Wielding Decarbonisation to Swell Energy Security and Energy Resilience in the EU

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Summary

This paper outlines strategies for enhancing energy security and resilience in the EU amidst geopolitical upheavals and the protectionist and interventionist industrial policies adopted by global competitors. Focusing on technological innovation and green business models, this paper suggests a change of paradigm, positioning decarbonisation as the catalyst to reach EU energy security, energy resilience and economic growth. Key recommendations include implementing a future-proof electricity market, diversifying energy supply chains, supporting small and medium-sized enterprises and cleantech startups, and creating polycentric energy and climate partnerships.

The paper also emphasises the importance of integrating the EU's energy markets to increase supply and decrease energy costs. By fostering a single market for innovation, offering financial incentives and leveraging international cooperation, the EU can mitigate import vulnerabilities and drive the green transition, while avoiding short-sighted, isolationist strategic autonomy approaches that run the risk of stifling innovation and growth.

Keywords EU energy security – Energy resilience – Decarbonisation

Introduction

Recent geopolitical disruptions and increasingly protectionist and interventionist competition from global powers have exposed vulnerabilities in the EU's energy supply chains, necessitating a comprehensive re-evaluation of industrial and energy security strategies. The EU's heavy reliance on a few third countries for energy imports and specific parts of the value chain with regard to renewable energy[1] and clean technologies[2] has highlighted the urgent need for a resilient and sustainable energy policy approach. This paper explores the current state of the EU's energy resilience, taking a look at the electricity market, cleantech and the industrial decarbonisation race, and international partnerships, and provides concrete policy recommendations for strengthening energy resilience through innovation and international cooperation.

State of play

Geopolitical tensions, such as Russia's war on Ukraine, have underscored the risks for the EU associated with relying on only a few energy sources from a limited number of third countries, as disruptions to supply could have severe economic and social consequences. Simultaneously, increased competition in cleantech manufacturing and the procurement of raw materials on the global stage by actors such as the US and China is challenging the EU and highlighting the risks of accepting the status quo,[3] which would effectively mean falling behind in terms of wealth creation and innovation.

Defined as 'the ability to shield the energy system from internal and external shocks', energy resilience must

[1] *European Commission*, 'Energy Statistics – An Overview' (2022), 1.
[2] For example, solar panels; B. McWilliams et al., 'Smarter European Union Industrial Policy for Solar Panels', *Bruegel* (2024), 2.
[3] For example, with regard to lithium-ion batteries: Cleantech for Europe, *EU Cleantech Quarterly Briefing* (Brussels, 2024).

increasingly be understood as a synonym for energy security and energy transition.[4] A holistic approach to ensuring energy resilience is needed, as energy resilience and an industrial agenda geared towards climate change are mutually dependent and mutually reinforcing. This approach needs to reflect the role energy systems play and the services they provide with regard to two elements. First, it should ensure the sufficient and reliable supply of the materials, fuels, technologies and skills needed to maintain the pace and scope of the planned transformation of the energy systems. Second, it should provide for the ability to meet the projected primary energy demand, and enable the system to produce (affordable and clean) energy for industries and households to use in a secure, flexible and efficient manner, at all times.

The US has initiated substantial investments in climate-friendly technology through the Inflation Reduction Act, focusing on building a future energy economy and manufacturing industry, while countries in Asia have also made strides in supporting the domestic production of climate-friendly technologies. China leads in solar and wind energy, while Japan, Korea and India are all enhancing the incentives to produce cleantech.[5]

The EU has responded by focusing on integrating climate policies into its trade and economic strategies. It has also, to some extent, been working on enhancing its energy infrastructure and fostering cross-border integration to support the sustainable energy transition. Despite still being in 'the driving seat of global decarbonisation' thanks to the European Green Deal,[6] Europe faces several challenges to fully integrating its climate policies into a cohesive economic, industrial and trade strategy, starting with issues with its internal electricity market.[7] Additionally, the EU's strategy on energy security dates from 2014, calling for a prompt and contextualised update.

Following the recent reforms to the electricity market design (EMD),[8] the EU's electricity market needs further mid- and long-term adjustments, focusing on integration and evolution to lower procurement costs and provide investment and innovation incentives. The main issues include insufficient price signals, lack of flexibility, limited system integration of renewable energy sources (RES) and market fragmentation across member states. With the inherently intermittent nature of RES, enhancing flexibility and storage capacity is crucial to maintaining a stable and reliable energy supply.

If not tackled, these challenges will hinder the market's efficiency, stability and ability to adapt to evolving energy demands and decarbonisation goals.[9] The European Commission has highlighted the need for investment in grid infrastructure to accommodate growing RES and electrification demands. The Grid Action Plan emphasises the importance of anticipatory investments and faster permitting procedures for efficient grid expansion and modernisation. Additionally, the EU has stressed the need to create a regulatory framework that incentivises grid operators to invest in these necessary upgrades while managing consumer electricity costs fairly.[10]

The Net Zero Industry Act (NZIA) suggests the use of various instruments and measures to bring EU industries to net zero. These include promoting carbon capture and storage technologies to address emissions from hard-to-abate sectors. It also recommends the use of energy regulatory sandboxes that could be effective for scaling new and currently less-developed technologies, for instance, innovative storage solutions. The NZIA emphasises the importance of the development of 'hydrogen valleys' for industrial use, accelerating the

4 B. Weber et al., 'An Industrial Agenda to Increase Germany's Energy Resilience', *EPICO KlimaInnovation* (2024), 4.
5 M. Pieper and B. Weber, 'One Year on, Europe Is Still Missing a Business Case for Industrial Decarbonisation', *Euractiv*, 16 August 2023.
6 Ibid.
7 EPICO KlimaInnovation, *Accelerating EU Industry Competitiveness: Paving the Way for the Next Policy Cycle* (Brussels, 2024).
8 European Parliament and Council Regulation amending Regulations (EU) 2019/942 and (EU) 2019/943 as regards improving the Union's electricity market design (Text with EEA relevance), OJ L2024 (13 June 2024), 1747.
9 B. Weber et al., *Where to Go? Assessment of Market Design Options for the European Electricity and Gas Market*, EPICO and Aurora Energy Research (Berlin, 2022), 11.
10 European Commission, *Grids, the Missing Link – An EU Action Plan for Grids*, Communication, COM (2023) 757 final (28 November 2023).

deployment of hydrogen technologies across borders. Reducing regulatory burdens and supporting industrial symbiosis in 'net-zero acceleration valleys' are highlighted as strategies to enhance the competitiveness of EU industries in the green transition. The Act also insists on additional investments in renewable energy technologies, such as wind and solar, as well as energy-efficiency improvements such as smart grids.[11]

However, several issues remain, including the strongly selective, top-down approach that limits innovation; limited consideration of broader challenges, such as investment barriers; and coordination of EU green policy. An EU-level funding strategy is also missing, making cleantech deployment dependent on fragmented national policies.[12]

The NZIA rightly encourages leveraging existing EU funding instruments, such as the Innovation Fund, and emphasises the need to de-risk investments through the use of financial tools such as guarantees to attract private capital to cleantech development and deployment. However, as is noted more generally in the Draghi Report on competitiveness,[13] too much focus remains on the public sector: the EU should not deploy an extra €800 billion or take on massive public debt annually. To develop and scale cleantech, funders, startups and developers encounter high costs. Addressing this funding shortage requires the creation of an EU-wide harmonised legislative framework to develop coherent cross-border funding strategies to promote innovation. These strategies should provide investors and developers with a clearer understanding of the financial markets and access to de-risking tools such as guarantees to attract capital, and should streamline financial and industrial regulations for high-value investments to support the scaling of cleantech startups.

The single market also requires strengthening in order to effectively deploy strategic net-zero technologies and to facilitate direct and indirect electrification, which is essential for achieving climate goals.[14] A report on the single market authored by Enrico Letta found that a 'fifth freedom', focused on research, innovation and education, could promote knowledge sharing and drive technological advancements.[15] The Draghi Report suggests improving competitiveness across the EU by securing natural gas supplies, increasing interconnection infrastructure financing to strengthen European power systems, lowering energy taxation and earmarking more Emissions Trading System revenues for energy-intensive industries. It also highlights that cleantech is an area where the EU can hold its own vis-à-vis other regions, provided that it takes decisive action, such as via the accelerated implementation of the NZIA.[16] Yet, the EU still needs to carry out significant work to fill these gaps.

In parallel, dependence on a limited number of third countries for energy imports, renewable energy deployment and manufacturing is becoming an increasing liability. Energy-intensive industries need to diversify their energy supply chains; adopt sustainable business models, including circularity; and prioritise efficiency and innovation.

While the overall dependency on energy imports is expected to decrease, there will still be a need to import certain energy carriers, particularly renewable hydrogen. This is the case for Germany, which plans to increase the deployment of RES by at least 70% by 2045 compared to total energy imports from non-renewable sources.[17] Given its importance to reaching net zero, hydrogen stands out as an area in which EU energy diplomacy should be improved in order to deal with competition for an initially scarce resource and a much-

[11] European Parliament and Council Regulation on establishing a framework of measures for strengthening Europe's net-zero technology products manufacturing ecosystem and amending Regulation (EU) 2018/1724 (Text with EEA relevance), OJ L2024 (13 June 2024), 1735.
[12] S. Tagliapietra et al., *Rebooting the European Union's Net Zero Industry Act*, Bruegel (2023), 7.
[13] M. Draghi, *The Future of European Competitiveness*, European Commission (Brussels, 2024), 59.
[14] B. Weber et al., *An Industrial Agenda to Increase Germany's Energy Resilience*, EPICO KlimaInnovation (2024), 5.
[15] E. Letta, *Much More than a Market*, European Council (Brussels, 2024), 7.
[16] Draghi, *The Future of European Competitiveness*, 43.
[17] S. Samadi and J. Lechtenböhmer, *Climate Neutrality by 2045: Comparison of Developments in the Energy System in Current Scenarios for Germany* (2022).

needed global ramp-up at the same time. The international hydrogen market faces several key issues: high production costs, significant infrastructure investment needs and intense global competition. The focus on renewable hydrogen is crucial for meeting climate goals, but achieving cost parity with fossil hydrogen remains challenging. Stable prices and strategic investments are an essential missing piece of the puzzle to support growth and competitiveness.[18]

The EU member states encounter common issues in hydrogen diplomacy. The challenge of aligning regulatory and sustainability standards across different regions needs to be addressed, while the geopolitical tensions arising from regional conflicts and dependencies are complicating diplomatic and economic partnerships. There are also legitimate socio-ecological justice concerns, including the fair and equitable treatment of local communities and the environment in partner regions, and the risk of environmental degradation due to large-scale energy projects that could harm ecosystems and biodiversity.[19]

Policy recommendations

Shifting the paradigm to leverage decarbonisation goals and catalyse energy security and resilience means that the EU must adopt a holistic and forward-looking approach. The following recommendations provide a roadmap for achieving these objectives. More concretely, the EU must increasingly focus on accelerating technological advancements and innovative and scalable green business models, and integrating these into the energy system.

Implementing a future-proof electricity market

Electricity will become increasingly important for our overall energy system, boosting its resilience. However, the electricity market needs to be fit for purpose, particularly in terms of adapting to an ever-increasing share of renewables. Making the electricity market future-proof will also require close cooperation between member states and the European level.

First, there is a need to speed up the market-driven expansion of RES. The new European EMD sets out the broad strategy for this. For example, it calls upon member states to implement guarantees to scale market-driven private agreements through the use of direct contracts between suppliers and industrial consumers in the form of power purchase agreements (PPAs). These should also be made available for small and medium-sized enterprises (SMEs). Furthermore, the EMD determines that public support for renewables expansion should be ensured by member states by using two-way contracts for difference (CfD)[20] when directly financing RES build-outs. The EU should provide Union-wide guidelines for both smart CfDs and PPAs to help to create a more competitive and dynamic energy market. The Agency for the Cooperation of Energy Regulators (ACER) has acquired additional competences, for example, with regard to an EU-wide PPA platform, and this should lower barriers for access to these contracts for manufacturing companies. If member states were to

[18] B. Lotz et al., 'Design Options for a European Hydrogen Bank', *EPICO KlimaInnovation, Konrad-Adenauer-Stiftung and Guidehouse* (Brussels, 2023).

[19] S. Schäfer et al., *EU Hydrogen Diplomacy in Africa and the Middle East: A Just Regional Energy Transition*, EPICO KlimaInnovation and the Iberdrola Energy and Climate Chair of the College of Europe (Brussels, 2023). For example, Kazakhstan, with its abundant renewable resources, has potential as a green hydrogen producer and exporter. Increased cooperation with other similar countries has the potential to result in the development of green hydrogen supply chains. Yet, challenges such as a lack of decarbonisation incentives, limited local research and development, inadequate transport infrastructure and water scarcity remain significant barriers to fully realising this potential. See EPICO KlimaInnovation, *EU–Kazakhstan Green Hydrogen Partnership: Mapping Barriers and Establishing a Roadmap* (Brussels 2023).

[20] A two-way CfD is a contract signed between an electricity generator and the state, which sets a strike price, usually by competitive tender. The generator sells the electricity in the market but then settles the difference between the market price and the strike price with the state. This allows the generator to receive a stable revenue for the electricity it produces, while providing limiting revenue for generators when market prices are high. In a two-way CfD, if the market price is below the strike price, the generator receives the difference; if the market price is above the strike price, the generator pays back the difference.

act too slowly with regard to the aforementioned PPA guarantees, the EU might also consider stepping in, for instance, via the European Investment Bank (EIB). The goal of such guarantees would be to enhance the bankability of projects by reducing off-taker risks. Guarantees would also help SMEs and cleantech startups, that is, companies that might otherwise pay a higher risk premium, gain access to PPAs.

Second, an ever-increasing share of RES in our electricity mix means that flexibility becomes paramount. This is necessary both to keep system costs in check, but also to ensure competitive power prices for households and industry. This flexibility could consist of demand-side adjustments in the household sector, for example, by shifting the times at which electric vehicles are charged; flexibility on the industrial side; or storage solutions which could help to increase adaptability. In the EMD, member states are called upon to assess the current flexibility in their respective markets and to identify targets for improving it. These flexibility strategies are to be based on a common methodology, developed by ACER at the European level. Both the methodology and an exchange on the best policy instruments should become the nucleus of an EU-wide flexibility strategy.[21]

There is also a strong need to implement alternative financing methods for grid expansion and to focus on cross-border integrated grid planning to maintain competitive electricity prices. Expanding transmission capacities between countries will reduce costs and volatility, and a focus on renewable energy will ensure competitiveness and resilience.

The EU should improve the long-term visibility of infrastructure planning and underpin it with binding political commitments that encourage financial investment in supply chains. Greater coordination of gas and hydrogen supplies and infrastructure actors should be prioritised. With the necessary infrastructure, the EU can support the deployment of renewable energy technologies and enhance energy resilience. The report on EU competitiveness by Mario Draghi proposes making public guarantees regarding the financing of EU interconnections. This would leave ample room for member states to come up with proposals on how to finance the purely domestic parts of energy infrastructure.[22]

A blueprint for developing cross-border cooperation could come from the North Sea, an area which is key to achieving energy security. This region includes a lot of offshore wind potential, which could be pivotal for Europe's electrification and production of hydrogen. The European Network of Network Operators for Hydrogen, the European Network of Transmission System Operators and the European Network of Transmission System Operators for Gas should work together to establish clear and ambitious offshore hydrogen production targets, favouring innovative financing models such as tax incentives, public guarantees and hydrogen purchase agreements. Together, these could significantly boost investment and mitigate financial risks. Encouraging public–private partnerships and utilising advanced technologies will foster cost-efficient development. Infrastructure that integrates hydrogen production with existing energy systems and industrial hubs should be promoted to optimise space and resources, ensuring a resilient and efficient transition to a hydrogen-based economy.[23]

Boosting cleantech and industrial decarbonisation

To drive the green transition, the EU must establish innovation incentives that support startups while also signalling the temporary nature of certain financial instruments, offering predictability to companies, investors and the public sector. By providing clear and consistent support for innovation, the EU can foster the development of new technologies and business models that contribute to industrial decarbonisation and energy resilience.

[21] EPICO and Aurora Energy Research, *Accelerating a Technology-Neutral Flexibility Strategy for the German Power Market* (Berlin, 2024).
[22] Draghi, *The Future of European Competitiveness*, 59.
[23] S. Williams et al., *Connecting Borders Through Offshore Hydrogen: Infrastructure and Financing in the North Sea*, EPICO KlimaInnovation (Brussels, 2024), 5.

Strengthening the single market will also entail creating a conducive environment for innovation, hence providing increased support for SMEs and cleantech startups. It is crucial to enhance regulatory harmonisation and simplify bureaucracy, thus reducing compliance costs and barriers for businesses. In contrast to mere subsidies, greater integration can foster competition and leverage economies of scale. Tax incentives, grants and public guarantees are all tools that could enhance the bankability of smaller companies, and should therefore be further developed and implemented.

The EIB should thus expand the rollout of public guarantee products to support cleantech manufacturing and reinforce EU competitiveness. Enhancing guarantees for manufacturing and loans, supporting long-tenure investments and facilitating access to green capital markets could all aid this much-needed innovation. The EIB should also provide guarantees to reduce risk and increase private investment, ensuring European manufacturers can scale production and maintain market leadership in the global green energy transition.[24] Creating a single market for innovation that prioritises these agents of change, rather than solely the incumbents, will harness the EU's domestic potential.

The NZIA recommends the use of energy regulatory sandboxes,[25] and these should be swiftly implemented to expedite the adoption of new and less-developed technologies and to streamline regulatory frameworks for fostering innovation across the member states. Developing such sandboxes could provide the ability to test new technologies, market mechanisms and business models in key areas such as demand-response, energy-storage and smart-grid technologies in a controlled environment. This would enable critical issues to be identified and resolved, enhancing Europe's energy system flexibility. One such issue relates to market barriers, predominantly the diverse compensations that aggregators have to pay to suppliers in some member states.[26] Policymakers should therefore systematically establish sandboxes across the EU in a speedy and coordinated way to enable the exchange of information and the identification of common obstacles.

Forming polycentric energy and climate partnerships

Bilateral partnerships should complement multilateral ones, with the EU Global Gateway enhancing cooperation with third countries through investments and additional funding to better mitigate the risks associated with energy import dependencies and to ensure a stable supply of essential resources.

For example, EU hydrogen diplomacy in the Middle East and Africa should focus on partnerships with local communities, enhancing sustainability standards and boosting financial support for renewable hydrogen projects. This would ensure local stakeholders are involved and benefit from hydrogen initiatives, promoting socio-economic development. Two key parallel approaches are also needed. First, establishing enhanced sustainability standards is key to minimising environmental impacts, for example, ensuring water use is managed responsibly and biodiversity is protected. Second, the international part of the European Hydrogen Bank needs to overcome investment barriers and scale up projects.[27]

Whereas the domestic pillar of the hydrogen bank is already underway, with two auction rounds having taken place, the structure of the international pillar still needs to be developed. This could be done in three complementary ways. The first would be to combine default guarantees with supply-side auctions to reduce investment risks and incentivise renewable hydrogen production by covering the gap between production

[24] B. Weber, *An Industrial Agenda to Increase Germany's Energy Resilience*; Cleantech for Europe, 'The EIB's Strategic Roadmap 2024–2027 Should Stimulate More Public Guarantees to Unlock the EU's Cleantech Competitiveness' (Brussels, 2024).

[25] Energy regulatory sandboxes are controlled environments where innovative energy technologies or business models can be tested under relaxed regulations to foster development without regulatory risks.

[26] G. Sgaravatti, 'Electricity Tariffs Dashboard', *Bruegel* (Brussels, May 2024).

[27] EPICO KlimaInnovation and the Iberdrola Energy and Climate Chair of the College of Europe, *EU Hydrogen Diplomacy in Africa and the Middle East*.

costs and market prices. The second would be to develop a robust infrastructure, including pipelines and terminals, to support hydrogen imports and create a stable market. The third would be to implement import prioritisation benchmarks, ensuring alignment with sustainability goals and supporting global energy transition targets. For example, the European Hydrogen Bank should facilitate matchmaking between hydrogen producers and consumers to bridge supply and demand gaps, thereby fostering efficient transactions and maximising the limited molecules available.[28]

Going forward, EU policy should focus on stronger climate diplomacy. The Climate Club, which was launched at the Conference of the Parties 28 in 2023, offers another framework for establishing partnerships outside of bilateral and multilateral relationships in emission-intensive industrial sectors (e.g. steel and cement), and its potential should be harnessed for future industrial policy in the EU. By following a sectoral model, it could foster knowledge exchange and enhance climate finance mechanisms. Cooperation should focus on upstream areas (e.g. green iron ore, renewable hydrogen and scrap) and downstream areas (e.g. markets for climate-friendly steel products).[29]

The EU should also decouple discussions on the Carbon Border Adjustment Mechanism from the Climate Club to avoid contentious debates and missed opportunities for cooperation. For example, in the steel sector, the priority should be to seize 'quick wins' by promoting green steel and the use of renewable hydrogen, and to lead in the markets for intermediate and finished products through promoting green public procurement. Additionally, the EU should provide financial and technical support for green steel projects and create a conducive environment for dialogue to build trust among member countries, which could enable cooperation on more challenging decarbonisation issues in the future.[30]

Conclusion

Ongoing challenges predominantly stem from the discrepancies between the EU's decarbonisation goals, the involvement of energy-just international energy partnerships and the need for economic growth. This calls for a stark paradigm shift in EU energy and climate policymaking.

The EU stands at a critical juncture. By strengthening both its single market and the electricity market, supporting innovation and enhancing international cooperation, the EU can build a resilient and sustainable energy framework. Taking these measures will mitigate the risks associated with geopolitical tensions and ensure a reliable supply of energy, fostering a secure and prosperous future.

EU energy security and resilience could be significantly enhanced through a combination of strategic policy interventions and international cooperation. By focusing on technological innovation, supporting SMEs and cleantech startups, and fostering diversified partnerships, the EU can reduce its dependency on external sources and build a more resilient energy system. This will require a concerted effort, but will achieve a secure, resilient and net-zero energy future that benefits all citizens and industry.

[28] B. Lotz et al., 'Design Options for a European Hydrogen Bank'.
[29] P. Kumar, *Piloting the Climate Club in the Steel Sector*, EPICO KlimaInnovation (Berlin, 2023).
[30] Ibid.

	Programme 1	Programme 2	Programme 3
	Implementing a future-proof electricity market	**Boosting cleantech and industrial decarbonisation**	**Forming polycentric energy and climate partnerships**
Project 1	Shift subsidies from fossil fuels to guarantees of PPAs for SMEs to boost market-driven renewable-energy expansion. Provide EU-wide guidelines for complementary two-way CfDs that incentivise innovation and efficiency. Develop an EU-wide storage and flexibility strategy on the demand side. Ensure EU compatibility of capacity mechanisms, complementing hydrogen-ready gas or nuclear power plants.	Establish innovation incentives to support startups and signal that European carbon CfDs are temporary, offering predictability to companies, investors and the public sector. Carbon CfDs should be linked to the EU Emissions Trading System, initially have a term of 10 years, and be focused on applications where they provide clear added value in terms of resilience.	Couple hydrogen diplomacy with EU climate diplomacy. Support third countries in developing a voluntary certification scheme for green hydrogen and its derivatives that is aligned with EU requirements. The European Commission should identify key regions that are only taking the first steps in the hydrogen economy and provide concrete support to them on the formulation of standards and certification.
Project 2	Improve the long-term visibility of infrastructure planning and underpin it with binding political commitments that encourage financial investment to ramp up supply chains. Grid capacity bottlenecks cannot cope with an ambitious RES expansion.	The EIB should pursue its rollout of guarantees, focusing on scaling manufacturers of clean technologies through coverage of up to 80% of the risk. Such guarantees should aim to make cleantech bankable in the long term. The European Commission should schedule related funding for the next Multiannual Financial Framework.	Boost the energy pillar of the Global Gateway with projects aimed at mobilising additional funding to import hydrogen derivatives, through guarantees and support for off-takers. Priority should be given to sectors with the highest potential for carbon emissions abatement.
Project 3	ACER, INNOH, the European Network of Transmission System Operators and the European Network of Transmission System Operators for Gas should further detail hydrogen infrastructure planning. The first step should be to develop an integrated offshore and onshore hydrogen infrastructure plan for the North Sea as a blueprint to be replicated in other key areas in the EU.	Simplify, standardise and speed up the application process for permits and licences. To this end, energy regulatory sandboxes should be swiftly further detailed on a sector-by-sector basis, with the eventual aim of enabling regulators to assess the effectiveness of different regulatory approaches and their impacts on the EU's energy system.	Strengthen the EU's role in the Climate Club established by the G7, particularly in cooperation on sectoral strategies for industrial decarbonisation. The Climate Club offers a framework for establishing partnerships outside of bilateral and multilateral relationships in hard-to-abate industrial sectors. It could play a crucial role in enhancing the international dimension of the EU's climate resilience.

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