FCA Future Cleantech Architects

The New European Policy Cycle

5 Priority Areas for Action

Why focus on industrial decarbonization and cleantech?

Europe's industry faces numerous challenges and risks, including energy dependence on fossil fuels, external competition, job transformation, innovation, and securing adequate financing. Energy-intensive sectors like cement, chemicals, and transport are significant contributors to greenhouse gas (GHG) emissions, relying heavily on fossil fuels while producing emissions throughout their processes. Transitioning away from fossil fuels will be essential for reducing emissions, making the availability of decarbonization options critical for the future.

Clean firm power, in complementarity to wind and solar, is an essential element to counteract challenges of dependency on unpredictable weather conditions and intermittency across the day and seasons. Research and cleantech innovation scale-up must be the second pillar of Europe's action.. More than 50% of the technological innovations required to reach net zero by 2050 still need to be developed. It is crucial to start development now, as cleantech has challenging innovation stages and large-scale deployment has long ramp-up times. The forthcoming EU response will be decisive in reaching net zero by 2050.

Europe must implement the Green Deal and the Fit for 55 legislation (directives and regulations) adopted in 2023, aiming at reducing emissions to 55% below 1990 levels by 2030, now. This regulatory stability will provide the regulatory signal needed to create new green markets. However, monitoring and improving this legislation will remain crucial on two fronts, particularly for the intertwined goals to maintain competitiveness and reach the proposed target of a 90% emissions reduction by 2040.

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1. Support innovation to decarbonize hardest-to-abate sectors, where technologies are still nascent or require significant advancements.

2. Focus on electrification, scale up clean firm power and energy flexibility tools such as innovative energy storage solutions, and fully deploy existing cleantech solutions to achieve immediate emissions reductions across industries.

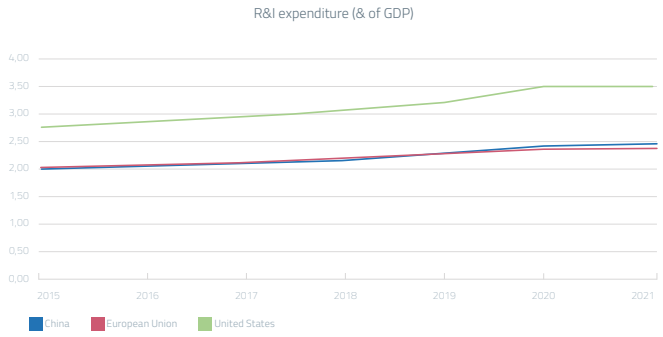
This document outlines essential components for a competitive, resilient, decarbonized, and sustainable industrial agenda, emphasizing robust research and innovation (R&I) efforts and strategic deployment of current technologies.

5 Priority Areas for Action

1. A robust post-2027 EU Research and Innovation agenda

Challenge

Investments in innovation are essential for European competitiveness. However, in 2022, the EU research and development expenditure was **2.24%** of GDP, below the target of **3%** (Eurostat).



Policy action

According to the IEA, to achieve significant CO_2 emission reductions by 2050, major cleantech innovations must be driven this decade, as nearly half the necessary reductions will depend on technologies currently in the demonstration or prototype phase. The research and innovation agenda can drive and nurture EU competitiveness, developing innovative cleantech from the very first stage to deployment and manufacturing through pilot lines and demonstration projects.

Our Recommendations

- Support a diversified portfolio for cleantech breakthroughs to keep the EU as a frontrunner in the global energy and climate transition.
- Strengthen the post-2027 Horizon Europe program, prioritizing the green transition as a key driver to EU resilience and competitive sustainability – maintain a minimum of **35%** target for climate.
- Allocate **50%** of European Innovation Council (EIC) projects to green transition (>current **24%**)
- Enhance the R&I ecosystem by facilitating access and synergies between EU funds (ESIF, Horizon Europe, Innovation Fund, CEF) to accelerate technology maturation and deployment
- Continue cleantech dialogues between EC and think tanks, industry, investors to set joint priorities

FCA Resources:

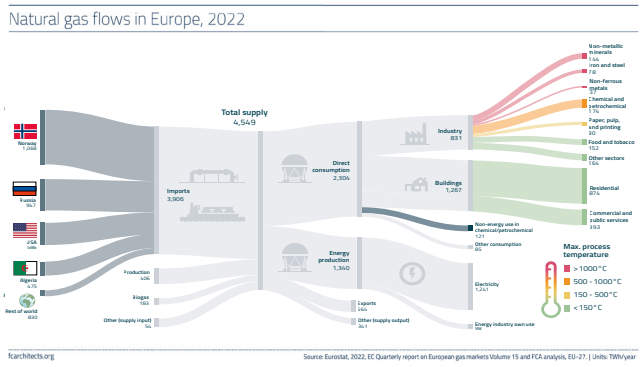
Future Technical and Policy Cleantech Priorities

Joint Publication with EIC

2. Overcoming Europe's energy dependency: making electricity cheap, secure, and low-carbon

Challenge

Europe's industry is highly dependent on natural gas, which poses a challenge to energy security and sovereignty. A number of enabling conditions are also still missing to make the transition effective in the 8 energy sector. For instance, Europe's electric grid is currently inadequate to handle the increasing demand for clean energy, with too few power lines and substations to transmit electricity efficiently. This bottleneck is a significant barrier to decarbonization efforts, leaving **222 GW** of renewable generation capacity, mainly solar, unconnected by 2030 under current conditions. Small and medium enterprises (SMEs) face particular challenges due to their limited access to high-capacity transmission lines and the complexities of connecting new electrified equipment.



Policy action

Eliminating subsidies for fossil fuels will make alternative clean energy more attractive. It is crucial to address the barriers that prevent industries from transitioning away from fossil fuels, particularly coal and natural gas. This can be achieved by promoting and providing strong incentives for the adoption of replacement technologies that can shift the energy mix toward cleaner sources.

Our Recommendations

- Speed up electrification (set an EU target) and mitigate the intermittency of solar and wind by developing and deploying dispatchable, clean firm power technologies such as advanced geothermal, hydro, and concentrated solar power and integrate long duration energy storage solutions . Europe needs an energy storage strategy, with targets for 2030, 2040 and 2050.
- Invest in alternative energy storage technologies, such as thermal energy storage: Current energy storage strategies focus heavily on batteries, which may not be the best fit for all industrial applications, particularly those requiring high power for extended periods.
- Accelerate grid improvement and expansion to improve transmission, drive down electricity costs, and accommodate new assets. The EU Action Plan on Grids must urgently be implemented.
- Set clear targets for renewable energy and energy efficiency beyond 2030, with the view of achieving **90%** emissions reduction by2040 as should be enshrined in the EU Climate Law.

FCA Resources:

LDES Factsheet

LDES Infographic

Example of cleantech development need: an eye on geothermal

Advanced geothermal can harness the earth's energy. The temperatures that can be achieved exceed 400°C, making it suitable not only for clean, dispatchable, firm electricity production, but also for integration within industrial facilities to aid in high-temperature industrial heat decarbonization. Europe has provided strong political and societal support to intermittent renewables; however, the potential of geothermal energy remains untapped for Europe's energy transition, due to risk perception and environmental potential impact if not strictly ruled.

CO_2 3. Accelerate Industry decarbonization

Policy Action

Some sectors are hard-to-abate as they are high in emissions but lack current solutions and require research, scale-up, and uptake in industrial processes

a) High-temperature heat

Challenge

Energy use for heat generation is responsible for over **25%** of global greenhouse gas emissions. Most industrial processes require heat, from 20°c to 2000°c, with gaps primarily in temperatures exceeding 500°C.

Policy Action

Promote electrification, industrial heat pump deployment, and flexibility tools such as thermal energy storage technologies to replace fossil-based high-temperature heat, enhancing grid stability and flexibility, which are crucial for broad decarbonization. Energy storage and grid expansion are doubly effective solutions for both high-temperature heat and keeping the grid stable and flexible while phasing out gas-based electricity. It is crucial to emphasize the need for development and deployment of clean, firm, dispatchable power as a prerequisite to decarbonize industrial high-temperature heat.

Our Recommendations

- Review and update the 2016 EU Heating and Cooling Strategy to reflect the latest technology advancements and send the right signal to the market and the industry
- Continue supporting the research on novelty, performance, and material improvement of mid and long duration (seasonal) energy storage (electricity and heat)
- Reward grid contributors proportionately to encourage heat storage solutions coupled with electrification. Thermal storage presents a solution by lowering energy costs and increasing grid flexibility.

FCA Resources:

Munich Security Conference Slides
Technical Report on Decarbonizing High-Temperature Heat in Industry
TES Factsheet
LDES Factsheet

b) Cement

Challenge

Cement production represents **5%** of global emissions, with **60%** coming from basic chemical reactions, **30%** from process heating, and **10%** from machinery electricity. In addition, demand for concrete and therefore cement is expected to continue to increase as it is one of the building blocks of our future green infrastructure.

Policy Action

80% of the decarbonizing needs of the sector can be covered with electrification, but some emissions remain hard to abate, especially at higher temperatures. However, further innovation, from the laboratory to pilot plants, still holds the promise for potentially more cost savings and prospects of global European technology leadership, for instance on electric plasma torches or direct co-located thermal methods.

Our Recommendations

- Support research and innovation in structural efficiency and low-carbon cement.
- Focus on performance-based standards and review the 2013 Best Available Techniques (BAT) reference document (BREF) for the production of cement, lime, and magnesium oxide
- Revise the 2014 public procurement directive to further drive lead market creation through green public procurement and scale up existing good practices of some European cities
- Enhance research, innovation, and demonstration (pilots) with Carbon Capture and Storage (CCS) and Carbon Dioxide Removal (CDR) for the last mile of unavoidable emissions in order to steer down the costs of such technologies.

FCA Resources:

Cement Policy Brief (coming soon)
Cement Value Chain Infographic
Cement Factsheet

c) Aviation

Challenge

The aviation sector is responsible for about **2.5%** of global CO_2 emissions, and current policies are not sufficient to get the sector to net zero by 2050. Yet CO_2 is only part of the problem: more than **60%** of aviation's warming impact on the planet is caused by non-CO_2 emissions. But jet fuel characteristics are hard to beat, long-haul flights are challenging to decarbonize and represent **38%** of CO_2 emissions, and planes in operation are in use for 25+ years, not to mention the expected growth in demand.

Policy Action

Prioritize Sustainable Aviation Fuels (SAFs) development and deployment, invest in research and development of alternative transport modes and electric-powered aircraft for short-haul flights, and, as a niche application, hydrogen-powered aircraft for mid-haul flights.

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FCA Resources

Aviation Factsheet
Aviation Policy Brief
Book and Claim Policy Brief
Jolt Podcast on Aviation
Technical Report on SAF Assessment Under ReFuelEU

4. Prioritize some sectors for scarce renewable resources usage

Challenge

Overreliance on scarce raw materials or biomethane, hydrogen, and carbon capture can be risky for Europe's future security. The use of scarce alternative sustainable fuels must be steered towards applications without alternatives.

Policy Action

Invest now to develop these technologies, but strategically allocate limited feedstock such as green hydrogen to sectors where they will have the most significant impact and where there are no other more efficient or viable decarbonization technologies.

Our Recommendations

- Focus on decarbonizing current hydrogen applications and redirect resources from sectors that can be more efficiently decarbonized without hydrogen, such as cement, electricity generation, domestic heating, and road transport.
- Deploy green hydrogen in sectors where it is an indispensable feedstock, such as refineries, petrochemicals, ammonia production, methanol production, and primary steelmaking, before expanding to nascent sectors like shipping and Sustainable Aviation Fuels (SAFs).
- Encourage the European Commission to develop clear guidelines for green hydrogen production and utilization to maximize efficiency and sustainability, applying stringent EU standards for green hydrogen
- Build the necessary infrastructure for hydrogen transportation and storage to connect facilities to the network

FCA Resources

Hydrogen Factsheet
Hydrogen Guiderails (coming soon)

5. Take steps to secure longer-term funding for cleantech manufacturing and infrastructure

Challenge

According to the IEA's "Net Zero by 2050" roadmap, by 2030, Europe needs to invest around $1 trillion annually in clean energy technologies and infrastructure to stay on track for net-zero emissions by 2050.

Policy Action Priority

A Green Deal Industrial Investment Plan to support decarbonization efforts and innovative cleantech development, manufacturing, and deployment, by securing public and private funding and creating mechanisms to de-risk investments in new technologies.

Our Recommendations

- Closely monitor national investments for cleantech: they are necessary to achieve the renewable energy and energy efficiency targets, as well as the implementation of the many Directives, including secondary legislation (delegated acts). The specific **5%** target of new installed capacity in 2030 for innovative renewables under REDIII is one of the most interesting features of the Innovation Plan for Europe and shall be detailed clearly in the NECPs, SET Plans, and their progress reports by EU Member States.
- Establish dedicated cleantech innovation hubs in regions with strong industrial bases, supported by both EU and national funds, and by earmarking a percentage of European Structural and Investment Funds to cleantech manufacturing and deployment. Future EU funding for Member States could be made contingent upon achieving set renewable energy and energy efficiency targets and not used for supporting fossil fuels.
- Incentivize R&I efforts of private companies and cleantech uptake in industrial processes: carbon pricing mechanisms such as the EU Emissions Trading System (ETS) must make carbon-intensive processes more expensive and cleantech more competitive. A second step consists in implementing financial guarantees by the EIB to mitigate risks for industries transitioning from natural gas to electrification, adjusting grid fee structures to reduce costs for industries using renewable energy making green power more economically viable, and securing clean energy at competitive prices for industrial users.

FCA Resources

Study on 5%
Open Letter to Public Guarantees

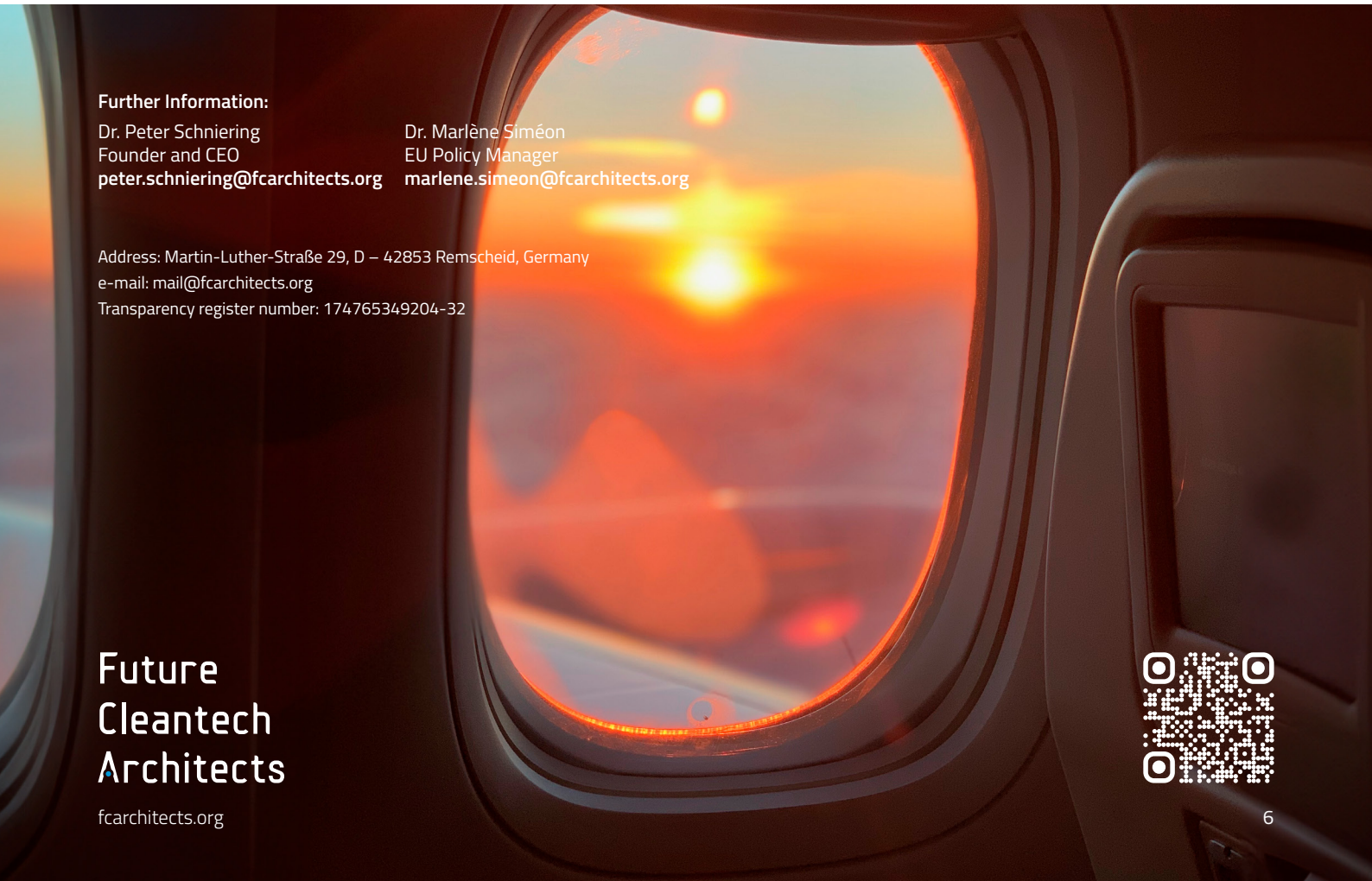
Engagement opportunities

If you want to make informed and science-based decisions during your mandate, and learn more about cleantech challenges and solutions, reach out to us at Future Cleantech Architects.

- Directly contact us with your technical request or questions
- Participate in industrial site visits in one of Europe's most prominent industrial regions
- **Participate in our interactive sessions:** Coffee & Cleantech, 45mn interactive technical briefing for policymakers in Brussels (~20 participants max.), early in the morning before EP Groups' meetings. It takes place from 08:15 to 09:00 at the Representation of the State of North Rhine-Westphalia, Rue Montoyer 47, 1000 Brussels.
    - Industrial decarbonization and high-temperature heat (16 October 2024)
    - Hydrogen (4 December 2024)
    - Clean firm power (end of January)
- Consult our webpage for technical reports, policy briefs, factsheets, videos, and podcasts
- Connect with us on LinkedIn, X, or YouTube

Who we are?

Future Cleantech Architects is a non-profit independent climate innovation think tank that focuses on hard- to-abate industries. We accelerate innovation in critical industries where sustainable solutions are still in the very early stages and participate in high-level research consortia on key technologies. We also work with policymakers, steer discussions with other think tanks and cleantech payers on European policies, as well as with media on a monthly Innovative Greentech Series with the German newspaper Handelsblatt. Our headquarters are in Remscheid, an old heavy industry city in Germany.



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