantifiable sustainability standards. The EU has expanded the scope of the Batteries Directive from 2006, to include separate designations for electric vehicle batteries. Unlike US efforts, the EU has a comprehensive Extended Producer Responsibility (EPR) directive for batteries since 2006, now being reinforced by legally binding targets for recyclability, recoverability, and carbon footprint. The battery regulations force manufacturers and suppliers to act sustainably and promote circular incentives such as battery recycling.

However, the United States is taking significant steps to boost innovation and circularity in the electric vehicle industry, particularly in the realm of battery recycling. The "Inflation Reduction Act of 2022" offers major subsidies, fostering the growth of the domestic battery recycling industry and encouraging domestic value chains to address battery material shortages and geopolitical dependencies.

By offering greater governmental support for battery recycling in the EU, combined with increasingly rigorous battery regulations,

circular business models in Europe can compete with the Asian battery market dominance and increase European material sovereignty. China, benefitting from both abundant critical minerals and a well-established battery recycling infrastructure, might be dominating today, but their lack in sustainable practices could become a major threat.

6. Cylib is planning talks with various companies regarding strategic partnerships. Could you elaborate on how cylib intends to develop partnerships at the EU level, especially with other startups, research institutions, and government organizations, to advance the European battery recycling initiative?

Currently, our main goal is to scale our pilot line operations onto an industrial level. We are already in the development phase of our industrial facility which will start its operations in 2026 and offer a total recycling capacity of 10,000 tons per year. To achieve this, we've brought in industry experts with extensive experience in plant construction and chemical operations, drawing from their backgrounds in global chemical corporations.

Our strong foundation in research at RWTH University Aachen has been instrumental in fostering partnerships, enabling us to cultivate strategic and political partnerships and establish collaborations at the German and EU level. The proprietary process we employ has garnered significant recognition, notably earning the “North Rhine-Westphalia Innovation Prize 2023”, positioning us as a lighthouse project within the political ecosystem. cylib was also honored with “The Spark Digital Prize 2023” by McKinsey & Company and Handelsblatt, underlining our circularity and digitalization. Looking forward, we are keen on further developing partnerships rooted in shared values for sustainability, contributing to the progressive advancement of the European industry.

7. As a successful woman in the field of battery recycling and startups, what advice would you give to young women aspiring to a career in the technological and sustainable sector? How can they overcome challenges and assert themselves in a male-dominated industry?

Question the norm and be determined! In navigating the tech industry, which is predominantly male dominated, a crucial aspect of my journey has been my deep desire to solve problems with sustainability in mind. My early fascination with battery recycling led me to explore the field when it was considered unattractive in research, and there was no established group for battery recycling at RWTH University Aachen. I founded the group myself and gathered like-minded peers who shared my enthusiasm to question norms, experiment with unconventional methods, take risks, and set new standards in research. Establishing a startup, particularly in the hardware industry, presents new challenges. However, whether male-dominated or not, I've found that a robust technical background rooted in (questioning) research, coupled with a clear vision and the determination to see it through, have been the most valuable factors.

8. How do you see your personal future in the field of battery recycling and the startup environment? Are there any specific projects or developments that you are particularly excited about or that you would like to advance in the coming years?

I am particularly excited about our current industrialization. cylib has ambitious plans to become a significant global player in battery recycling, aiming to make a sustainable impact on industry, climate, and society. Our end-to-end technology is scalable, robust, and superior. Combined with our mission-driven team, we are bound to create a true circular economy and become a leading scaleup in the battery ecosystem.

By offering greater governmental support for battery recycling in the EU, combined with increasingly rigorous battery regulations, circular business models in Europe can compete with the Asian battery market dominance and increase European material sovereignty.

Nurish Dialogue

Research Year 2022/23

Charlemagne Prize Award Ceremony 2023 for Volodymyr Zelenskyy, President of Ukraine

Sunday, 14 May 2023 in Aachen

"Every generation has its moment when it has to stand up to defend democracy and what it believes in. For us, that moment has come. And just as the courageous freedom fighters chnged the face of our continent a little more than 30 years ago, today it is we, who will decide what our Europe will look like in the future."
Ursula von der Leyen,
President of the European Commission

"[...] the award of the Charlemagne Prize today marks not an ending, but a new start – the start of our continued integration in Europe, along with Ukraine, the countries of the Western Balkan, the Republic of Moldova and, in the longer term, Georgia too. In view of the watershed Russia triggered with its war of aggression, our message today is clear: Europe stands firm and united."
Olaf Scholz,
Chancellor of the Federal Republic of Germany

"Restore the peace that will be the fruit of our common victory, an inheritance we will leave to our children and grandchildren as the most crucial legacy of Europe! And if anyone still doubts whether to support the Ukrainian people... I implore you here in Aachen or in any other city of our beautiful free Europe – go outside, look around, and feel the most important thing we all desire, that which gives us all peace and respect in Europe... Feel the freedom! It is simply there. But we are fighting for it."
Volodymyr Zelenskyy, Charlemagne Prize Laureate 2023

Karlspreis Europa Forum 2023
Saturday, 13 May 2023, at

"We must fight for our democratic values within the EU. Only then can we carry them to the outside world."
Martin Schulz,
Charlemagne Prize Laureate 2015

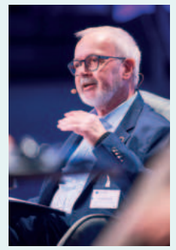
"EU democracy is in danger. Before we strengthen it, we must protect it!"
Katarina Barley,
Vice President of the European Parliament

Challenges to the European Way of Life

We are all wise to pursue ambitious goals, striving to express our intentions clearly in aiming to preserve jobs, address climate concerns, while we also want to uphold a robust welfare state, fostering well-being and prosperity. Achieving this requires a delicate balance, and the key question is whether there is a preparedness to accept necessary compromises."
Marija Kolak,
President of the Bundesverband der Deutschen Volksbanken

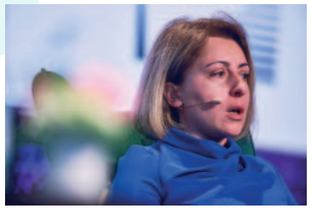
"The swift progression of technological megatrends lies beyond our control, yet it serves as a guiding force for societal transformation. Estonia's strategy is not to alter these trends but rather to skillfully adapt to them."
Taavi Rõivas, Former Prime Minister of Estonia

(How) can a larger European Union work?



"We should capitalize on the current appeal of EU membership to reform not only the enlargement rules but also ourselves. The key task lies more in the reform capabilities of the current EU member states than in those of the future ones."
Dr. Werner Hoyer, the then President of the European Investment Bank

"Usually, discussions about the war in Ukraine revolve around the resurgence of an east vs. west divide. However, it's not quite that straightforward. Analyzing public opinion polls reveals that this conflict has significantly divided even the east. (...) As a consequence, Europe finds itself at a crucial juncture, shaping its destiny by navigating diverse interests, uncertainties, and, importantly, opportunities."
Ivan Krastev, Political Scientist



"Accession talks and their outcomes should not be conflated with the reconstruction process in Ukraine. While these are interconnected processes, the expenses associated with reconstruction should not be perceived as a justification for denying Ukraine's EU membership. Framing it as such could instill an insurmountable fear that this would become the most expensive enlargement process in history. The rebuilding and reconstruction efforts will indeed incur costs, but they should be attributed to their own merits."
Eka Tkeshelashvili, Former Georgian Minister of Foreign Affairs

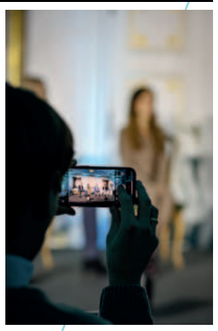
"Human Solidarity should have no limits. When you're fighting for human dignity, always keep fighting; then even the unexpected will be achieved."
Oleksandra Matviichuk, Nobel Peace Prize Leaureate 2022

Karlspreis Europa Summit

17 November 2023

The Karlspreis Europa Summit takes place annually to mark the conclusion and commencement of a research year at the Charlemagne Prize Europe Academy. During this period, former fellows have the opportunity to discuss their findings with experts, decision-makers, and the general public. The following outcomes have been produced:

A Vision for DeepTech Startups Unifying Europe



In the Townhall, titled "Igniting Innovation: Europe's Demand for Deep-Tech Startup Support", we explored the complex landscape of challenges and opportunities surrounding the facilitation of disruptive deeptech startups, with a focus on achieving strategic autonomy in Europe. The discussion addressed crucial issues, including the scaling challenges faced by European startups, the potential for universities to commercialize more research, and the shared ambition to cultivate startups "the European way." Engaging in this insightful dialogue were esteemed participants: Sabine Kerssens (TNO), one of our distinguished 2022/2023 Charlemagne Prize Fellows, in conversation with Prof. Dr. Erik Stam (Universiteit Utrecht), Lilian Schwich (cylib), and Dr. Tobias Henz (McKinsey & Company).

💡 Key Findings:

- "The move towards DeepTech is an extraordinary chance for Europe - to strengthen the entrepreneurial ecosystem, and with that, the European economy and society." Dr. Tobias Henz
- "Several European countries perform very well in the global landscape for deeptech. The European ecosystems of deeptech entrepreneurship should become better connected globally." Prof. Dr. Erik Stam
- "Surely Europe can and should step up its game in DeepTech - by learning from individual countries' successes, as well as becoming more orchestrated overall." Dr. Tobias Henz
- "It is important to recognize the global competition and the transformative power of startups, particularly in challenging economic times. Viewing startups as catalysts for change, with the potential to uplift the economy and people's optimism for our future, underscores the significance of overcoming fragmentation through strategic planning, innovation orchestration, and fostering serendipitous connections." Isidro Laso Ballesteros, Cabinet Member at Commissioner Valean for Transportation, in charge of innovation, startups, and digitalization at the European Commission

Europe's Role in Space

Highlighting the critical significance of space for Europe, with discussions on the continent's preparedness for strategic challenges in the new space era amid rising global competition and conflicts, Dr. Insa Thiele-Eich, a commercially trained astronaut and meteorologist at the Rheinische Friedrich-Wilhelms-Universität Bonn, Christoph Kautz, Director in the DG for Defence Industry and Space at the European Commission, and Kai-Uwe Schrogl, Political Advisor at the European Space Agency - ESA, joined 2022/2023 Charlemagne Prize Academy Fellow Lisa Becker in exploring how Europe is establishing a strategic position in space, underscoring the continent's need for increased sovereignty.

💡 Key Findings:

- Europe holds a robust position in the global space arena, equipped with unparalleled competitive capabilities.
- Achieving genuine strategic sovereignty necessitates enhanced autonomy, a comprehensive approach grounded in a bold vision, and a greater willingness to take risks to fully leverage the potential of commercial space.
- Although Europe's space strategy may appear incremental, it consistently yields promising and successful outcomes, relying on a distinct European value proposition.

Energy Security in Europe

The panel discussion "Pipeline Power Shifts: Prospects for European Energy Security" delved into the fundamental question of how to secure the EU's long-term energy supply and with whom. Christoph Erber, Charlemagne Prize Fellow, engaged in discussions with industry and policy experts Dr. Falk Bömeke (Bundesministerium für Wirtschaft und Klimaschutz), Dr. Stefan Kaufmann (thyssenkrupp), and Prof. Dr. Guntram Wolff (Deutsche Gesellschaft für Auswärtige Politik e.V. | DGAP) at the Karlspreis Europa Summit 2023 on November 17th.

💡 Key Findings:

· Establishing a robust EU-Africa partnership grounded in shared benefits is crucial for Europe's green transition.

· Prioritizing and reinforcing Europe's climate and energy ambitions should be a central focus for the next EU Commission.

· Aligning European industry with the bloc's energy security and climate mitigation objectives necessitates close collaboration with the private sector.

The conclusion of the summit marked the beginning of discussions surrounding the European Parliament elections in 2024. Political representatives engaged in debates with youth and the public on pressing and election-defining issues. An overview of the audience's perception of specific topics before and after each debate is depicted below:

"As parliamentarians, it is vital for us to distinctly outline our goals and priorities for Europe. This approach ensures active citizen engagement in the development of the EU."
Moritz Körner, Member of the European Parliament (Renew Europe)

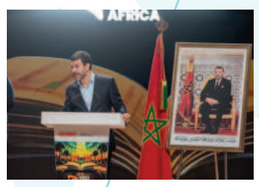
“Especially in the field of migration, challenges are overshadowed by populist debates. However, these debates do not provide solutions, and we should carefully contextualize them in light of the upcoming election.”
Gaby Bischoff, Member of the European Parliament (Deputy Chair of the Progressive Alliance of Socialists and Democrats in the European Parliament)

"My goal is to have a renewable energy grid in the EU, where EU law actively supports renewables. Renewable energy is much more competitive than the currently heavily debated nuclear power, which, in addition to all its risks, questions about nuclear waste, etc., is also a very expensive form of energy."
Terry Reintke, Lead Candidate for the Greens/EFA Group in the 2024 European Parliament Elections

INTERNATIONAL CAMPUS OF EXCELLENCE – Focus Africa

The International Campus of Excellence is envisioned to function as a global hub of forward-thinking individuals, nurturing the continuous pursuit of knowledge, science, innovation, and business diplomacy. In doing so, ICOEXCELLENCE convenes two generations of luminaries alongside exceptional young leaders to engage in discussions on cutting-edge issues. Since its inception, the Charlemagne Prize Academy has been a partner in this outstanding initiative, jointly aiming to address the challenges of our time beyond borders of continents.

"Science and innovation form the cornerstone of our progress. They should not be mere tools for achieving economic growth but instruments that foster education and position humanity at the forefront."
Mr. Hicham El Habti, President of University Mohammed VI Polytechnic, Morocco



“We can identify six emerging realities in the economic and financial landscape, demanding prompt action:
1. The growing influence of China, particularly in Africa, due to the Yuan becoming the new international platform for transactions.
2. Rising global interests in raw materials.
3. Heightened concerns regarding data security and transactions.
4. The pursuit of strategic autonomy by nations.
5. The ongoing digital transformation and advancements in artificial intelligence.
6. The international trend towards populism, leading to the decomposition of nations.”
Prof. Aldo Olcese Santonja , Vice President, Royal European Academy of Doctors, Spain

"I would suggest to not classify countries by Global South and Global North! We are all in the same boat with common challenges: climate, energy, migration. We are all part of this planet and of globalisation!"
Luis Alberto Lacalle Herrera, Former President of Uruguay

“I embrace the term ‘Global South’. The Global South is where 85% of the world’s population lives. However, we do now live in a globalized world. What happens to the planet will happen to us all. People are now realizing that climate change is impacting the Global North, too. I have seen flooding in China, India, Bangladesh for years, for decades. But it has not been on the radar of many countries. Now, the Global North, the 15% of the world’s population, realizes the challenges of climate change at first hand.”
Ameenah Gurib-Fakim, Former President of Mauritius

“Strengthening educational collaborations, promoting sustainable trade and industrialization, and ad-dressing climate change collectively underscore the imperative for enhanced partnerships between Europe and the Global South, particularly in Latin America and Africa. Amidst the ongoing conflicts, it is imperative for our generation to adopt a forward-thinking approach and collaboratively devise enduring solutions through partnerships. Partnership is not just a choice; it's essential.”
Dr Jürgen Linden, Chairman of the Charlemagne Prize Board of Directors

“I was able to mobilize other people, but in order to be an effective activist, collaboration and assistance from others are essential. You require more than just your individual efforts.”
Prof. Richard Roberts, 1993 Nobel Prize Laureate in Medicine, UK

“The imperative, for me, lies in propelling technology forward and fostering education that aligns with the demands of the future. This, I believe, is the key solution to not only navigate the complexities of the present but also to shape a future marked by progress and stability.”
Prof Dr Ulrich Hermann, Chairman of the Foundation’s Council

Outlook

Outlook for 2024

Prof. Dr. Thomas Prefi, Chairman of the Charlemagne Prize Foundation

The persistent challenges from recent years are anticipated to continue into 2024. Although we made preparations for many of these issues in the past year, some are no longer surprising in terms of unpredictability. This encompasses the European elections, poised to exert a substantial influence on the future direction and functionality of the EU. Similarly, the U.S. elections may scrutinize the global role of the EU in existing alliances and commitments. Crises and conflicts from prior years persist in influencing our public debates, and technological and digital advancements appear to deepen the divide between leading regions and those lagging behind.

In response to uncertainties surrounding European competitiveness and sovereignty, our emphasis in the past year was predominantly directed at a strategic alignment of European ambitions. This was prompted by the understanding that maintaining dependencies - especially in the energy sector following Russia's attack on Ukraine, Europe's innovation capacity in direct comparison to counterparts in the U.S. or Asia, and in newly contested sectors such as space - could detrimentally impact the resilience and integrity of the European continent. The idea in this report draws upon the idea to analyze how more sovereignty could be (re)gained in these sectors without jeopardizing crucial cooperations and partnerships based on values and shared future interests beyond internal borders.

Europe will need thorough reassessment of its alliances. Additionally, it must strategically and sustainably work to prevent new dependencies and redefine itself in specific domains. However, this is contingent on the EU's ability to enhance its own design, structure, and operation - both internally and externally - moving toward a more efficient and effective union, proactively addressing future challenges that are surely yet to come.

This leads us to the core of the ongoing research year, focusing primarily on Europe's shaping and action capabilities. This aims to ensure competitiveness on the global stage and maintain prosperity while considering value-based and European objectives. To address this, we have we have chosen four specific questions that will be examined in detail throughout 2024.

Two of these topics specifically emphasize the internal perspective. Firstly, we delve into the EU's ambition to assume a pioneering role in environmental and biodiversity protection while adapting to climate-related changes. An analysis will be conducted to identify the legal prerequisites necessary to effectively meet the goal of protecting 30% of European waters by 2030. The resource of water will play a pivotal role in shaping Europe's future.

Equally relevant for Europe's role as an international value-based actor is dealing with digital developments in the race for the Metaverse. While the majority of major tech players are currently based in the US, the challenge lies in overcoming the fragmentation between the economic landscape and political attractiveness. Now, after lengthy negotiations, the EU has adopted its AI Act, whose impact on the technological and innovative landscape in Europe, thus, remains unforeseeable. Consequently, our inquiry revolves around how European industrial consortia can effectively emerge and operate, particularly in the realm of current immersive technologies.

While both of these topics simultaneously address global challenges, two additional themes focus on Europe's role beyond its borders: One focuses on the vision of a sustainable reconstruction process in Ukraine, which, beyond current debates on military support, proactively considers a potential post-war scenario. This notably involves locally-led and corruption-sensitive approaches that could enhance discussions regarding Ukraine's EU accession and, more broadly, collaborative reconstruction endeavours.

At the same time, the diplomatic dilemma surrounding peace and stability in the Middle East is of particular importance for Europe. A persistently destabilizing situation will inevitably influence the world and Europe, making it imperative to proactively contemplate the EU's role in future peace negotiations, sensibly contextualize the situation, and discuss diplomatic instruments that go beyond the Abraham Accords and current peace efforts, incorporating a visionary European approach.

The current challenges raise distinct questions for all generations, particularly the younger generation, who should approach them with confidence. We appreciate the opportunity to once again support young talents committed to addressing these questions and advance ideas that should be contemplated now if Europe is to meet its own aspirations.

Europe will need thorough reassessment of its alliances. Additionally, it must strategically and sustainably work to prevent new dependencies and redefine itself in specific domains.

New Fellows 2023/24

VERÓNICA RELAÑO ÉCIJA

Verónica holds a PhD in Oceans and Fisheries from the University of British Columbia. Her work focuses on connectivity and addressing socio-ecological challenges arising from the mismanagement of marine resources. She has volunteered for numerous organizations, been actively involved in climate change conferences, and has contributed as a consultant for the World Bank and as a teaching assistant at the University of British Columbia. As the founder and director of the UN Ocean Decade Project "SOS – Somos OceanoS (ocean stories for conservation)," she spearheads initiatives to amplify local voices and foster equitable management in 'paper Marine Protected Areas.' Currently a postdoctoral researcher at the University of Santiago de Compostela, she investigates Ocean Equity and simultaneously serves as the Oceans Program Manager at NGO Onewater.

Research Question: How can the EU reach its objective to legally protect 30% of European seas by 2030?
Institutional Affiliation: Onewater (formerly Water Science Policy, WSP)
Mentor: Dr Vedran Nikolić, Directorate-General for Environment (DG ENV), European Commission

ELENA BASCONE

Elena Bascone is a public policy professional, focusing on future economic and political challenges. Her research spans economic, security, and tech policy. Her previous experiences included policy work at the Council of Europe and the European Commission. Passionate about computer programming, she partially coded her Future Blog in 2022 and initiatied her project, Res Publica, in 2018. In 2023, she became the Italian Ambassador of Women in immersive Tech Europe and wrote for MIT Technology Review Italia, all while she delved into immersive technology, securing the Charlemagne Prize Fellowship for a year-long research project on European consortiums and collaboration in the metaverse. She is currently a Visiting Fellow at the Center for European Policy Studies (CEPS) in Brussels.

Research Question: How can we make the global race to the metaverse European-like? Developing a business and policy model to build European industry consortia.
Institutional Affiliation: Centre for European Policy Studies (CEPS)
Mentor: Wolfgang Ischinger, Ambassador (retired)

MIRANDA LOLI

Miranda is a researcher in international relations examining the role of international organizations at the local level, with a specific focus on the global fight against corruption. Currently, she is simultaneously undertaking her fellowship at the Jean Monnet Centre of Excellence in Florence and is an associated member of the DFG research training group “Standards of Governance”. In 2023, she received her PhD from the University of Darmstadt with a dissertation on the international and local practices of anti-corruption in Kosovo and Ukraine. During her doctorate she conducted fieldwork in Kyiv and Pristina and was a guest researcher at the European University Institute (EUI) Florence.

Research Question: How can the EU engage with its Ukrainian partners in a locally-led corruption-sensitive rebuilding process post war?
Institutional Affiliation: University of Darmstadt
Mentor: Dr Federica Bicchi, Associate Professor of International Relations, Department of International Relations at the London School of Economics (LSE)

YASMINA ASRARGUIS

Yasmina Asrarguis is a researcher on Middle East Peace at Sorbonne-Nouvelle University and a graduate of Sciences Po Paris where she undertook her Masters in International Security. She currently works as Public Relations Associate Officer at the Cabinet of the UNESCO’s Director-General.Serving as a Global Shaper at the World Economic Forum, Yasmina was awarded the Peter Throughton Prize in 2018 for her study on the root causes of ISIS recruitments in France. Previously, she worked with the OneVoice Movement and the Aladdin Project of UNESCO both of which promote dialogue and interfaith peace in the Mediterranean region.

Research Question: Beyond the Abraham Accords: Strategic Opportunities and Challenges in Europe's Pursuit of a Peace Initiative in the Middle East
Institutional Affiliation: La Sorbonne Nouvelle University
Mentor: Prof Bernard Rougier, Professor of the Middle East Department Studies at La Sorbonne Nouvelle University

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The **Bosch Alumni Network**, whose platform we'll use for sustainable networking with our fellows even after the funding period.

Our sustainable and important partnership with the **City of Aachen**.

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The **Chairmen and Members of the Charlemagne Prize Committees**, whose continuous dedication contributes significantly to organizing the Charlemagne Prize's activities and fostering the development of the Academy through their voluntary efforts.

Representatives of the Academy's advisory board, whose guidance in agenda setting and candidate selection is invaluable to the initiative's development.

Charlemagne Prize Laureates, who lend their expertise to support various publications and activities associated with the prize.

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All **authors** who contributed expert content and input to this report.

The Charlemagne Prize Foundation expresses special appreciation for everyone involved in making the Academy's endeavors successful.

About: Established in 2019, the Charlemagne Prize Academy is dedicated to fostering young talent in Europe. The academy supports young researchers in developing innovative and original solutions and analyses for the future challenges of the European Union through year-long research projects. In 2023, the academy awarded fellowships worth €25,000 each to three selected project ideas. The academy's goals include 1. supporting emerging scholars in researching subjects with European relevance and building a resource pool for the significant challenges of tomorrow, 2. agenda setting for the selection of specific topics, and 3. creating and supporting dialogue on future issues between politics, youth, the public, and academia.

Initiators: The concept of establishing the Charlemagne Prize Academy was introduced by Dr. Jürgen Linden, Chairman of the Charlemagne Prize Board of Directors, and Prof. Dr. Thomas Prefi, Chairman of the Charlemagne Prize Foundation. The initiative aims to bring together young ideas on the future of Europe through evidence-based research and policy analysis, aligning them with the perspectives of decision-makers to provide solutions for the challenges of tomorrow.

Operations: The academy operates under the responsibility of Christine Dietrich. The report contextualizes the academy's results and connects them with expert opinions in Europe. The report's editors include Christine Dietrich and Karina Blommen, with graphic design by Dagmar Setzen.

Disclaimer: This report comprises the research findings of projects conducted by independent researchers during a one-year Charlemagne Prize Fellowship, contributions from partners and supporters, and excerpts from the Karlspreis Europa Summit held on November 17, 2023. The purpose of this report is to showcase potential challenges for Europe's future, along with existing proposals and approaches to address them. The content is solely based on the authors' perspectives, reflecting circumstances between October 2022 and December 2023, and is formulated for public discussion on the relevant issues. Consequently, we do not endorse any aspect of the analysis presented in this report.

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Accustomed to crises, Europe stands at a pivotal crossroads in shaping its future direction regarding conflict resolution, navigating new technologies, successful transition to new goals and standards, individual prioritisation of topics, and its role in highlighting the importance of democracy and participation, especially in this crucial election year 2024. Within this report, we integrate the research findings of our Charlemagne Prize Fellows with insights from decision-makers and experts to actively contribute to the discourse on the Europe of tomorrow.

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