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## POWERING CLEAN TECH REVOLUTION IN EUROPE



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# I EDITORIAL

## POWERING CLEAN TECH REVOLUTION IN EUROPE

Clean technologies have become increasingly important in Europe as the continent strives to reduce its carbon emissions and meet its climate goals. These technologies encompass a wide range of solutions that can help reduce pollution, increase energy efficiency and promote sustainable practices.

The Commission's recent initiatives (adopted on March 16), with the Net-Zero industry Act, which aims to accelerate the production of clean technologies in the EU, and the Critical Raw Materials Act, which allows the EU to benefit from secure and sustainable access to critical raw materials, are also essential to safeguarding strategic sectors.

One of the main benefits of clean technologies is that they can help create a cleaner and healthier environment. By reducing emissions and pollution, these technologies can improve air quality and reduce the impact of harmful chemicals on our health. In addition, clean technologies can also help reduce waste and promote recycling, which promotes sustainable practices.

Another important benefit of clean technologies is that they can help spur innovation and economic growth. By investing in these technologies, Europe can foster a new wave of entrepreneurial activity that can create jobs and stimulate economic growth. In addition, clean technologies can help create new markets and opportunities for the continent's businesses, helping to drive economic growth and prosperity.

Despite these benefits, many challenges still need to be addressed in order to fully exploit the potential of clean technologies in Europe. One of the biggest challenges is the need to increase investment in research and development. Without sufficient investment, it will be difficult to develop new and innovative solutions that can help address the complex challenges facing the continent.

An additional challenge is the need for greater collaboration between governments, businesses and other stakeholders. The Commission's ambition to identify priority projects, speed up approval procedures, and unlock new funding is a critical step to improve the speed and viability of new projects.

In conclusion, clean technologies are an important tool for promoting sustainable practices and reducing carbon emissions in Europe. While many challenges remain, the potential benefits are considerable and must be urgently exploited. By investing in research and development, encouraging greater collaboration, and adopting clean technologies, the European Union can help reduce carbon emissions.

**Editor-in-Chief**  
**LAURENT ULMANN**

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**FRANS TIMMERMANS**

*European Commission Executive Vice-President for the European Green Deal*

# Leveraging the Green Deal for an Industrial Revolution

The clean tech industrial revolution is underway. In this global race to net zero, the European industry is well equipped to play a leading role thanks to the European Green Deal, the Fit for 55 Package, the RePowerEU Plan and the Net Zero Industry Act.

Clean tech is no longer just about fighting the climate crisis. With Russia's war against Ukraine, the ensuing gas supply shock and the fossil fuel price crisis, renewables and electrification-based technologies have secured their position at the top of the affordability and security agenda.

If we want to get to climate neutrality in 2050, Europe will need a massive scale-up of clean tech manufacturing in the next years. With the Net Zero Industry Act we aim to manufacture at least 40% of our deployment needs in Europe. We will continue to trade with our partners; not everything will be made in Europe, but more should be made in Europe.

Many industrial economies have focused their energy transition strategy strongly – and in some cases even exclusively – on subsidies for clean tech. The European way is based on three pillars.

First: climate-oriented funding like the Innovation Fund and Recovery and Resilience Facility. Second: market-based tools and enablers such as EU Emissions Trading Scheme and a more interconnected single energy market. And third: a new ambitious regulatory framework that promotes an energy sector based on renewables and energy efficiency, sustainable resource use and clean transport.

Above it all, a Climate Law which enshrines Europe's long-term goals in a legal framework provides long-term certainty. The European way will deliver the best value for money for European citizens, a more competitive economy and a better performing industry, which is ready to face global competition for

decades to come. Clean tech is a booming market, and the more we enhance our competitive advantage, the more quality jobs can be created in Europe.

For this model to perform at its best we need to do better at pooling resources for clean tech investments at the EU-level. The European Hydrogen Bank, with the first EU-wide auction for producing renewable hydrogen, is an example of what we can aim to achieve – a single point of entry to an emerging clean tech market for the global investment community.

Hydrogen is an industry where the EU is still well ahead of global competition. Over 50% of installed electrolyser capacity and over 50% of electrolyser manufacturing capacity is here in the EU. To maintain that lead as the technology will move to mass production, we need to build up hydrogen value chains.

The new European Hydrogen Bank will help to bridge the current investment gap, where potential suppliers aren't sure of having enough demand, and companies weighing whether to switch to hydrogen aren't sure of having enough supply. A first auction worth €800 million will be funded through the Innovation Fund and is due to be launched this autumn.

For renewable hydrogen produced in the EU, the Bank will cover the difference between the cost of producing renewable hydrogen and the price that the market is willing to pay. The exact amount of this green premium will result from a competitive bidding process: renewable hydrogen producers who require the lowest amount of support in terms of euros per kilo of hydrogen produced will win the auction.

This approach could be used to roll out similar auctions for other clean tech manufacturing challenges, such as batteries or offshore wind. It will fall to EU Member States to decide on this, but it is clear that new joint funding through the Innovation Fund is a solid

way to further boost clean tech in Europe. The fund is financed by the market itself – through ETS-revenues – and already supports industrial decarbonization, renewables and clean tech in Europe. Demand for the fund is very high and it has proven to be a very effective instrument to reward the most competitive innovation in Europe.

Europe has led the way with the adoption of ambitious climate targets. We were the first major economy to commit to climate neutrality over three years ago. Since then, most industrialised economies have followed suit. Today Europe will again lead the way in phasing out fossil fuels, where others think they can keep both economic development models alive in parallel. We will also lead the way in making this industrial revolution not only relevant for our climate goals, but also for our environmental objectives: abundant clean water, clean air and an environment free from toxic waste.

Europe is a good place to invest in clean tech. Investors which chose Europe know that their business case doesn't rely exclusively on subsidies. They can rely on our policy framework to guide towards the most competitive outcomes and future-proof solutions which not only limit the carbon footprint but also the impact on water, soil and air. This is the real industrial competitiveness of the future we want to build with the industries which invest in Europe.

All in all, Europe is ready for the race to net zero. It's a good race to be in because everyone who is in the race will win if they move fast and I'm confident that Europe is in pole position to become the first climate-neutral continent on this planet.

**BRUNO LE MAIRE**

*French Minister of the Economy,  
Finance and Recovery*

# Europe must lead the clean tech revolution

Europe is at a turning point in its economic and political history, as it faces two unprecedented challenges.

The first challenge is sovereignty. The Covid-19 pandemic and the Ukrainian war have evidenced Europe's state of relative dependency for some goods production and fossil fuels, with supply problems and high inflation. We do not want to go through these hard times again. To avoid it, we have agreed on the need to regain our autonomy, by de-risking our value chains, repatriating some key components and changing our energy model. In this regard, the US Inflation Reduction Act is a wake-up call. It addresses the same challenges and may have some negative impacts on our industrial base. It makes the European reaction even more imperative.

The second challenge is climate emergency. The Sixth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) is alarming: global warming will probably exceed the 1.5°C mark from 2030, and reach 2.7°C in 2100 without any further efforts. Every tenth of a degree counts. Natural disasters are increasing in intensity and frequency. Europe will not be spared.

The response to both critical challenges will determine the European Union's place as a major power in the coming decades. The question in front of us is pretty clear: are we going to be able to preserve the planet and the prosperity of our populations?

The answer to both challenges lies in a single strategic objective: to lead the clean tech revolution. Obviously, we do have assets, resources and ambitions. It is now a matter of political will.

Over the past five years, some major initiatives have already been undertaken to build a European green industrial policy.

The European Union promoted commercial reciprocity, by implementing the carbon border adjustment mechanism, to prevent the relocation of production outside the Union and the rise of carbon-intensive products imports. It also resorted to sectorial regulations, such as the Chips Act, to support the production of semiconductors in Europe. A third key action was the launch of several important projects of common European interest (IPCEI). It includes some major steps on batteries, to switch to electric vehicles in 2035, and on hydrogen, to produce decarbonized electricity.

Europe must now accelerate and amplify this movement. What are the next steps? The Commission's recent proposal for a Green Deal Industrial Plan includes a set of unprecedented measures.

The Net Zero Industry Act will support the development of clean industrial technologies, with a goal of 40% of European manufacturing in these sectors by 2030. Also, the Critical Raw Materials Act will encourage the production, processing and recycling in Europe of critical raw materials, with quantified targets by 2030. It represents an overall of the regulatory framework and sets ambitious production targets.

The Commission has also reviewed its Temporary Crisis and Transition Framework (TCTF) to encourage Member States to adopt support measures in essential sectors for the green transition, including through tax credits. The objective is to redirect funding to the decarbonization sectors, without undermining the level playing field and the rules of the common market.

Finally, Europe should act jointly with its Member States.

France is willing to play its role as a driving force. One of our flagship investments has been to devote 30 billion euros to ecology and energy transition through the "France

Relance" plan. In addition, the 54 billion euros of the "France 2030" plan will accelerate the ecological, industrial and social transformation of the country.

I will also present in a few months to the French Parliament a green industries draft law. The aim is to make France a major clean techs producer, by streamlining the creation of new industrial sites, boosting their financing and securing a highly qualified workforce.

We still have a long way ahead of us. But I strongly believe that Europe, the old Continent that started the industrial revolution in the 19<sup>th</sup> century, can lead the clean tech revolution in the 21<sup>st</sup> century.



**NADIA CALVIÑO**

*Spanish Vice president and Minister for the Economy and Digitalization*

# A Green Economy Pact for Europe

The world is undergoing massive changes with a profound impact on the international economy and the role of Europe. In recent years, we have lived through a pandemic, a war, an exponential acceleration of digitalization and a reshuffle of political narratives that have put the concept of "security" back on top of political priorities. Beyond physical, digital, and legal security, there is a broader need to ensure economic and social "resilience", including strategic autonomy, environmental sustainability, and ability to plan long term in a context of climate change, fair rules-based international trade and international competition. The challenges are evolving but the core is not new: we need to reinforce our safety nets and deal with urgent matters without losing sight of mid-term objectives. Crises such as the one we are living are an integral part of our history, and in fact, explain the nature and evolution of current political and economic institutions, starting with the European Union.

This reshuffle of narratives stresses lessons some had forgotten, including the relevance of a strong role for the public sector as an active player in social and economic progress. This includes investing in sectors and public goods that are socially profitable; fostering research that will benefit everyone in general but no one in particular; guaranteeing well-functioning markets, thriving thanks to a healthy, educated, and skilled workforce, reliable sources for inputs, a safe and clean environment, and mechanisms to discipline those who don't play by the rules. We fortunately live in democratic societies that ensure that any structural change is undertaken in a manner that is politically sustainable, this is, ensuring that the costs and benefits are distributed in a manner that is fair, both across and within countries, generation, regions, and social classes.

Right now, Europe is confronted with challenges that require addressing emergencies in a determined and effective manner but also compatible with our midterm objectives and strategic agendas. Dealing with what's urgent without losing sight of what is important. Structural reforms are needed for the economy to keep evolving and adjusting to new realities, based on the core principles of the Union: freedom, equality, protection of minorities, open social market economies and international cooperation. Resisting calls to turn back to protectionism and polarization, which have proven time and again to lead to poverty and conflict. Our goal should be to overcome traditional trade-offs and find workable ways to achieve green sustainable growth, efficient and fair markets, well-functioning rules based international trade, social justice and fiscal responsibility.

And we must do this by applying some of the lessons learnt during the pandemic and the war in Ukraine, this is, working with unity, solidarity, and determination. Taking a holistic approach that provides a clear vision to drive the different ongoing projects. In this regard, Spain has made an ambitious proposal of a Green Economy Pact for Europe, setting the path towards a sustainable growth model supported by a competitive industry on the basis of an ambitious electricity market reform to address the main competitive disadvantage of European industry, a temporary competition framework with streamlined processes to support public support in strategic areas, such as clean energy, semiconductors, electric vehicles, or critical technologies, and a new fiscal framework and integrated banking and capital markets ensuring the necessary public and private investments at European and national level.

Clean tech is at the heart of this roadmap, to ensure resilience and strategic autonomy regarding the necessary inputs and

technologies to drive the green transition. We have learnt from the pandemic and now the war in Europe that excessive reliance on a few suppliers and complex global value chains can be a source of vulnerability. Reducing reliance on fossil fuels should also lead to reliable international value chains and international synergies based trust-worthy suppliers.

Finally, beyond action at EU level and bilateral cooperation, global challenges require global responses. Protectionism and other geopolitical tensions are a matter of global concern and need to be addressed within existing multilateral fora. The EU should be in the lead with a special sensitivity towards the views of the "Global South", to ensure that the new world order that is in the making continues to deliver growth and prosperity to EU citizens and humanity as a whole.

At the end of the day, dealing with today's challenges requires not only dealing with the economy or technological change but also turning back to the principles of political economy: a clear vision for the future, strong democratic leadership, and the ability to coordinate different policies at national, European and global level.





**MARIYA GABRIEL**

*European Commissioner for Innovation,  
Research, Culture, Education and Youth*

# Power Deep Tech Innovation for a Net-Zero Economy

**T**he race is on. Countries all over the world are competing for new technology to protect their industries, while mitigating the negative impact of climate change. For the European economy to remain relevant, the EU must invest in deep tech, particularly in its subsets clean and net-zero technologies.

Deep tech is innovation based on scientific or engineering discoveries, and providing advanced and emerging technology solutions to deep societal challenges. AI, quantum computing, and biotechnology are some examples of deep tech that is vital to deal with climate change, the energy crisis, and global public health.

The deep tech market has been growing fast in recent years. European deep tech companies are valued at a combined €700 billion, while deep tech accounts for a quarter of all European venture capital, and the European venture capital funding in deep tech has the potential to grow much more. It is interesting to note that climate tech's share of deep tech funding has increased more than fivefold in the past six years.

Deep tech represents a great opportunity to boost the EU's economy, for EU industrial players to stay ahead of the curve and remain competitive. By investing in deep tech, including clean and net-zero tech, we will provide the tools to increase the efficiency and productivity of existing industries. It will help develop new, high-value products and services, bringing new opportunities to enter or expand business in emerging markets. Additionally, it will create more and better jobs in Europe.

Imagine a world where renewable energy is cheap and abundant, where AI algorithms can optimize everything from traffic flow to

supply chain management, and where precision medicine can cure diseases that were once thought incurable. These are just a few examples of the transformative power of this new wave of deep tech innovation.

To support such development and growth, in 2022, we have launched the New European Innovation Agenda to position the EU as a leader in the new wave of deep tech innovation and start-ups. The Agenda is a central contribution to the recent EU initiatives to boost a net-zero industry and ensure we deliver the objectives of the European Green Deal on time, such as the Green Deal Industrial Plan, the Net Zero Act and the Critical Raw Materials Act.

Through the consultations and co-creation processes with stakeholders, we have ensured the Agenda reflects the priorities of those impacted on the ground, from innovation ecosystem leaders, start-ups, unicorns, women founders, women working in the capital venture, universities, and businesses.

This new vision provides Europe the right instruments to boost Europe's innovation performance and push deep tech innovation, including clean technology. It aims to increase access to finance for European start-ups and scale-ups by unlocking new sources of private capital to invest in and benefit from the scaling of European deep-tech start-ups. It suggests new approaches to regulation, such as regulatory sandboxes, test beds, living labs, and innovation procurement, so innovators can experiment with new ideas.

In addition, the New European Innovation Agenda proposes the regional innovation valleys to strengthen and better connect innovation players throughout Europe, including in regions lagging behind. It will also support EU Countries and regions direct, at least, €10

billion to concrete interregional innovation projects.

Moreover, the New European Innovation Agenda aims to attract and retain talent in Europe, for example by training 1 million deep tech talents, increasing support for women innovators, and innovating with start-up employees' stock options. Lastly, it will improve policymaking tools through clearer and comparable terminology, indicators, and data sets, which can inform policies at all levels across the EU and ensure better policy coordination at the European level.

It is clear that to achieve a net-zero economy, we must invest in research and innovation for deep tech. If EU players join forces, Europe can win the global clean-tech race. Indeed, we have competitive advantage, as we are worldwide leaders in science and engineering. Using the opportunities offered by the New European Innovation Agenda and other EU initiatives, we can leverage clean tech as the key to unlock the digital and green transitions of our economy and society.

Together, we will power innovation for a net-zero economy. With deep tech, we will simultaneously support the economy and advance solutions to tackle the most pressing challenges of our time, namely reducing the reliance on fossil fuels, increasing global food security, and improving healthcare.

Let us make Europe a leader in the new wave of deep tech innovation and start-ups.



**MOHAMMED CHAHIM**

MEP (S&D Group – Netherland), Vice-president of the Socialists and Democrats, Co-Chair of the Cleantech Friendship Group

# Securing the EU's green industrial base

Two weeks ago, the European Commission announced two pivotal regulations: the Net-Zero Industry Act (NZIA) and the Critical Raw Materials Act (CRMA). While some attribute these acts to 'open strategic autonomy', others view them as a response to the American Inflation Reduction Act (IRA). For me, these regulations are in the first place crucial to establish a regulatory environment that will accelerate the green transition and secure the EU's green industrial base.

## Learn from past mistakes

During the Covid and energy crisis, we learned the hard way that being dependent on (single) third countries for crucial parts of your supply chain is not desirable. We have also learned the hard way that not having the right regulatory environment to keep strategic sectors in Europe can lead to losing a sector entirely, like our solar panel industry that China took over. What we failed to do for our this branch, we are doing better for the battery and chip sectors. By introducing the Battery Regulation and the Chip Act we set the right regulatory environment for these sectors to remain present in the EU. Experiences from the past provide us with good lessons today. How can we prevent us from making the same mistakes or (more ambitious) undo them? I therefore welcome the Commission's political aim to limit dependencies of third countries to 65% of the critical raw materials and secure a European production capacity of 40% for strategic net zero technologies.

## Do we have a business case?

Setting this 40% targets for EU production capacity of these net-zero technologies is a good idea in theory. But in order to make these targets more than a theoretical number we need to make sure that there is actually a market for these technologies. Otherwise, we

are subsidizing a market that does not exist. To create business cases for these technologies, someone has to pay the green premium. The EU should pay this green premium, only if we make sure these technologies have a future in the EU. To guarantee this European future, we need legislation for all covered net-zero technologies that takes into account and sets conditions for the full value chain, just as the Battery Regulation does for the Battery sector.

## The market is a bad master but a good servant

Another critical point missing from the regulations is the link to our existing industry. We need to determine how to match net-zero technologies most efficiently to decarbonise existing industrial sectors. We have to ensure that our industry has access to these technologies without having unfair competition with sectors that have other options to become carbon neutral. A non-existing market cannot be an efficient market. The Commission states that critical raw materials are indispensable for a wide set of strategic sectors, including the net zero industry. However, how these emerging clean tech sectors will get access to these materials in a competitive global market remains a question mark. If we want private investors to invest in these clean tech sectors, they need predictability, which eventually boils down to access to finance and access to raw materials. Let us for example take the case of iridium: an essential critical raw material for electrolysis to produce green hydrogen, which is also used in telecommunication sector. How do we guarantee access for clean tech? How will we allocate these scarce materials taking into account limited supply and high demand in a way that fulfils our European strategic goals.

I believe we need to create a regulatory environment that steers this merit order and prioritises and enables the right clean tech.

This is the only way to secure a competitive green industrial base in the EU. Reaching this, is something we cannot leave up to the market, we have to steer the market in this direction. We need to let the market work for society, not the other way around. As Jens Stoltenberg said: *"the market is a bad master but a good servant."*

## Money is a means not an end

Regarding the financial means necessary to achieve these targets, the discussion is polarized. The European Commission even left it out of the proposal. Generally speaking, we all agree that entering into a subsidy race with the US is a bad idea. Firstly, a race to the bottom ends on the ground, and secondly, competitiveness cannot be built on subsidies. While some want to see a broad flexibilization of state aid rules, others want to see a new European fund with fresh money. I propose a third way. Let us first take stock of all the funds and subsidies we have in the EU, and assess whether they align with our strategic objectives. We could spend a lot of this money in a more targeted way, with stricter green and social conditions, contributing to our strategic goals. Targeting and conditionality in line with our strategic European objectives should be the guiding principles for any (new or old) financial instrument.

Overall, the goal is clear, securing a green industrial base for the EU. How we want to achieve the goal will become clear in the next months when Parliament and Council work on their respective positions.



**LIDIA PEREIRA**

MEP (EPP Group -Portugal), Co-Chair of the Cleantech Friendship Group.

# Promote the sustainable industrial model of tomorrow

The Industrial Revolution triggered industry as the European economy's cornerstone. Nowadays, facing globalisation, sustainability challenges and rapid technology change, the industrial sector is constantly looking not to compromise, but to maintain and reinforce Europe's leadership. It is precisely alongside with the intensification of pollution and environmental hazards that the concept of *Sustainable Industrial Development* affirms itself, aiming to minimize the industrial footprint while maintaining economic growth, social advancement and quality of life. Considering the profound changes of paradigms that the recent times have brought, companies have now a window of opportunity to adapt their operations in order to reduce the disruption brought by climate change.

The European Union's imperative must consist in opening the right paths for industry to shift towards a more sustainable future that will happen with the enhancement of decarbonization. The EU is committed to establish as thoroughly as possible the basis to support a transition to a green and digital economy, through a framework that will allow enterprises to adopt the best industrial model and to be global leaders while sustainable.

In the year of 2022, EU's industries accounted for 20% of EU's emissions, being a polluting agent, industry is also an operator of progress, on which lies precisely the solution for a greener future.

In regard to the practical task of promoting an industrial model, it is relevant to understand what makes industries more sustainable, responsive and adaptive to the present and future challenges. Sustainable industrial development must promote a conservative, circular and efficient usage of resources, entering into new business models

in which environmental safety is guaranteed by having the control over all stages of production. One of the most important components of sustainability is minimizing environmental impact through pollution prevention and practicing safe chemical management.

If we picture a sustainable industrial environment and once determined to achieve it, certain goals must be kept in mind. The need to develop a common innovation process with a positive CO<sub>2</sub> contribution that generates sustainable products and services is crucial. Secondly, this industrial future will undoubtedly foresee a strong innovation capacity and a significant contribute to reduce CO<sub>2</sub> burdens and increase the competitiveness of SMEs. The foundation of a sustainable collaborative platform for the development of sustainable industrial environments, with long-term organisation and funding has been part of the EU course of action on this topic and European ambition can only increase from now on.

*Industry 5.0* aims precisely for a vision of industry that can go beyond efficiency and productivity and reinforces the industrial contribution to society. This model places the wellbeing of the worker at the centre of the production process and uses new technologies to provide prosperity beyond jobs and growth while respecting the production limits of the planet. It consists on mechanisms that make enterprises move past a traditional focus on technological growth and complements the Industry 4.0 approach by putting research and innovation at the service of the transition to a sustainable, human-centric and resilient European industry. In essence, Industry 5.0 represents a reframing that translates learnings obtained from the pandemic and the need to achieve a more resistant industrial system, truly capable of

enhancing and seizing the opportunities in the European Green Deal.

The process of establishing industry as a driver of sustainability demands a lot from governments, public policies' design and of course from industry-state partnership. It will ask for new policy instruments, based upon new objectives and mainly, it will require sharpness of action for example when budget allocation needs arise. From these needs we can deduce that this issued industrial model of the future will demand for an innovative governance. A complex arena where policy processes, areas and governance levels can work in interconnection in the pursuit of efficiency is expected.

It is pragmatically impossible to find a universal formula to achieve sustainable development for the industrial world. The challenges that come along are multiple. Yet, the need to set an actual Agenda capable of generating a universal effort, through increasing determination of governments, of the private sector, stakeholders and civil society has to talk louder. Politically, I deliver a perspective under which elevation to higher standards is crucial to achieve transversally inclusive, sustainable and resilient economic and industrial growth. Industrialization needs to be serving the purpose of creating and supporting peaceful and more prosperous societies and that will be the case through structural transformation and through European initiatives as identified in the Industry 5.0 model.

After all, the sustainable industrial model of tomorrow is an European model, an European effort seeking global dissemination and affirming Europe once again as the home for cleantech and industrial innovation, Europe as the place where sustainability and human well-being comes first and guides ambitious decisions.



KAREEN BOUTONNAT

CEO Europe and APAC for Lightsource bp

# The NZIA: Tripling down on renewables without choking global solar supplies

You will have heard this before, but it bears repeating: The need for urgent climate action has never been more obvious. Equally clear is the need to quickly roll out massive amounts of renewables. This is especially true for solar. Its technology is proven, available and cheap. It can be delivered fast and at scale. Thanks to globally established supply chains, solar is now cheaper than coal. In 2022, existing supply chains allowed solar to be deployed globally at a scale of 20GW per month. Moreover, last year decisionmakers recognised that renewables are not only key to decarbonisation but also for our energy security. Solar has been expanding rapidly, but now it must soar. Global solar capacity is set to triple over the next five years. We must maintain this momentum as people rightly urge its expansion.

## Europe needs to be smart about solar

Europe has a vital role to play in all this. The region managed to stay on track despite a war, an ensuing energy crisis, and associated cost-of-living challenges. In addressing this new energy reality, REPowerEU commits to doubling down on renewables and accelerating their deployment. With the Green Deal Industrial Plan and the Net Zero Industry Act (NZIA), the EU considers revisiting its industrial strategy and reshoring manufacturing of clean technologies.

Nevertheless, some provisions in the proposed NZIA are counterproductive towards the EU Green Deal and climate neutrality objectives. We must not choke well-performing solar global supply chains with a misplaced effort to artificially prop up a domestic manufacturing value chain. Especially when that value chain would take years to build.

A diversified supply chain that is market-oriented and based on sustainable economics has value for market operators. It must not be based on measures that push developers of solar projects into making irrational choices such as buying more expensive products or that limit access to innovative and premium products available globally.

Requiring developers to use local content "Made in Europe" to participate in public procurement and renewable auctions will slow down the rollout of solar instead of supercharging it. That is time we simply do not have, and money poorly spent. Local content requirements are a distraction to what we really need – delivering the energy transition on time and on budget.

A European solar manufacturing value chain is only viable with massive long term public subsidies, with taxpayers' money financing CAPEX and ongoing OPEX, moving us back 20 years to when renewables were much more expensive. With such an approach, there is a real danger that Europe ends up with more expensive solar modules and insufficient volumes to achieve its targets. Ultimately, less solar power means higher energy prices for European consumers.

Recently, SolarPower Europe announced that the EU achieved annual solar record installation in excess of 40GW. Delivering such volumes at cheap prices for consumers requires procuring freely the required solar panels as well as construction and maintenance operations from local and international markets, at the best available commercial terms.

## Europe needs affordable and quick solar solutions

Affordable solar modules have been a critical driver of Europe's green transition. It needs to remain that way. Applying non-price criteria will increase prices. Designing artificial local content rules, under the name of resilience to push supply chains away from China, will put the ongoing growth pace at risk. A "Made in Europe" strategy will decouple the EU market from cost competitiveness and innovative, quality products. Last but certainly not least, it will increase energy costs to the European economy at a time when they are already sky-high.

BloombergNEF showed that manufacturing solar domestically comes at substantial extra cost to European families and businesses: Each 1GW manufactured in Europe will cost EUR375mn/year more than from current supply

chains. Applying this to the NZIA's 40% manufacturing target of 30GW results in an extra cost of EUR11bn/year, or cumulative EUR55bn from 2025 to 2030. And let's not forget: the cost premium won't just suddenly disappear on 1 January 2031...

## Solar must remain the kingpin of the energy transition

Today, solar is the cheapest form of electricity generation. We must keep it this way. If global solar supply chains are unduly restricted, it will negatively impact the pace of new installations in Europe and consequently our energy security. Europe has worked very hard to be where it is today. It would be detrimental to our own objectives if local content rules roll back the gains of recent years.

REPowerEU rightly identified solar as the 'kingpin' of EU energy independence and as an accelerator of the green transition. We must not lose sight of our goal – living up to our Paris commitments and making sure everybody can benefit from affordable, clean energy. We have now the opportunity to reflect upon and correct the NZIA proposals where necessary. In their current form, local content and non-price requirements are an unforced error. The European solar sector requires a smart diversification strategy. One that builds on existing supply chains, expands them, and reduces risks. One that focuses on growth, additionality, and complementarity. Ensuring competition among manufacturers and safeguarding the freedom of choice of solar developers is a prerequisite to continue driving investment towards Europe. And it is how we will REPowerEU.

At Lightsource bp, we have been ready to go beyond business as usual. In September 2021 we announced our solar industry-leading target of 25GW by 2025. To date, we have already developed 8.8GW. A lot remains to be done, let's get to it.



**CHRISTIAN EHLER**

*MEP (EPP Group – Germany), ITRE Committee Member, rapporteur for the Net-Zero Industrial Act (NZIA)*

# Towards a Business Case for Industrial Decarbonisation in Europe

**T**he Net-Zero Industry Act (NZIA) aims to tackle three challenges for the Union through regulation: decarbonisation, industrial competitiveness, and strategic autonomy. While I agree with all three objectives, I strongly believe that the Act's methodology needs improvement.

The NZIA focuses on developing new manufacturing capacity to fulfill domestic demand for decarbonized energy technologies. However, this is not the right approach for two reasons. First, Europe is an export continent, and to maintain our prosperity and way of life, our industry needs to be oriented towards exports. Setting targets for domestic demand is not the right approach. Second, even if permitting is substantially sped up across Europe, the contribution of the final products of any new manufacturing capacity established under this Act will be optimistically deployed in 2028. The contribution of these final products to the 2030 decarbonisation objective cannot be expected to be very significant.

To address these issues, we need to shift the approach of the Act. We need to rethink the production objective, and instead of aiming for manufacturing to meet domestic demand, we need to aim at capturing a significant part of global demand. This will gear our industry towards ambitious exports while building manufacturing capacity in Europe. Furthermore, we need to clarify that the NZIA should cover the full value chain of clean tech - with the exception of raw materials as the CRMA is covering this.

This shift in objectives can only be successful if the Act also delivers the tools to achieve the objectives. The key objective of the tools has to be to create a business case for industrial decarbonisation in Europe. There are two main issues to address.

Firstly, we need to be ambitious on streamlining our regulatory environment. The NZIA should set quantitative objectives for lowering the administrative and regulatory burdens on our industry. Furthermore, we need to have Better Regulation. The 'competitiveness check' announced by President Von Der Leyen was a welcome step in this direction, and the next step should be to strengthen the innovation principle in the Commission's process to prepare legislation. Innovation is our only way towards decarbonisation and competitiveness. Regulation can be a real challenge for innovation, and even market-creating regulations have the risk of being too prescriptive and not technology-neutral. By explicitly considering how a regulation could impact innovation, legislators can make informed decisions on the level of regulation required to achieve our objectives.

Secondly, we need investment. While the NZIA proposal mentions a future Sovereignty Fund, it is not adequate to meet the investment needs to achieve the Act's

objectives because it will focus on support for capital expenditure. Our regulations will make production in Europe more expensive - not setting it up, but actually running it. To ensure a business case for industrial production in Europe, we need to address this. The NZIA should mandate Member States to set up effective tax-based schemes to lower operational expenditure. This should be linked to decarbonisation objectives and funded through national ETS revenues.

In conclusion, to achieve the objectives of the NZIA, we need to shift the focus of the Act towards capturing global demand while building manufacturing capacity in Europe. To be successful, we need to streamline our regulatory environment and invest in tax-based schemes to lower operational expenditure while linking it to decarbonisation objectives. By doing so, we can create a business case for industrial decarbonisation in Europe while also addressing issues of competitiveness and strategic autonomy.





ALIX CHAMBRIS

Vice President Global Public Affairs and Sustainability at Viessmann

# Heat pumps made in EU: lessons learned for a successful industrial policy

On 30 November 2022, our Group CEO Maximilian Viessmann joined the kick-off of "Clean Tech Europe", a platform launched by Commissioner Thierry Breton with national energy ministers. This was one more step in the necessary dialogue between EU manufacturers and policy makers to accelerate the energy transition in buildings, and especially the heat pump ramp-up. For Viessmann, a 106 year old family owned company, this is a historic chance to contribute to EU climate and energy goals while safeguarding EU jobs.

Four months later, the European Commission published the Temporary Crisis and Transition Framework (TCTF), the Net Zero Industry Act, and it closed one of the largest calls of the EU Innovation Fund. All those initiatives target heat pumps as one of the "strategic technologies" that are crucial for the European Green transition.

## Heat pumps are indeed strategic for European competitiveness and energy security.

**Heat pumps are one of the key solutions to phase-out fossil fuels in buildings:** Over 30% of the total EU gas consumption is used to heat residential buildings. The replacement of oil and gas boilers by heat pumps is an effective way to reduce oil and gas consumption, hence to reduce EU dependency on imported fossil fuels. The IEA estimates that annual heat pump sales of 7 million units will lead to a saving of 21 bcm of gas by 2030. This is "equivalent to almost 15% of EU pipeline imports from Russia in 2021"<sup>2</sup>.

### **New technologies make heat pumps suitable for 90% of EU residential buildings:**

New heat pumps working with natural refrigerants can now provide much higher output temperatures. This means that they can run existing radiators in existing buildings without prior insulation of the entire building envelope. The hybridisation of existing gas boilers is another way to quickly decarbonise existing heating systems. Gone are the days when heat pumps were only suitable for highly insulated new buildings that were equipped with underfloor heating systems!

### **Their roll-out is not as fast as it should be:**

The sales ratio of oil and gas boilers to hydronic heat pumps was 5:1 in 2021<sup>3</sup>. In Germany for instance, 70% of new heating installations were gas based in 2021. One

objective set out in *RePowerEU* (the EU energy security strategy adopted in response to the weaponization of energy supply) is to install 10 million new hydronic heat pumps in five years, i.e. by 2027 - compared to a total installed stock of circa 9 million in 2021, and 30 million by 2030. This requires an increase of existing European manufacturing capacities by 300% to 500%.

### **The shift away from conventional heating solutions towards heat pumps could threaten the EU industrial footprint:**

In 2021, the share of imports from third countries outside EU27, for the total heating market, was around 15% while it was between 30-40% for hydronic heat pumps. This means that, everything remaining equal, the portfolio shift (oil and gas boiler sales down / heat pumps up) naturally benefits non-EU manufacturers at the expense of the EU manufacturing

<sup>3</sup> Source: *Heating market report*, ehi



<sup>1</sup> The TCTF sets new, extraordinary state aid rules for investments in production capacity.

<sup>2</sup> Source: *The future of heat pumps*, IEA, 2022.

footprint. EU/China trade data also shows deteriorating trends over the past 5 years. This does not mean that the portfolio shift is not a good objective. A healthy competition, if there is a level playing field, will ultimately benefit the end-consumers and is likely to drive costs down. Yet, it certainly means that careful monitoring and a targeted support for the heating market is needed in order to safeguard EU manufacturing capacities.

**The timing of the ramp-up happens at a time of unprecedented disruptions in supply chains:** The accelerated uptake of heat pumps, the volatility of demand (partly driven by policies) AND the current supply disruptions put the EU industry under extreme pressure. In a normal, stable economic environment, a change of 20% on the demand side needs to be anticipated at least 6 months in advance along the entire supply chain. For critical components such as pumps, inverters, evaporators, compressors, heat exchangers and semiconductors, EU manufacturers can experience supply delays between 20 to 70 weeks. This deteriorates short term EU competitiveness because most Asian manufacturers have easier access to materials and components (partly because of their location and size).

### Lessons learned for a successful industrial policy

Building on the above, and harvesting the strength of the European manufacturing base, a successful industrial policy focuses on 5 issues:

- **Secure stable demand / ensure customer satisfaction:** A constant demand for heat pumps is a prerequisite for a successful ramp up of manufacturing capacities in Europe. Subsidies will be needed at the beginning to reduce the price gap between oil and gas boilers and heat pumps, especially for low-income households. A gas to electricity ratio below ½ is also needed to ensure acceptability of operational costs, i.e. energy bills, for the end-users. The monetization of demand side flexibility and self-consumption models will also be instrumental to increase the attractiveness of heat pumps towards the end-user.
- **Leverage the new state aid framework for investments in manufacturing capacities** - including for brownfield projects: The new Temporary Crisis and Transition Framework allows Member States to subsidise up to 20-35% of investment costs - capped between 150 mn and 300 mn euros depending on the wealth of the region where the investment takes place.
- **Leap to natural refrigerants:** The heat pump ramp-up offers an opportunity



to leap directly to natural refrigerants that have low GWP and no negative environmental impacts. The revision of the F-gas regulation and the upcoming REACH PFAS regulation can be leveraged to give the industry the right signal and gradually phase-out all fluorinated gases without jeopardising the achievement of RePowerEU goals.

- **Invest in skills and attract installers:** The installation of millions of heat pumps require a suitably trained workforce. Existing EU instruments such as the European Social Fund and the EU Pact for Skills can be leveraged to attract and train installers.
- **Reward sustainable heat pumps:** The Net Zero Industry Act foresees an additional 5% subsidy points for end-users who install heat pumps that have a higher "sustainability and resilience contribution"<sup>4</sup>. While the exact definition

remains to be determined, this is a step in the right direction.

Heat pumps are certainly not the only solution to decarbonise buildings. District energy, hybrid solutions, photovoltaics, batteries, solar thermal, biomass, green gas solutions, next to energy efficiency measures, are other necessary options. The integration of heat pumps in the wider energy system, security of supply for winter peak demand, and sector integration are other critical success factors. Yet, heat pumps are an essential, sine qua non, enabler. The significant increase of heat pump sales in 2022 (close to 40%) gives hope that the transition is underway at full speed and that there is no way back. With the right industrial policy, we can ensure that this transition is a success for climate goals, energy security AND for the long term competitiveness, jobs and growth in Europe.

<sup>4</sup> Article 21, NZIA, as defined in Article 19 NZIA



**PERNILLE WEISS**

*MEP (EPP Group – Denmark), ITRE & ENVI Committee Member, Member of the Cleantech Friendship Group*

# Unlocking the potential of clean tech innovation

**B**oosting the development of promising clean technologies is not only critical for achieving net-zero emissions but also to drive our future economic and industrial growth.

Yet, many of these technologies remain at an early stage of development. According to the IEA's Sustainable Development Scenario, more than a third (35%) of cumulative emissions reductions by 2070 compared to the current trajectory rely on technologies that are currently at the prototype or demonstration stage. This is particularly the case for sectors that are hard to decarbonise such as heavy industry (steel, cement, chemicals) and long-distance transport (trucks, shipping, aviation, etc.).

Since current technologies will not be sufficient to transition to climate neutrality, the situation calls for urgent efforts to unlock the full potential value of emerging technologies. More than the pure ability to innovate, this requires an holistic approach that fosters a well-functioning and comprehensive ecosystem in which innovation can thrive and where all relevant stakeholders (engineers, researchers, entrepreneurs, policy-makers, investors, etc.) can collaborate efficiently to meet the most pressing needs of the climate transition.

However, doing so will not be an easy road: empirical evidence shows that innovation is a non-linear and time-consuming process. Each stages of development (usually divided into four: prototype, demonstration, early adoption and maturity) has funding, technical and market risks, with eventually only a minority of products making it to mass-market deployment in practice. Moreover, the time from the first to last phase can take between 20 to 70 years. For instance, the journey for solar photovoltaic and lithium-ion

batteries (two recent successful clean energy technologies) took around 30 years.

What is certain is that the time to act is now: the pace of innovation in the upcoming decades will depend on the policies and decisions put in place today. For some energy sectors, 2050 represents just one investment cycle away. Reducing global greenhouse gas emissions will not depend on one magic silver bullet innovation, but on a broad combination of technologies working across all sectors of the economy.

In this context, how to unlock the full potential of clean tech innovation? The post-pandemic era, fuelled by stimulus packages, offer some unique opportunity for action. Three important aspects should be strengthened:

First, de-risking investments to enhance mass-market deployment and private capital. Today's relative policy instability, technological uncertainty and entrenched dependence on fossil-fuel-intensive technologies means that the climate transition remains a high-risk for many private investors. In addition, high up-front capital requirements, a lack of experience in new clean sectors, and a short-term vision on profits, have led to significant finance gap for the needed investments.

By contrast, the public sector can invest more patiently than a majority of investors. The overarching goal of the EU and national governments is to help position our economy for long-term success. As a result, they have the ability to take initial investment risk in demonstration projects (the stage before mass-market commercialisation) via public financing instruments, thereby "de-risking" (and thus enhancing) private capital. While the process of innovation involves a wide range of participants, governments have a

pivotal role that go far beyond simply funding research and development.

Second, to foster cross-sector & international collaboration and value "spillovers". To work more efficiently and avoid duplication of effort, we should also ensure that new knowledge, experiences and best practices flows to other users, notably between researchers, academia, companies, policy makers and international partners.

In particular, support networks in overlapping fields and cross-fertilisation between sectors can be very useful to encourage "spillovers". Spillovers are knowledge accumulated in one technology area that can be a powerful driver for innovation in other related technologies, thereby increasing the overall rate of innovation. Often overlooked, spillovers are crucial because they can be harness at a much lower cost and are an optimal use of already existing resources.

Third, to address the shortage of skilled workforce in the sector. Clean tech companies are sometimes faced with a lack of skilled workers, as needs are not always perfectly matched with proper education and training. As such, enhancing the education system by training relevant personnel (technicians, researchers, engineers, etc.) and dedicating adequate funding to research infrastructures (laboratories, research institutes, universities) are necessary to better adapt to the needs of a constantly evolving sector.

To conclude, by de-risking investments, strengthening cross-sector collaboration and spillovers, and fostering the development of a skilled workforce, the potential of clean technology can be maximised.





**CHRISTIAN BUSOI**

*MEP (EPP Group – RO),  
Chair of the ITRE Committee*

# Improve the resilience of our value chains in the context of Net Zero Industry Act

Clean technologies play a key role in shaping the transformation of the energy industry and supporting the decarbonisation of all sectors of the economy. Clean energy technology supply chains involve new opportunities, but also new risks and vulnerabilities. Disruptions to clean energy technology supply chains may lead to a delayed and more expensive energy transition. Therefore, making clean energy supply chains secure, resilient and sustainable is a priority for the EU.

The Union industrial strategy should be designed both for securing European leadership in clean energy technologies and for improving the existing industrial base and supporting its transformation in the future to provide high-quality jobs and economic growth for all Europeans in order to achieve the objectives of the Green Deal.

The ninth legislature of the European Parliament has been characterised by exceptional events.

The European industry has been challenged on everything from unforeseeable events such as COVID-19, post-COVID supply chains disruptions, record high energy and commodity prices, high inflation, rising interest rates, and ultimately, Russia's unprovoked and unjustified aggression against Ukraine.

Despite these storm winds, the EU economy has held up remarkably well and political unity has paid off. The efficiency of the cooperation between co-legislators, the Council and the European Parliament, has reached its maximum in the area of energy security, with the approval of the regulation on minimum gas storage obligations in just three months, a record time for the ITRE Committee I am proud of chairing. We have been calling for a holistic approach for incentives to support strategic industrial sectors and their supply chains, which are facing a sharp increase in the costs of energy, transport and raw materials

Now our European industry is facing a new competition challenge coming from increasingly fragmented global markets.

As regulators, it is our privilege and duty to improve the resilience of European value chains to continued change and upcoming challenges. We already understood how the green and digital transitions strengthen our industrial competitiveness, how the European Green Deal and a strategic industrial policy go hand in hand. Now we need to shape our regulatory environment to allow a fast scale-up of clean and renewable energy, create the best conditions for sectors that are crucial to reach our net-zero target, foster technologies like wind turbines, heat pumps, solar panels, renewable hydrogen as well as CO<sub>2</sub> storage. We need faster and more flexible planning and permit procedures, but also more policy coherence and coordination on the wider climate and environmental agenda.

We know that currently, the EU depends heavily on a very limited number of suppliers for all the strategic technologies in several stages of their supply chains and, for some technologies, throughout the complete value chain. We already experienced with Russia how untrustworthy suppliers can exploit and weaponise such dependencies to their advantage. In that exceptional situation, we reacted to Russia's actions approving in record time the gas storage regulation, learning an important lesson.

This time, we are ahead of the events. We are now reforming the electricity market design to limit the impact of gas price spikes on electricity consumers, providing power producers with revenue stability, shielding industry from price volatility. We are beginning a thorough analysis of the Critical Raw Material Act recently proposed by the Commission to reduce excessive European dependencies on single suppliers.

The reinforcement of Union open strategic autonomy requires a combination of different solutions, including diversifying suppliers through sectoral partnerships and alliances,

reducing energy and material use, boosting EU manufacturing and production capacities, increased investments in strategic sectors and fostering innovation and research and development. We are aware that in the new geopolitical context, we must boost the European industrial competitiveness, sustainability and security, reduce administrative burden, and create breathing space for our industry.

One of the most efficient ways to strengthen European industrial resilience and reduce dependences is to diversify supply chains. Another way to strengthen European industrial resilience and reduce dependences is by enhancing the EU's manufacturing capabilities in key strategic technologies, such as solar and wind energy, heat pumps, electricity grids, batteries, long-duration energy storage, electrolyser manufacturing for renewable hydrogen and pre-fabricated sustainable building materials.

We believe there is also a need to strengthen 'Made in EU' and accelerate the adoption of Industry 4.0 technologies, particularly by SMEs. Parliament would like to see the 'Made in Europe' partnership in the Horizon Europe programme and to do so by fostering SMEs' cooperation with universities and research and technology organisations. 'Made in Europe' should stand not only for quality and innovation, but also for highly sustainable industrial products, processes and services, and promote the recovery of quality employment and manufacturing opportunities throughout the Union, in order to support the balanced and sustainable development of all EU regions.

We are not alone on this road. We will work together with like-minded partners, such as Japan, the United States, South Korea and others, aligning partners' interests with EU interests, to diversify and integrate sustainable supply and value chains.

We need to maintain our open strategic autonomy in an increasingly challenging geopolitical environment.



**HILDEGARD BENTELE**

MEP (EPP Group – DE), ITRE Committee

# “Act” as “Action” - The Critical Raw Materials Act is the fundament of a transforming industry in Europe

**A** lot has changed in the last two years. The pandemic and the war have made us feel the consequences of interrupted supply chains and high-energy prices. At the same time, we have taken first major steps in translating our climate goals into regulatory framework: We have expanded and improved ETS and effort sharing, increased our targets for the shares of renewable energies and energy efficiency and set ambitious targets for the mobility transition as well as hydrogen, wind and solar production. We have driven digital solutions forward, created the foundations for a semiconductor market and set new rules for batteries.

However, neither the projected demand nor the availability of the needed raw materials for this “new” European industry is to date secured. Even more due to fierce global competition, not only from the US and China, and with our competitors coming from better starting points or having made better strategic decisions in the past. This is why we should implement a proactive, coherent raw materials policy.

## A comprehensive approach and strategic anchoring

The draft Critical Raw Materials Act (CRMA) is the result of two years of intensive discussions between the Commission, Parliament and stakeholders, giving monitoring, early warning and incentives for cross-border lighthouse projects to the European level and “homework” to EU Member States mainly with regard to adjustments in permitting procedures, data collecting and sharing as well as stockpiling. As a latecomer under the Green Deal and climate-related legislation, the European Commission has made use of its known toolbox and of the recommendations of the European Parliament. Among them: taking a future-oriented perspective, strengthening the circular economy, identifying and describing quantitative targets, mapping and exploring, closing material gaps, rethinking the list of commonly used raw

materials, improving timeliness, predictability and transparency of authorisation processes, options for stockpiling, better coordination of raw materials policy at EU level and between the EU and Member States.

Critical raw materials (CRMs) have very different features and availability and requested in very different quantities. Therefore, we certainly have to call into question the one-size-fits-all approach applied by the European Commission. My primary focus as EPP rapporteur in the lead ITRE committee is to ensure that this legislation makes a real difference: we need raw material policy to be a compulsory consideration at all political and administrative levels and in the boards of our European manufacturers. Secure access to and sufficient quantities of CRMs will decide about technological leadership, competitiveness and hence jobs in Europe. Therefore, I think that we definitely need to harvest the lowest hanging fruit, namely the speeding up of permitting procedures - even more since we have made significant progress on this matter in the recently agreed Renewable Energy Directive.

## Keeping our own house in order: Policy Coherence

As politicians and legislators, we need to keep our own house in order. The Green Deal and the climate law have led to a multitude of new legislation and reviews, some of which developed in “silos”, propped up by policy-makers captured in fragmented thinking. In this context, we are running a real risk of incoherence and even contradiction regarding our strategic priorities. With regard to the CRMA, the potential classification of CRMs as “hazardous” under REACH is a classic example. Changes in waste management, air quality, industrial emissions, water and nature conservation are other examples of policies where legislation may have an unintended negative direct or indirect effect on CRMs and strategic

projects. As CRMs often come as by-products, impact is often not obvious at first sight. I therefore think it is necessary to create a “CRM filter” that must ensure that EU legislation as part of its impact assessments takes sufficient account of the impact of drafts for new or amended laws on CRMs supply and strategic projects.

## A last word on domestic mining

Without any doubt: We will continue to import the big majority of CRMs needed, this is why new and adjusted partnerships with reliable partners must be high on the agenda. Besides a much-needed European climate diplomacy, the EU – hand in hand with Member States – we need to establish energy and raw materials issues as integral part of our European foreign policy and its underlying support and financial assistance systems. However, to allow for a certain level of guaranteed independence and security, we should also exploit – where economically feasible – our domestic potential of CRMs, also to keep knowledge and skills in mining as a strategic competence. To me, domestic mining is a matter of credibility: How can we ask projects in third countries to comply with European standards in terms of sustainability, due diligence, environmental and social standards, transparency and innovation if we are not willing and able to put them into practice on our own continent?

Our main goal must be to handle our resources with care and in the most efficient and circular way. The CRMA is at the heart of industry but also environmental legislation. With a lot of enthusiasm and some constructive criticism, I look forward to be part of the negotiation team and I remain committed to contribute to a timeline that will deliver concrete results until the end of this legislative term.



**HENRIKE HAHN**

MEP (Group of the Greens – Germany)-  
ITRE Committee Member

# Critical raw materials, at the heart of decarbonization issues

Critical Raw Materials are key to enable the European industry to meet our political goals and ambitions of the twin green and digital transitions. They are gaining additional importance in light of the defence and space sector facing Putin's invasion of Ukraine and the ongoing war in Europe.

Against this background, the Critical Raw Materials Act is an important initiative for an active European diversified raw materials policy that brings sustainable mining, processing, and recycling and circular economy forward.

However, we need a forward-looking strategic plan on how to handle the increased European and global demand for Critical Raw Materials. Here we should highlight the increased need for substitution of raw materials but also emphasise sufficiency and ensure that demand-side actions are carried out to curb the future demand.

Circular economy must be at the heart of any critical raw materials strategy.

Diversified supply of primary materials is the current challenge. If necessary, sustainable mining needs to be promoted with the highest possible environmental and societal standards. Regardless whether extraction activities takes place within the EU or in other countries. It must be ensured that we do not cause harm to our environment and society. A blind call for more mining is out of place. Mining in Europe should be a well-coordinated, supervised and monitored process of a well-balanced policy ensuring our European strategic autonomy and competitiveness of our European green industries. Reducing the complexity and increasing the efficiency of extraction projects should not sacrifice the environment and people's needs

in the corresponding mining regions. Mining in European protected areas such as Natura 2000 must not be allowed.

According to the Impact Assessment and based on Commission services most exploration companies active in Europe are based outside of the EU. Most interviewed private and public financial institutions have not been involved in financing exploration projects and stated that this was due to the high risk involved. Financing of new mines is generally considered very risky and the private financial sector is not willing to engage. However, they are willing to engage in processing and refining as well as recycling activities.

In the long term, a circular economy must be the target for all policies on the EU level regarding raw materials. Subsequently recycling is the most important element for a circular economy. We must design forward-looking policies with ambitious and realistic targets that evolve over time and take into account the whole life cycle of the product.

Boosting innovation, research, and skills is equally important. Here I welcome the Commission's call to strengthen the uptake and deployment of breakthrough technologies in critical raw materials. Large-scale skills partnerships on critical and strategic raw materials and a Raw Materials Academy that will promote skills relevant to the workforce in critical raw materials supply chains is certainly important. The emergence of the European critical raw materials value chain would create further demand for skilled workers, thereby posing a risk for shortage increase if no action is undertaken. The materials dimension of the battery value chain alone may create up to around 200 000

jobs in 2030 and 0.5 million jobs when in full transition (after 2030).<sup>1</sup>

Furthermore, diversifying the Union's imports of critical raw materials is a key to ensure a successful industrial policy. While Europe still heavily depends on imports on raw materials by often geopolitically questionable countries, I see a huge potential for developing the market for secondary raw materials and reuse it. The EU has to strengthen its global engagement with like-minded partners, including by establishing a Critical Raw Materials Club. We need an active sustainable European raw materials policy in the future with the Green Deal at its core.

<sup>1</sup> Fraunhofer-institut für system und innovationsforschung ISI – Job preview study: job effects in the upstream battery value chain quoted after [file:///C:/Users/agartinska/Downloads/090166e5f9401c33%20\(3\).pdf](file:///C:/Users/agartinska/Downloads/090166e5f9401c33%20(3).pdf)



**BERND SCHÄFER**

CEO and Managing Director of EIT RawMaterials

# The race to secure a sustainable supply of critical and strategic raw materials continues to intensify.

It puts Europe's resilience, its ability to act and the continent's future prosperity under an unprecedented stress test.

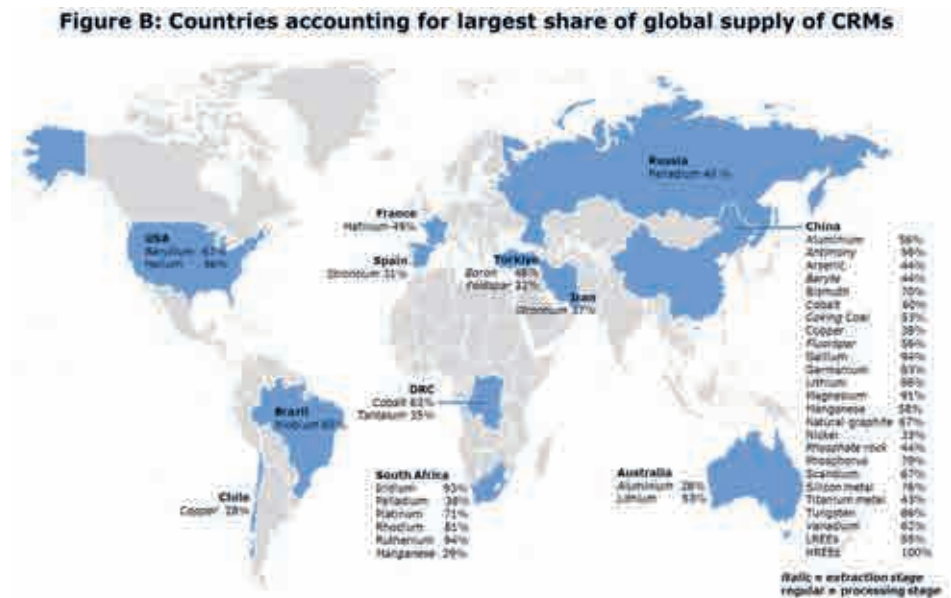
Climate change calls for a bold and swift transformation of the economy. With metals and minerals being key enablers of the European Green Deal and for the shift from a linear brown to a circular green economy, the challenge to secure present and the exponentially growing future supplies of raw materials has been elevated to the very top of the political agenda.

The need for critical raw materials from both secondary and primary sources has exploded. As the energy transition gains momentum, market projections suggest a seven-fold and a forty-fold overall increase in mineral and metal demands for clean energy technologies by 2040.

To make matters worse, the Russian war in Ukraine has put Europe's energy sector, its oftaking industries and private households under immense strain. It is now abundantly clear that Europe cannot wait any longer to accelerate its transition to clean, alternative forms of energy and away from its dependence on fossil fuels, much of which come from Russia.

But it is the colliding ambitions of the world's two biggest markets, the USA and China, that have caused alarm across the European raw materials' consuming industries. Belatedly, the potential impact of this has awoken Europe to the urgency of mobilising a highly secure and resilient supply of critical raw materials and the need to counteract a one-sided supply dominance.

For decades China has held a quasi-monopoly on rare earth metals and it



continues to grow its strategically leading position in the processing of several other materials used for rechargeable batteries, including lithium, cobalt, nickel, graphite, manganese, copper, and aluminum. Now it has laid bare its intention to take on the lithium extraction market, a move that could see it control at least two-thirds of the global supply of this vital metal by the middle of the decade.

*Countries accounting for the largest share of global supply of CRMs*

On the other side of the world's geopolitical divide, the USA made its intentions very clear with the approval of its game-changing Inflation Reduction Act (IRA). With \$369 billion in investment incentives for clean energy projects, this represents the largest

climate spending package ever<sup>1</sup>. It clearly signals the USA's renewed priority to reduce its dependence on China and to gain access to the indispensable raw materials it needs for making batteries for clean tech, solar panels, wind turbines and energy storage and conversion systems.

## Europe: Squeezed from outside and within

Europe, with its twin digital and green transition well underway, sits between these two competing political and economic powerhouses and risks its own world-leading clean tech ambition being squeezed out of the

<sup>1</sup> Inflation Reduction Act of 2022, [www.energy.gov/lpo/inflation-reduction-act-2022](http://www.energy.gov/lpo/inflation-reduction-act-2022) (Accessed 17 March, 2023)

race. Sourcing and securing supplies of base, advanced, critical, and strategic raw materials that adhere to Europe's self-imposed ESG standards are in peril unless all of Europe's member states show strong leadership and act without hesitation to drive and execute the raw materials agenda at all stakeholder levels.

### **The challenge is clear: what needs to be done now?**

So, the nature and scale of the challenge is clear. The question is, what can we do about it? What should be Europe's response to the ramped-up raw materials ambitions of the USA and China, as well as other big players, and what can it do to level the playing field against these competing giants?

In a signal to the world that the European Union is no longer prepared to stagnate, the European Commission devised the 'Critical Raw Materials Act' and the 'Net-Zero Industry Act', two highly significant and ambitious proposals. EIT RawMaterials welcomes both acts as they provide direction and clear guidance.

The 'Critical Raw Materials Act' in particular highlights the urgency to diversify supplies away from single-state economies, reduce mining permitting times that will help mobilize investment in responsible extraction, expand European processing and recycling capacities, and secure feedstock supply from within Europe.

However, if Europe is serious about its net zero carbon emission objectives, and if it wants to maintain jobs, competitiveness and grow its technological advantage, those recommendations need to be implemented without delay. In addition, each EU country and its respective industrial ecosystems must set and commit to their own quantifiable impact targets.

Europe has to act now to make supply shortages and disruptions to the secure flow of raw materials into our economy a thing of the past. As a matter of priority, Europe must build a highly reliable pipeline of minerals and metals that are responsibly extracted, manufactured, processed and recycled within the continent.

To this end, in 2020, EIT RawMaterials was entrusted by the European Commission to manage the European Raw Materials Alliance (ERMA) with the aims of reducing European dependency on strategic and critical raw materials from outside Europe, and to promote environmental, social, and governance (ESG) standards. ERMA responded robustly by developing two of Europe's

strategic raw materials value chains, which represent the views of over 600 stakeholders across the EU, academia, research, NGOs, industrial associations and government organizations. The first of these, the 2021 Rare Earth Magnets & Motors Action Plan, presented proposals to build Europe's first rare earth value chain. This plan resulted in 14 de-risked and bankable investment projects estimated to supply at least 20% of Europe's needs for permanent magnets by 2030 from almost 0% today.

The second action plan, to be published in May 2023, addresses the importance of Materials for Energy Storage and Conversion. It focusses on anticipating and quantifying the enormous raw materials investments needed to feed the transformational requirements for electrification and energy storage. This plan addresses the objectives of the REPowerEU Plan to increase the headline 2030 target for renewables from 40% to 45% under the Fit for 55 package. It presents massive investment opportunities and addresses bottlenecks and gaps in four primary strategic action areas: (1) materials in solar energy, (2) battery materials (3) fuel cells and electrolysers, and (4) alternative energy storage and conversion.

As a result of this action plan almost 50 investment cases were identified, targeting materials for energy storage and conversion across Europe and beyond, with a total investment need exceeding €15 billion. If these projects were realised, many of Europe's raw materials needs, as set out in the Critical Raw Materials Act, could be sourced from within the EU by 2030, a sure sign of the enormous potential for Europe that lies ahead.

It is my firm belief that both action plans, together with the many other investment opportunities that have been identified within the raw materials sector, represent an unprecedented opportunity for European industry. We must now act swiftly to establish robust and reliable raw materials pipelines in Europe in order to implement deep greenhouse gas reductions.

**Join us at the Raw Materials Summit, 15-17 May 2023 in Brussels to learn more about the most pressing topics outlined in the CRM Act.**

<https://www.eitrmsummit.com/programme>



**FREDERIC DESPREAUX**

Vice President, Cluster Northern Europe & CIS countries, Air Liquide

# Industrial solutions to decarbonise Europe

**A**ir Liquide's decarbonisation solutions are key to addressing climate emergency, while contributing to EU's industrial renewal and sovereignty. Molecules such as hydrogen, oxygen or nitrogen are necessary to the development of a net-zero industry and clean mobility, as well as to support the growth of EU's semiconductor production. Renewable hydrogen and Carbon capture technologies developed by our Group will contribute to abating industry's CO<sub>2</sub> emissions.

In a context of aroused geopolitical uncertainties and as part of the broader Green Deal Industrial Plan, the European Commission published new initiatives. We welcome them and call for further alignment between existing and upcoming pieces of EU's decarbonisation and autonomy policy framework.

## Provide an optimal regulatory framework for the rapid deployment of renewables and low-carbon technologies

In its recently published Net Zero Industry Act, the Commission proposes to support the development of technologies that are key for reaching the EU's decarbonization goals. Rightly so, hydrogen, biogas production and Capture Carbon and Storage (CCS) are identified, including targets on carbon storage. However, during the legislative process improvements could be proposed to focus more on the "value chains" notably for both the CCUS and (renewable & low-carbon) Hydrogen. It is key that CO<sub>2</sub> infrastructures are now developed in parallel to storage, in order to increase the speed of industrial hubs decarbonization. Also the support to hydrogen mobility would help Member States that effectively need to deploy alternative fuels infrastructures to meet EU targets.

### PROJECT IN BRIEF: Kairos@C

#### What is it?

Air Liquide and BASF are planning to develop the largest cross border CCS value chain in the world and to significantly reduce their CO<sub>2</sub> emissions at the industrial cluster in the port of Antwerp at the BASF chemical site, in a consortium named Kairos@C. Kairos@C is connected to Antwerp@C, a consortium that aims to halve CO<sub>2</sub> emissions in the Port of Antwerp by 2030. Air Liquide and BASF are founding members of Antwerp@C. The EU-Innovation Fund selected Kairos@C project for funding among 311 large scale projects aiming to decarbonise Europe's industry and energy sectors.

#### How will this clean technology deliver on the EU's goals?

Kairos@C is a cross-border liquid CO<sub>2</sub> value chain that will avoid up to 14 Mt CO<sub>2</sub> over the first 10 years of operation. Supported by the EU Innovation Fund, this groundbreaking project opens a new chapter towards developing a more sustainable industry. The unique end-to-end CCS project can and should be replicated. Indeed, the 12 largest European industrial clusters account for around 25% of CO<sub>2</sub> emissions in Europe.

### PROJECT IN BRIEF: Air Liquide retail joint venture with TotalEnergies

#### What is it?

Air Liquide and TotalEnergies join forces to accelerate the development of an extended network of hydrogen refueling stations, primarily for trucks, in 5 European countries (France, Belgium, the Netherlands, Luxembourg and Germany).

#### How will this clean technology deliver on the EU's goals?

The installation of new hydrogen refueling stations, especially for heavy duty vehicles, will not only contribute to reaching the goals set out in the Alternative Fuels Infrastructure Regulation, currently awaiting formal approval by EU legislators after the deal reached at the end of March, but will also contribute to the acceleration of the deployment of zero-emissions trucks and thus to the decarbonization of the sector.

Provided that renewable and low carbon electricity is available in large enough quantities and at affordable prices in the EU, hydrogen can be a lever to contribute to the reduction of the EU's energy dependencies in a context of enduring geopolitical tensions. To accelerate the development of the European hydrogen market, investments should be focused in a first stage on electricity interconnections and not on long-distance pipelines, as the initial European demand could be met by domestic production and contribute to reducing the EU's dependencies. Building a European hydrogen industry is not contradictory with the setting of international

standards on the attributes of renewable and low-carbon hydrogen to establish an international market framework and build partnerships. It is however important that this should be done in a coordinated and phased manner over time. In this regard, the recently adopted REDIII will represent one of the main drivers for the development of renewable hydrogen in the EU. However, we think that low-carbon Hydrogen (through both carbon capture or nuclear based electrolysis) should also be promoted for the role they have to play during the transitional phase where renewable hydrogen is not yet available in sufficient quantities.

Moreover, through its proposed reform of the Electricity Market Design, the Commission aims to introduce a set of legislative changes to accelerate a surge in renewables and the phase-out of coal and gas, make consumer bills less dependent on volatile fossil fuel prices, better protect consumers from future price spikes and potential market manipulation, and make the EU's industry clean and more competitive. It is key that this reform delivers on setting long-term price signals, which is fundamental to drive investments accelerating the roll out of renewables. Also, the reinforced focus on flexibility such as energy storage and demand response reflects the growing need for back-up solutions given the rising share of intermittent renewables in the system.

#### PROJECT IN BRIEF: ELYgator

##### What is it?

ELYgator, that will be located in Terneuzen in the Netherlands, is one of Air Liquide's flagship renewable hydrogen projects thanks to its unprecedented scale – encompassing a capacity of no less than 200 MW electrolyzer – and because it cleverly integrates two different electrolysis technologies (PEM and Alkaline) using renewable (wind) electricity.

##### How will this clean technology deliver on the EU's goals?

The technology and innovative operation enables virtual electricity storage to manage intermittencies of the grid which is key for the further development of renewable power. The project will be entirely sourced from renewable power sources and will enable avoidance of 3.3M tons of CO<sub>2</sub> over its 10 first years of the plant's operation.

In order to ensure long term attractiveness for private investment in Europe, at times where other geographies (e.g. USA's IRA) create a simple and effective framework, it is important to send the right signals to ensure continued private investment in clean technologies. For example, private hydrogen infrastructure such as crackers or pipelines that transport ultra pure molecules used as feedstock/chemical intrant, should not be regulated through the hydrogen and gas package. The gas directive indeed regulates long distance bulk Natural gas pipelines that mainly will be used for power or heat purposes. Applying similar rules to Hydrogen would not make sense as the infrastructure and market dynamics are very different depending on its application. Today, the industrial feedstock hydrogen market is very competitive, while the Hydrogen to energy market is still nascent: Existing hydrogen pipelines (some 1000km mainly in Belgium, Germany and the Netherlands)

diameter is of max 30 cm (average 10-15cm) wide, the medium natural gas pipelines to be repurposed into the future hydrogen backbone (some 50.000km according to the European Hydrogen Backbone study) are average 80 and up to 120 cm!

#### PROJECT IN BRIEF: Industrial scale ammonia (NH<sub>3</sub>) cracking pilot plant - Antwerp

##### What is it?

Air Liquide recently announced the construction of an industrial scale ammonia cracking pilot plant in Antwerp, Belgium. Using innovative technology, this new industrial size plant will make it possible to convert, with an optimized carbon footprint, ammonia into hydrogen. The innovative pilot plant, which combines a novel efficient process with Air Liquide's proprietary technologies, is planned to be operational in 2024.

##### How will this clean technology deliver on the EU's goals?

When transformed into ammonia, hydrogen can be easily transported over long distances. With this cracking technology, Air Liquide will further contribute to the development of hydrogen as a key enabler of the energy transition. Ammonia can be used as an energy carrier. It can be produced with a low-carbon footprint from hydrogen in geographies with abundant renewable energy sources such as sun, water and wind, or other low-carbon power.

#### Mobilizing financing for a low-carbon/net-zero economy

Certainty and clarity of financial support in terms of amounts and timing, visibility on what support is available and under what conditions. This requires providing clearer and simpler sets of conditions that allow visibility and timely decision-making. In this regard, Air Liquide welcomes the NZIA objective to help put Europe on a fairer level playing field. Europe's competitive position has been weakened by the energy crisis, where gas prices in the EU have been almost seven-times higher than, for instance, in the United States. The introduction of the US IRA combining climate and industrial policy provides at first glance an attractive and clear support scheme for clean technology typically through tax credits. Regarding hydrogen, for example, the amount of the tax credit is mainly based on the CO<sub>2</sub> content of the H<sub>2</sub> produced. This allows for an efficient decarbonisation as well as for neutrality regarding the technology used. Also the possibility to cumulate aids is

triggering a strong appeal to develop a sound hydrogen industry in the USA.

In Europe, the revisions of the State Aid framework - namely General Block Exemption Regulation (GBER) and Temporary Crisis and Transition Framework (TCTF) - should help the shift to net-zero EU objectives. However, its potential impact on the EU economy remains to be seen. The different national approaches and disbursement of aid under the GBER may result in a fragmented treatment across the EU. Also, we hope that the necessary means will be provided to match the US IRA support levels and be as much technology agnostic.

The upcoming calls under Innovation Funds and the European Hydrogen Bank mechanism as well as the pending proposals for a one-stop shop materialised by European Sovereignty Fund could help to bridge the gap between the demand and supply, de-risk the offtakers and provide the long-term visibility and clarity that is very much needed for EU industry to kick-start its decarbonation at the relevant scale.





**BART BIEBUYCK**

*Executive director of the  
Clean Hydrogen Joint Undertaking*

**Developing ports hydrogen infrastructure is crucial for the greening of the European economy, writes Bart Biebuyck, Executive Director of the Clean Hydrogen Partnership.**

Ports will be key hubs for the integration of hydrogen into Europe's energy mix. However, according to a first report recently by Deloitte Belgium for the Clean Hydrogen Partnership, the EU will have to "radically accelerate" the development of infrastructure at ports and the surrounding industrial areas to meet its renewable hydrogen targets.

Ports and their industrial areas will play a crucial role in boosting the use of hydrogen as part of the EU's plan to achieve a sustainable and green economy. This role includes their use as hubs through which hydrogen will be imported and distributed. Ports will also be big investors in the dedicated infrastructure needed to produce, import, store, and distribute hydrogen to industries in the surrounding areas.

The EU's sustainable energy plan, [REPowerEU](#), set a 2030 target of 10 million tonnes of renewable hydrogen production in the EU and 10 million tonnes of renewable hydrogen imports.

Achieving this target while continuing to expand the European hydrogen market through to 2050 would require the EU to "radically accelerate the deployment of hydrogen production, import terminal, reconversion, storage, transportation, and consumption infrastructure capacity in port ecosystems," the report states.

# Towards a European Hydrogen Ports Roadmap: unlocking the ports areas' full decarbonisation potential

Up to 42% of the EU's total hydrogen demand could be located in port areas by 2050 according to the Deloitte study. However, all stakeholders must work together to develop a long-term plan for investment in ports hydrogen infrastructure.

Accelerating the hydrogen infrastructure in ports and their capacity as hydrogen transit hubs is an important step towards building the hydrogen economy and our study clearly shows it. With ports and industrial coastal areas expected to account for 42% of the annual hydrogen demand across the EU we need to work together for the development of a European Hydrogen Ports Roadmap that can unlock the ports areas' full decarbonisation potential.

## Specific results for over 400 ports

The report is the first of three to be released this year. These studies will feed into a roadmap to increase the development of ports' capacity to handle, use and distribute hydrogen as an energy source.

This first study publishes specific results for each of the 427 European seaports and inland ports looking at future hydrogen demand and supply, the related CO<sub>2</sub> equivalent abatement, and a forecast of the required infrastructures needed for 2030, 2040 and 2050.

Port authorities and policymakers can use an online dynamic dashboard to view these scenarios and results as a means of gaining insights to feed into their planning.

The dashboard provides information on the potential hydrogen demand and related CO<sub>2</sub> abatement at specific ports, from where and at what cost this demand could be supplied, and which infrastructure and investments could be required to achieve the full benefits of the technology.

## Demand to increase significantly

According to the study, in the most ambitious market-driven demand scenarios,

annual hydrogen demand across the EU is forecast to increase significantly by 2050, up to about 53 Mt, with 42% of this demand stemming from port areas.

This demand in port areas is expected to be mainly driven by industry and the international shipping sector. Industry could account for 42% of demand and shipping from 31% by 2050.

This fast and large uptake of energy from hydrogen has the potential to lead to an abatement of up to 360 Mt of CO<sub>2</sub>-eq in 2050, representing 8% of Europe's total greenhouse gas emissions in 2019. The increasing use of the technology could lead to additional environmental benefits, such as the reduction of toxic atmospheric emissions, water pollutants, solid waste and noise.

Deloitte concludes that the share of hydrogen import in total hydrogen consumption in the EU could range between 25% and 70% in 2050 according to a cost optimisation model used for the study.

This share would depend mostly on the ability of EU countries to rapidly increase the rate of deployment of local renewable energy production capacities such as solar photovoltaic systems and onshore and offshore wind.

The largest hydrogen demand would come from Belgium, Netherlands, Denmark and Germany's northern regions in all scenarios. Deloitte expects that these countries will import between 40% to 80% of their total hydrogen consumption mainly from Morocco, Egypt, Algeria, Oman, Saudi Arabia and Qatar.

Imports from countries such as Australia could even be in the mix. Meanwhile some intra-European hydrogen exports and imports can also be expected, such as trade from Spain to France.

The report provides estimates for the required investment needed for all aspects of hydrogen production, imports, conversion, storage, transportation and consumption. This



includes the investment needed for refuelling stations and hydrogen bunkering.

### Hydrogen pilots at Valencia's port

The Clean Hydrogen Partnership has already started the process of developing port infrastructure through its investment in the [H2Ports](#) project at the Spanish port of Valencia.

The project aims to demonstrate and validate hydrogen technologies at the port over two years in real use situations. These include a hydrogen mobile supply station specifically designed for the project, a reach stacker machine designed to move shipping containers over short distances and a yard tractor.

The reach stacker and tractor will run on fuel cells and electric motors, which will be powered by hydrogen and will be zero-emission.

These pilots will be Europe's first experience of the use of hydrogen-powered fuel cell technology in port handling equipment.

Hydrogen, especially hydrogen derived from renewables, is expected to be critical as a substitution for fossil gas, coal, and oil in hard-to-decarbonise sectors. These include refineries, producers of ammonia, steel and chemicals, and heavy-duty road freight, shipping, aviation transport.

### What's next

The *Study on hydrogen in ports and industrial coastal areas* will be followed by a second report which will provide information on policy, regulations, governance, strategy and other non-technical requirements needed for the development of hydrogen technology at the EU's ports.

The report will also identify the priority areas for investing in research and innovation projects and the required safety regulations, codes, and standards needed for EU ports and areas.

The third report, expected by the end of the year, will examine several case studies highlighting the feasibility of developing a range of hydrogen-related activities and infrastructures in the vicinity of ports.

In parallel, European Hydrogen Ports Network events will be organised during the study to bring the main European representatives of the port ecosystem together to exchange, connect and take a long-term perspective on hydrogen take-up in European ports.

These activities aim to enable the creation of a European Hydrogen Ports Roadmap.

### FIND OUT MORE

The Clean Hydrogen Partnership is a public-private partnership of the EU, industry and research organisations to fund R&D in hydrogen technologies.

[Study on hydrogen in ports and industrial coastal areas](#)

**Study dashboard - stakeholders contact** [Sofie De Brabander at Deloitte](#)



## Study on hydrogen in ports and industrial coastal areas



**Deloitte.**



Co-funded by  
the European Union



**GUILLAUME DUREAU**

Senior Executive Vice President of the Projects Business Unit and Director of Research, Development and Innovation of the Orano Group.



# Recovering strategic metals for securing European supply

Guaranteeing the European Union's (EU) strategic autonomy on raw materials is crucial for the green and digital transition: it is essential that Europe prioritizes the recovery of strategic metals to secure its supply chains and reinforce its energy independence.

Orano, as a nuclear fuel cycle company, masters the recovery of uranium for more than 40 years and is fully committed to the climate and to both a healthy and resource-efficient world. Its new activities in strategic materials are supported by the expertise and know-how acquired by the company. This is a clear example of cross-cutting synergies between different sectors: Orano has a role to play to industrialize complex and sustainable solutions to guarantee the EU industrial sovereignty and the security of the supply of strategic raw materials.

Strategic metals are essential components in many high-tech applications, including renewable energy technologies, electric vehicles, and advanced electronics. However, the production of these metals is often concentrated in a few countries, making Europe dependent on imports and vulnerable to supply disruptions and price fluctuations.

**The EU is heavily dependent on imports of strategic metals, with a strong dependence on 34 critical raw materials, according to the European Commission<sup>1</sup>.** Eastern Asia countries are dominant producers of many of these metals, accounting for 80% of the global production of rare earth elements<sup>2</sup> for example. This dependence on a single supplier poses a major risk to Europe's strategic interests.

**Europe can free itself from this dependence by developing a recycling industry.** The Critical Raw Materials Act, recently published by the European Commission, should encourage the development of a comprehensive strategy for the recovery and recycling of strategic metals from domestic sources, including end-of-life products and industrial waste. This will require significant investment in research and development, as well as in the deployment of innovative technologies and infrastructures.

**Orano's efforts for the recycling of strategic materials and the relocation of industries in the EU territory are fully in line with its commitment formulated in 2020 to "Develop know-how in the transformation and control of nuclear materials for the climate, for a healthy and resource-efficient world, now and tomorrow". Orano offers a three-pronged response to the European Union's dependence on strategic materials, drawing on its recognized expertise in the nuclear fuel cycle.**

Firstly, Orano aims to recycle up to 20% of end-of-life lithium-ion batteries from electric vehicles in Europe by 2030. The group is leveraging and adapting its expertise in nuclear fuel recycling to develop an innovative low-carbon process to recover and purify the valuable materials contained in used battery modules (cobalt, manganese, nickel, lithium, graphite) for reuse in new components. Orano aims to become a leader in the recycling of lithium-ion (Li-ion) electric vehicle batteries in France and in the European market thanks to a new comprehensive hydrometallurgical process for the efficient recovery of materials of interest, which should be operational by 2025.

Secondly, Orano is also investing in promising projects to re-establish an industrial base for the production of high-performance

sintered magnets in Europe, in order to reduce our dependence on Eastern Countries producers. The group has know-how in powder metallurgy, sintering, and the effective management of risks related to hazardous materials and a controlled atmosphere. These skills are of key importance in the customer relationship management value chain.

Thirdly, Orano also aims at recycling platinum group metals (PGMs) from spent nuclear fuel. Today, the supply of PGMs is concentrated in Russia (palladium) and South Africa. Orano believes that significant quantities of PGMs could be recovered at its La Hague site in France, significantly reducing the security of supply risk for EU supply chains.

**The industry now needs a strong political signal and an appropriate regulatory framework to bring about a circular economy and a European value chain.** Ending dependency means that the regulations that will be discussed in the coming months (Net Zero Industry Act, Critical Raw Materials Act) must include two elements:

- **Sources of funding.** The recycling sector can start with the scraps linked to the production of batteries or with permanent magnets. However, until recently, and without any regulatory incentive, those strategic materials have been exported outside the EU or destroyed rather than being recycled in the EU territory – which can be considered a more expensive option. The new obligations set out in the Batteries regulation should progressively change this situation. But there is still a long way to go when it comes to rare earth elements: according to the ERMA

1 [Critical Raw Materials Act \(europa.eu\)](https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32022L0001)

2 *Ibid.*

Action plan<sup>3</sup>, less than 1% of rare earth elements are recycled in Europe. It is, therefore, necessary to provide financial support for the start-up of the recycling sector so that it can become profitable in the years to come and achieve the 15% objective set in the Critical Raw Materials Act, if not more.<sup>4</sup>

<sup>3</sup> Rare Earth Magnets and Motors: A European Call for Action. A report by the Rare Earth Magnets and Motors Cluster of the European Raw Materials Alliance

<sup>4</sup> According to the CEPS, moving beyond 2030, the share of future demand potentially covered through recycling increases, and in 2050 we estimate it could range between 24 % and 48 %. Report on Developing a supply chain for recycled rare earth permanent magnets in the EU - Challenges and opportunities

➤ **A regulatory framework that promotes circular economy.** The proposal for a regulation on the European Critical Raw Materials Act is a good step in the right direction. However, it is necessary to integrate binding collection and recycling rates. Otherwise, a lack of visibility for the sector will limit investments. In parallel, access to waste is crucial. End-of-life products must therefore be able to circulate freely for recycling in the EU, facilitating the use of secondary raw materials and valorizing by-products.

Orano is ready to contribute to these major developments and to provide its expertise at the European level. Investing in the relocation of strategic industries and in reinforcement of circular economy is key to strengthening our energy transition towards a carbon-neutral economy.

*Légende : Centre d'Innovation en  
Métallurgie Extractive (CIME) d'Orano.  
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**DOMINIQUE RIQUET**

*MEP (Renew group)*

*Co-chair of the intergroup on long-term & sustainable investments  
& Competitive European Industry*

# The clock is ticking for the EU regain its sovereignty on rare metals

This January, the Swedish mining company LKAB announced that it has discovered Europe's largest deposit of rare earth metals, which are essential to manufacture technologies enabling the green and digital transitions, in particular permanent magnets needed for electric motors in, among other things, vehicles or wind power turbines. This could represent a groundbreaking contribution to strengthen the European sovereignty in the sector of rare metals, whose supply is threatened by a global skyrocketing demand putting pressure on limited geological resources and on existing extracting and mining infrastructure.

## An intentional and long-standing loss of the European mineral sovereignty

Rare metals are under the political and policy spotlight: In 2021, the Commission issued a report on European strategic dependencies, identifying rare metals among the sectors for which the EU's dependence on third countries is the strongest and the most concentrated. The reduction of strategic dependencies was also at the heart of the Versailles declaration of the 27 European leaders of March 2022. In her State of the Union speech of September 2022, the President of the European Commission, Ursula von der Leyen, announced the upcoming publication of a Critical Raw Materials Act. This activism coincides with the urgent necessity to secure our supply of rare metals, as our demand will exponentially increase to keep up with our decarbonisation objectives. According to the Commission, the EU would need up to 18 times more lithium and 5 times more cobalt in 2030, and almost 60 times more lithium and 15 times more cobalt in 2050 for electric vehicles and energy storage. In parallel, there is no digital transition without rare metals, which are necessary components of a wide range of high-tech products, which may imply tradeoffs and prioritization between the green

and digital transitions. As a result, making both transitions a success implies extracting in a few decades as much resources as the humanity did until today.

Because our supply in rare metals is provided by a limited number of third countries, European sovereignty is clearly at stake. Both ecological and economic concerns, regarding the impact on the environment and local biodiversity, the cost of maintaining the industry in Europe as well as the opposition of the public opinion have led Europe to abandon the control of the supply chain to the benefit of third countries with much less restrictive

environmental and social legislation. Based on the Commission's data, while China provides 98 % of the EU's supply of rare earth elements, Turkey provides 98% of the EU's supply of borate and South Africa provides 71% of the EU's needs for platinum.

## Building a European mineral intelligence

A first step would be to develop a European mineral intelligence through a thorough inventory of our supply chains to anticipate where our vulnerabilities are the strongest. Such an initiative would be highly necessary



given the strong complexity and opacity of mineral supply chains, which range from the extraction, to the processing and manufacturing. Concretely, the EU should consider the creation of a European observatory, like the ones present in some Member States, such as the OFREMI (Observatoire des ressources minérales pour les filières industrielles) in France, while ensuring a strong level of networking and coordination between competent national authorities. It would be in charge of decrypting the global value chains, assessing technological evolutions and their impacts on the supply, identifying current and future needs in rare metals in the most strategic sectors and bringing companies concerned to build strategic stocks. One can also foresee stress tests missions in order to better anticipate supply shortages.

### Securing existing and new supply partnerships

Mastering the demand surge of rare metals will also require to secure new partnerships with reliable, responsible and diversified suppliers while pushing for ambitious environmental and social standards. The EU should strengthen its relations with its traditional allies on the basis of the *Mineral Strategic Partnership*, a multilateral initiative launched in June 2022 to invest in mining infrastructure in countries that maintain high environmental and social governance standards. But it should

also develop new strategic partnerships on the same basis than the EU-Chile agreement passed in December 2022 giving the EU better access to Chile's lithium resources. Rare metals should play a more important role in trade agreements concluded with third countries and could represent a new channel to encourage those countries to adopt more ambitious environmental and social standards when operating mines and refineries.

### Exploring the European mineral potential?

Despite being politically very contentious, the European soil is very rich in resources, especially in the north of the continent, where lay large deposits of nickel and rare earth metals. However, one major obstacle is the length of the permitting procedures, as it can take up to 17 years to open a mine. In the case of the deposit of rare earth metals discovered in Sweden, the company LKAB announced that it will be at least 10-15 years before it can actually begin mining. If the EU finally decides to go forward in exploring its mineral potential, it must do so with the most robust standards in order to mitigate the undeniable environmental impact and by involving local communities in the decision-making process to win their confidence and earn their support. Additionally, such projects will require massive investments coming both from public and private financial institutions. As such, the creation of a new European Sovereignty Fund and the support of the European Investments Bank (BEI) and National Promotional Banks and Institutions (NPBIs) are promising leads to remove barriers to investments and lock in private investments. Overall, it will be essential to incentivize financial institutions

to invest in companies in the critical materials value chain in Europe.

### Scaling up recycling capacities

As the EU will progress in the green and digital transitions, recycling will become a rising issue. Many current electric vehicles batteries will reach their end life after 2040, making it necessary to heavily invest in recycling capacities at large scale, which represents an opportunity for recovering rare metals from IT equipments, solar panels, wind turbines etc. It could generate additional supply and therefore contribute to reduce our dependency on external suppliers. Nevertheless, recycling will never fulfill 100% of the European demand. The EU has currently precocious recycling capacities and there are limitations to the collection of appliances and to separation of alloys incorporated in equipments. As a result, the EU will continue to need primary supply of rare metals in the upcoming years.

Hence, the EU will not be master of its energy and digital transitions without strengthening its mineral sovereignty. The EU has defined ambitious objectives. Time has come to reflect on the means to achieve these objectives. In this regard, the Critical Raw Materials Act and the ongoing discussions on innovative European financing instruments represent a unique opportunity to make us able to supply parts of our own demand of rare metals. Conquering more self-sufficiency in the rare metals sector will be an industrial, financial, political, environmental and societal challenge. It remains to be seen whether we are ready to tackle these challenges now and to handle the various consequences thereof.



Kiruna Mine



**DIEGO PAVIA**  
CEO of EIT InnoEnergy

# EU Green Deal Industrial Plan - More muscle, more speed and more simplicity for EU strategic industrial value chains

The global race for climate technologies has accelerated in recent months with major economies ramping up dedicated policies and support schemes. China, the USA, India or South Korea have chosen different approaches for their industrial strategies, but all target the same objective: localise strategic industrial value chains that are needed for the climate transition and are among the biggest drivers for growth in the current and future economy.

Europe's ambition to remain the early mover and powerhouse in the fight against climate change depends on a strong industrial position in climate technologies manufacturing. The EU has solid fundamentals to build on but it must beef up its toolbox to boost domestic industrial manufacturing: more muscle, more simplicity and more speed are needed to win this race.

**The EU has a strong business case for investors in climate technologies, with highly distinctive features:** A legally binding commitment to achieve a net-zero economy by 2050 and an unmatched regulatory framework for the energy transition, a European single market with a mature demand from business

or citizens for climate technologies and sustainable products, as well as a robust industrial capacity in many areas.

Also, Europe has demonstrated its ability to pool together its resources when the ambition and objectives are clear, and a fresh approach is properly executed, at speed: A clear example is the European Battery Alliance, which the European Commission mandated EIT InnoEnergy to lead in 2017, and where we now are ahead of the initial ambition of creating a new annual GDP of 250B€ across all the value chain, from mining to recycling.

**In addition, the EU can count on a rich industrial innovation ecosystem in climate tech which EIT InnoEnergy, amongst others, has and is contributing to grow.** Since 2010, EIT InnoEnergy, as an investor and accelerator, has grown a portfolio of 180+ start-ups and scale-ups, all contributing to the energy transition with made-in-Europe technologies to create maximum impact. A vast majority are CAPEX intensive and looking at developing industrial manufacturing capacities across the value chains of climate technologies (batteries, PV, green H2, wind,...). These companies (amongst

them 3 out of the 31 global unicorns in climate tech) are industrial frontrunners in their respective fields (such as NorthVolt in the full life cycle of batteries, H2 Green Steel, GravitHy in decarbonized iron and steel or NexWafe in wafers for Solar PV). They have an aggregated need of EUR160bn of extra financing until 2030 to meet their industrial objectives. This is a tremendous technology and industrial leadership opportunity for Europe that delivers growth and jobs.

From that perspective, the EU is in a privileged position. We have the technologies we need, and the entrepreneurs to create worldwide climate tech industrial champions.

**However, the EU's business case for investors and industrialists is hampered by a harsh and long-standing competitiveness gap and by the inability to maintain a level playing field with global players. This is currently amplified by increased electricity prices in Europe and the roll-out of support schemes across the globe such as the US Inflation Reduction Act.**

Taking the battery value chain as an example, the situation has become worrisome. The growth, and progress towards a resilient value chain across all segments is endangered. The figure below shows a 50% disadvantage on a base of 1275 at the battery pack level. This puts European industrial leaders in battery manufacturing in a losing position, and leads them to strongly assess moving their next investment across the pond.

On a similar note, there is a tremendous business opportunity to capture the EU demand for solar PV. The EU deployed more than 40GW of solar PV panels in Europe in 2022. Almost all were imported from China. This equals around EUR12bn of yearly trade deficit for Europe, which is expected to grow even more as demand increases (even if just to meet REPowerEU ambitions). The EU, through the ESIA (European Solar Industrial Alliance), also mandated to InnoEnergy, has set the ambition to develop 30GW of EU



domestic PV manufacturing capacity, from ingots to recycling. There is a strong appetite from the industry and investors to seize this business opportunity. Already, a very good pipeline of industrial projects has emerged. Still, the challenge is immense, because it is a scale game, and only beyond 5GW the business cases are viable. Here again there is a competitiveness gap stemming from energy prices, limitation of equipments/machinery, funding gaps, uneven playing field in terms of sustainability of products, and public procurement criteria.

**The EU can be the global leader, but this requires being bolder in creating favourable conditions for industrial scaling up.**

The EU Green Deal Industrial Plan comes at the right time, with mostly right measures proposed by the European Commission in the Net Zero Industry Act and the Critical Raw Materials Act. It can be made much stronger, with a few targeted additions for speed and simplicity, answering to the needs of the industrial frontrunners:

**1. Put sustainability, traceability and circularity (recycled content) at the core of the EU industrial strategy for climate technologies.** This will ensure that in Europe, to be competitive, any party would have to be performant not only on price but also on traceability, sustainability and recycled content in products. A crystal-clear signal will keep and attract to Europe the right players and the right investors. There are precedents in the EU demonstrating the relevance of this approach: Product regulation setting sustainability criteria and a traceability scheme (such as the EU battery regulation), improved ecodesign rules, the EU ETS (with free allowances earmarked for the best performers) and the associated Carbon Border Adjustment Mechanism. New, simple measures could be added, such as a "sustainable production bonus".

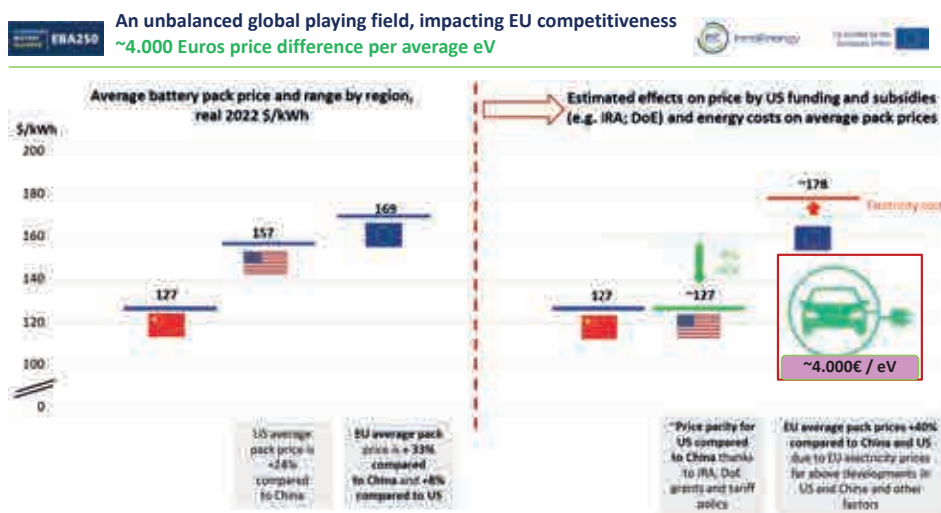
For selected net-zero products, a "bonus" could be granted to manufacturers which overachieve the objectives, or anticipate the provisions, for example of the EU battery regulation or upcoming similar ones for other climate tech products. The incentive will take the form of a grant, made available to the best performers. Compared with the US IRA production incentive, coming without sustainability strings attached, it will confirm the EU's stance: Leading on sustainability in the world.

**2. Support strategic industrial projects with best-in-class tools.** Setting capacity objectives, be they manufacturing capacity targets for strategic product/ technologies or extraction, or processing and recycling targets for strategic raw materials, gives a strong market signal. For industrial projects that will deliver upon those targets, time is of the essence. Both the European Battery Alliance and European Solar PV Industry Alliance have identified a readily available list of credible industrial projects that have the maturity to start operations as early as 2025 or 2026, provided investors get the required signals. Reducing time to permitting, getting effective financial support is required now, not in a year's time. Therefore, there is no time to lose to label Strategic European Projects that ensure that those targets are met. Member States now have the possibility to deploy new EU funds and thanks to the recently published and highly welcomed framework for State Aid, national aid without undue delay. Let's deploy this public support efficiently and at speed to de-risk private investments, which are always doing the heavy lifting. On permitting, the legislative work on the two Acts will be decisive to improve how permit granting is delivered. The

ambition must be to bring the EU at the level of global best practices (6 to 9 months for industrial permitting in the US or Canada). For projects already engaged in a permitting process, there should be an urgent effort to accelerate: It is all about administrative capacity and prioritisation of resources. The EU and the Member States should agree on an emergency action. Thinking out of the box, speed could be achieved through a special EU task force of experts mobilised upon need for the permitting of strategic projects, hereby supporting but also building the capacity of local authorities.

**3. Solve the skills gap, now.** A value chain is as strong as its weakest link. For most value chains in climate technologies, skills remain a strong bottleneck and a risk for industrial project development. With the European Battery Alliance Academy, an initiative taken by EIT InnoEnergy, the EU has a proven tool to deploy training at the speed and scale required by industry. Replication of this approach to other value chains and creating synergies across different academies makes a lot of sense. That said, the criticality remains the availability of financial support from public authorities to fund training programs, so industry can get the right workers for their needs. A decisive move would be to commit Member States to earmark and frontload a given percentage of their European Social Fund Plus allocations to specific value chains (for instance, 2% for the battery value chain in the next 3 years).

We are in a unique moment in the world and European history. Let's capitalize on Europe's early mover advantage in the green transition, and not being shy on leveraging extensively the existing and new tools of the tool box. The business opportunity to be captured has a tremendous impact for Europe in terms of sustainability, growth and jobs. Our next generations deserve that we go the extra mile at speed. EIT InnoEnergy is gearing up for this.





**MAURI PEKKARINEN**

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# Increase mining capacity in Europe by diversifying its value chains and investing in recycling

European Commission presented its proposal for Critical Raw Materials Act 16th of March 2023.

To boost EU autonomy, the European Commission is seeking to introduce targets of 10%-40% of the mining, recycling, and processing of critical raw materials used in the bloc to be done in the EU by 2030.

The Commission's proposal is in the right direction, but insufficient.

Putin's brutal war has weakened the whole world's geopolitical situation. Among many other issues, risks to raw materials' supply chains have grown. At worst, they threaten EU's two great and necessary reforms: the green and digital transitions. Even worse, the trade political confrontation between the great economic areas has escalated that may also pose threats to the security and stability objectives of the Commission.

This is a challenge to our union and its autonomy. It needs to be reinforced. Improving our access to the critical raw materials we need is in a key role. We need a major reform. We need to be able to take responsibility for our own raw material supply.

We all know that China has an outsize role in the global markets for metals. The same goes when we look at the thirty critical materials for Europe.

Until now, Europe has put the responsibility on others, so to say, for the production of the raw materials it needs. At the same time, it has neglected the security of supply of the raw materials it needs for its industrial production. At the same time, EU has closed its eyes to securing the environmental performance of imported raw materials by referring to WTO

rules, rules which China and the US are no longer abiding by.

For example, during the last 10 years, China has put a lot of effort into developing its skills in refining and technologies. Extracted raw materials are exported to Asia, and China especially, for refining. Europe's dependency takes many forms.

This is not a responsible way to go. Especially now that the operating environment has changed, maybe for good.

Development of the circular economy is often spoken of in connection with critical raw materials. Even, in the Commission's proposal. Recycling does offer an important part solution to the supply challenges of critical raw materials. However, there is always a delay in getting significant amounts of material from recycling. This is because the original products need to be at the end of their life cycle. We should use both carrots and sticks to develop it further.

For example, the effective use of industrial side streams could offer possibilities to recover discarded critical raw materials and rare earth elements alongside other technical materials and metals. We should encourage the documentation, assessment and recovery of these valuable materials always where possible.

Our strategic autonomy's development cannot be solely based on recycling alone, however. We cannot count too much on the good functioning of supply chains either. We should also recall that not all sources of supply fulfil the environmental or ethical standards we would like to see.

EU should put much more effort than it does now in increasing mining activities

that take place within its borders. There are opportunities in different parts of Europe. By using the newest technologies we can and we should act in a way that is sustainable both for the environment and the people.

The exploration of mineral deposits needs to be based on openness, transparency, consulting locals and on fast and flexible permitting processes. Permitting conditions need to place sustainable requirements both for mining activity and the restoration after mining activities have ended.

Innovative bio-economy provides opportunities to reduce EU's raw material resilience. For instance, in the future, we may be able to manufacture forest industry's residues into raw materials for the battery industry. At the same time we would be able to replace non-renewables with renewable alternatives.

Alongside the generally known critical metals and minerals, the "generally produced" minerals are becoming more and more critical too.

Europe needs to catch up with other in the global race for responsible acquisition of metals and minerals for keeping up industry's competitiveness to provide solutions to the green and digital transitions.





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# A new type of partnership to secure our supply chains

**F**or decades, Europe has built up its own dependencies: oil, gas, coal, chemicals...

Dependencies towards our systemic rivals...

Dependencies that have increased the risks of confrontation...

Dependencies from which we must now learn the lessons.

As Europe accelerates its green transition, with the re-evaluation of our economic models, it is essential not to substitute old dependencies for new ones.

The case of solar energy is a perfect example of this. China is now home to seven of the world's top ten solar panel manufacturers, and controls the entire production and supply chain through strategic investments and partnerships with many third countries.

Lithium, a component essential for our electrical vehicles, is another example. While China produces only 7% of the world's lithium, it will be able to control 1/3 of the world's supply by the middle of the decade.

These examples could be replicated in almost all industries related to the energetic and digital transition with the same result.

It is time for Europe to catch up in this area and we therefore welcome the Commission's announcement of these two legislative proposals: the Net Zero Industry Act and the Critical Raw Material Act.

## **Two proposals, one goal: A sovereign Europe!**

On the one hand, we have the "Net Zero Industry Act", which aims to facilitate the development in Europe of the means necessary to decarbonize our economy.

While on the other hand, to allow this industry to function, we will need to secure our access to

strategic and critical raw materials, and this is what the "Critical Raw Material Act" intends to do.

By developing our European industry and studying what raw materials we need, Europe intends to finally put in place real strategies for securing our access to these raw materials through strengthened ties with third countries. This is essential for the growth of our global industries, for the development of secure, resilient, affordable and sufficiently diversified European value chains, while ensuring benefits for third countries.

## **Win-win partnerships that the EU intends to offer to third countries**

To this end, Europe intends to develop a "Club for Critical raw materials". A club composed of countries that share our values, our goals and our environmental and social standards. We must no longer create new dependencies on countries that do not defend our values or countries that are openly hostile towards us, as we have seen with Russia.

This club will be centred on creating "strategic partnerships". This means creating partnerships that promote sustainable growth in third countries and contribute to the resilience of European industrial value chains.

In short, these will be win-win partnerships.

Europe has already been able to develop strategic partnerships with countries such as Canada, Ukraine, Chile and New Zealand.... A list that it intends to extend over the coming years and for which some positive effects have already been felt.

However, one should not be naive and fall into the trap of letting our competitors into the club. This club must serve to guarantee the sovereignty of Europeans. By letting in, without debate, states such as the United States whose only ambition is to defend its own interests, to

the detriment of Europeans, we must ask ourselves what the consequences of this would be.

Without undermining our previous alliances, we cannot assume that all of our allies will be inclined to the same goal of strengthening European sovereignty.

## **We can be allies but not necessarily aligned**

We must also face the fact that these partnerships place many constraints on third countries, particularly with regard to abiding by our European environmental and social standards. This is a reason often put forward by partners that are quick to align with other countries that have much less demanding standards... It is important to champion our standards and to make them attractive to our future partners.

## **Reinforcing the attractiveness of the European model**

The European Commission also plans to use its various programmes, including the "Global Gateway", to attract these new countries. But here again, the question of resources arises. The Global Gateway, with its 300 billion in funding, is already criticised for being underfunded, and seems weak compared to the \$40 trillion in funding from the United States or the Chinese new Silk Roads. We will have to work to ensure our attractiveness as these two other blocks are ready to work with much lower standards, and especially with much less consideration for third countries.

Europe has chosen to take a leap towards greater autonomy in the supply chains. With these new legislative proposals, through the creation of new strategic partnerships and by providing ambitious global leadership, the potential is great. The hopes are just as high, but we must not let ourselves be discouraged. This would have dramatic consequences for the Union and for our citizens.



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# Empowering the sustainable and smart mobility transition in Europe

**B**y 2050 the transport sector needs to reduce its emissions by 90%. This will require an unprecedented effort of the sector: an inevitable shift to zero-emission powertrains and renewable and low-carbon transport fuels in a relatively short period of time. At the same time, multiple disruptive trends like digitalisation, automation, and the emergence of shared, collaborative economy and platforms are reshaping the current mobility and transport landscape.

The European Commission's Sustainable and Smart Mobility Strategy sets out how we are rethinking transport – through a simultaneous green and digital transformation of the sector. In this context, we can no longer look at transport modes individually. We need to ensure that users are offered the best mobility experience, combining strengths of different modes of transport.

Many technologies are already there. Some are quickly penetrating markets, such as battery-electric vehicles. Others are less mature and still require market ramp-up, such as renewable and low-carbon fuels, or further development, for example zero-emission powertrains in maritime or aviation transport. All of them require a policy framework that is fit for purpose.

The last years have been very busy. In July 2021, the Commission published the 'Fit for 55 Package', with a broad set of initiatives addressing the need to reduce greenhouse gas emissions by 55 % by 2030. In December 2021, we followed up with a suite of proposals for efficient and green mobility, including a suite of proposals of how to ensure a future-proof and smart transport infrastructure policy. Still in 2023, the Commission intends to come forward with a policy package on greening freight, while also preparing new initiatives to boost digital mobility.

Progress is visible. The co-legislators have already agreed on the ambitious revision of the CO<sub>2</sub> standards for cars and vans: by 2035, emissions from all new cars and vans will have to be reduced by 100% compared to the requirements in 2021. There is also a review of the CO<sub>2</sub> standards for heavy-duty vehicles underway. This overhaul is complemented by the co-legislators' agreement on the new Alternative Fuels Infrastructure Regulation, which sets binding targets for Member States for sufficient publicly accessible infrastructure.

Those policies on vehicles and infrastructure are flanked by measures to promote sustainable user behaviour, and to incentivise the uptake of zero-emission vehicles. Such measures include carbon-pricing in an extended EU Emission Trading System, and road charging through the revised Eurovignette Directive. Member States and the Parliament have also reached an agreement on the ambitious revision of the Renewable Energy Directive, doubling the targets related to renewable transport fuels until 2030.

As part of the 'Fit for 55 Package', we are promoting the use of sustainable, alternative fuels in aviation and waterborne transport, through initiatives such as 'RefuelEU Aviation' and 'FuelEU Maritime'. This is complemented by measures, such as the Renewable and Low-Carbon Fuels Alliance that brings together industry actors from all parts of the value chain to boost production and supply of such fuels in the aviation and waterborne sectors.

We have set the framework, and now it is time for the market to deliver. But a powertrain and fuel switch alone will not be sufficient. Efficient multi-modal mobility is a key element of this modernisation agenda. The revision of our TEN-T policy will help build an well-functioning EU-wide multi-modal

network of road, rail, inland waterways, short sea shipping and inland ports, airports and terminals, addressing capacity bottlenecks and hurdles to multi-modality.

Laying out the physical infrastructure, aptly supported by European funding such as under the Connecting Europe Facility, is one side of the coin. The other one concerns the layout of an interoperable digital and data infrastructure. Facilitating access, pooling and sharing of mobility and transport data is a key enabler of better mobility services, for the benefit of the user and for an optimal use of transport system capacities. The ongoing revision of the Directive on Intelligent Transport Systems is an important next step on our journey towards fully connected, cooperative and automated mobility. In the future, the Commission also intends to develop a common European Mobility Data Space in order to ensure a better level-playing field for data-driven mobility services.

In the end, it is the consumer who decides. Tools such as multimodal digital mobility services (MDMS) help passengers compare different travel options, choices and prices, and raise awareness about the most sustainable mobility solutions. Here, current market practice is far from being developed, often lacking sufficiently attractive services for passengers. This is why we are working on a new initiative on MDMS, addressing the interaction of operators and service providers, standards and interfaces.

This is a positive agenda for the transformation of the transport sector. Our policies will help modernise the transport system, and allow European companies to strengthen their competitive edge, while ensuring that no one is left behind in this transition.

**GIORGIO TRAVAINI**

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# Leveraging the many benefits of high-speed rail

**R**esponsible for the movement of people and goods, transportation is the backbone of European society and the internal market. It's also responsible for nearly a quarter of the EU's total greenhouse gas emissions<sup>1</sup>.

If the EU is to meet its ambitious climate goal of becoming carbon neutral by 2050, it must significantly cut transportation's carbon footprint.

A good place to start is by increasing rail's total share of passenger traffic – which currently sits at a mere 7%<sup>2</sup>.

## When less is more

Producing less CO<sub>2</sub>, consuming less energy, and taking up less space than road and air transport, rail is one of the most sustainable forms of mobility. There is an opportunity in Europe to exploit, enhancing and expanding, Europe's rail network taking advantage of the latest innovations. That is why Europe's Rail Joint Undertaking – the European partnership on rail research and innovation – has been looking into it, particularly for the high-speed rail network.

High-speed rail, or HSR, is a general term used to describe a rail system that can run much faster than traditional rail – with trains travelling at speeds of 200 km/h or higher.

The last 20 years has seen Europe's HSR network grow substantially, with the network now providing high-speed transport along nearly 15 000 km of HSR tracks that crisscross Europe. But a new report<sup>3</sup> on the benefits of HSR, commissioned by Europe's Rail and produced by Ernst and Young and Bocconi University, in collaboration with ALLRAIL, CER and UNIFE, found that HSR is about more than just high-speed travel, it also provides a plethora of societal, economic and environmental benefits,

especially when compared to other modes of transportation.

Decreased levels of CO<sub>2</sub> and air pollutants per passenger kilometre, as well as increased safety, have positioned HSR as the most sustainable form of transport. Thanks to its high energy efficiency and ability to power transport using increasingly sustainable electricity, HSR is many times less emission-intensive than other forms of transportation, including road and air travel. In fact, in some parts of Europe, HSR is on track to deliver the transport alternatives required to reach the EU's overall decarbonisation objectives.

## Good for people and communities too

HSR isn't just good for the environment – it's good for people too. When asked why they pick HSR over other forms of transport, many passengers cite comfort (more leg room, less noise and vibration!), competitive travel times, a comparative ease of boarding, the possibility of city-to-city connections, and the ability to carry out work or enjoy leisure time alone, with family or even pets while onboard.

And let's not overlook the many benefits HSR brings to communities and regions. For starters, it stimulates economic development by connecting citizens and regional businesses through a fast and competitive alternative to road transportation. It also increases local productivity and accessibility, boost economies, and lowers traffic congestion – altogether improving the quality of life for the communities it serves. By acting as a practical alternative to short-haul flights, HSR can even help alleviate the capacity pressure that many European airports are currently facing.

## Delivering on HSR's potential

HSR clearly has the potential to help Europe meet its climate goals and decrease its dependency on foreign fuel, all while creating a better-connected Europe for its citizens and the economy. However, delivering on this potential requires having a comprehensive, efficient, and pan-European HSR network in place, which currently isn't the case.

The reality is that most high-speed lines are concentrated in Western Europe, with HSR being nearly non-existent in much of central and eastern Europe. The current HSR network is also full of bottlenecks and gaps, making a seamless HSR transport experience across Europe nearly impossible. Instead, passengers must fill in these service gaps via personal vehicles or by catching a flight – essentially negating HSR's climate and energy benefits.

The joint HSR study<sup>4</sup> clearly shows that investing in a comprehensive European HSR network will deliver added value to European society and massively reduce the environmental footprint of European passenger transport. That's why it is important to work for a future where every European will be able to travel across Europe by high-speed rail.

## The passengers will be attracted

With the goal of creating a European HSR network that connects all EU capitals and major cities, the European Commission wants to double HSR traffic by 2030 and triple it by 2050 and this is require also significant sector investments, exploiting the outputs of the investment in R&I done in Europe's Rail and elsewhere.

Investments in a modern and attractive rail and more particular HSR that has the proven ability to decrease carbon emissions, increase connectivity, and boost productivity and economic activity across the Continent seems to be the right choice to make for a sustainable future.

Passengers will be attracted because HSR journey's will be a fast, convenient, affordable, and comfortable way to travel between cities. As rail's share of passenger traffic increases, Europe will see the substantial decrease in congestion and transport-related carbon emissions it needs to become climate neutral by 2050.

1 <https://www.eea.europa.eu/en/topics/in-depth/transport-and-mobility>

2 [https://ec.europa.eu/commission/presscorner/detail/en/ip\\_20\\_2528](https://ec.europa.eu/commission/presscorner/detail/en/ip_20_2528)

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## Next step: political innovation

Governments can exercise their power in two main ways: on the one hand, by imposing rules and regulations, and on the other, by distributing or extracting money through instruments like subsidies and fines. The European Green Deal is built on the very same foundations. It aims to usher in a cleaner and more sustainable way of life. The European Commission wants to curb greenhouse gas emissions by using an unprecedented amount of legislation, mainly under the umbrella of the Fit for 55 package and the Green Deal.

The Commission is ploughing ahead by combating undesired practices and initiatives, for instance through the establishment of the Emissions Trading System (ETS) and the effective ban on the sale of combustion-engine cars as of 2035<sup>(1)</sup>, and by subsidising green technology innovation on a more modest scale. The USA has chosen a different path. Instead of clamping down on unwelcome practices, it is fast-tracking desirable developments. Through this alternative strategy, as exemplified by the Inflation Reduction Act<sup>(2)</sup>, the US Government is supporting and subsidising businesses and innovation. This should prompt the EU to reconsider its own strategy.

### Brake or accelerator

In my work with Parliament's Committee on Transport and Tourism, I have often wondered about the Commission's approach to tackling climate change in the transport sector. The sector is responsible for vast greenhouse gas emissions in Europe every year: for example, in 2019, the last year before the pandemic, it generated 835 million tonnes of CO<sub>2</sub> equivalent, accounting for 28.5 % of the total emissions in the EU<sup>(3)</sup>. Given this significant contribution to emissions, it is only natural for the Commission to pay attention to the sector – especially since demand for transport is expected to continue steadily rising in Europe in the future, driven by population growth.

Indeed, according to estimates, freight<sup>(4)</sup> and passenger<sup>(5)</sup> transport demand will respectively grow by 30 % and 25 % by 2040. If we do not act, emissions of greenhouse gases will soar. In transport, as is the case for energy, there is no need to reinvent the wheel because technology for clean energy and clean transport already exists, albeit it can still be improved.

Taking the resilience dimension of transport into account, a pan-European high-speed rail (HSR) network can play a role in overcoming the airport capacity challenge. The European Organisation for the Safety of Air Navigation (Eurocontrol) forecasts a capacity gap at European airports of 1.5 million flights in 2040<sup>(6)</sup>. Meanwhile, the number of short-haul plane journeys (under 500 km) reached



*HSR networks are national-oriented causing lack of cross-border links and leaving areas in the EU behind.*

2.7 million in 2019, representing 24 % of the total flights departing from Europe<sup>(7)</sup>.

If we shift to rail in Europe, we can make transport cleaner, safer and accessible to all. The train literally leaves nobody behind.

It goes without saying that HSR is clean. For example, for a 600 km trip, carbon emissions from HSR are 8 times lower than travelling by car and 11 times lower than flying<sup>(8)</sup>. So, why are the EU and the Member States not investing more in such a clean mode of transport for cross-border travel?

Unlike for air and road transport, it should be noted that the onus is on the Commission to manage international rail transport and facilitate green development in this area, given the national-oriented, state-owned environment and the lack of open and fair competition.

Nevertheless, the Commission and its counterparts at national level (the Member States) are still using restrictive instruments to get things done. They seem to believe that prohibition and legislation are the only ways to boost the green transition. They trust in the power of curbing through fines and 'politics-as-usual' practices as the silver bullet (rather

than a bullet train) for the current transport challenges. Policymakers and politicians are still basing their action on the political instruments of the past. However, a 'European Inflation Reduction Act' is needed for the development of a connected Europe via HSR.

A real pan-European HSR network that contributes to a more sustainable future can only be established through a European approach, and specifically an EU agency that has the responsibility for creating high-speed cross-border connections and the authority to do so. An agency with a budget that fits the challenge. An agency with a vision, a plan and a road map. Only the EU can create such an agency, which should also be responsible for ensuring a level playing field for daily operations.

The EU grants its citizens the right to move freely across borders. As a result, it is also responsible for helping European passengers to make use of that right.

So, is it time for 'political innovation'? The obvious answer is 'yes', because we do need innovation in politics. We need politicians who work to accelerate, not put the brakes on, investment in public goods, such as

information technology, public transport and energy supply. To foster technological innovation, it is essential to implement stable, technologically neutral and non-politicised strategies, which minimise the impact of the biggest enemies of any innovation business, i.e. regulatory uncertainty and moving goalposts.

To conclude, political innovation is about creating opportunities and providing alternatives in an open market rather than imposing restrictions and controlling the market.

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- <sup>2</sup> White House, '[Inflation Reduction Act Guidebook](#)', 2022.
- <sup>3</sup> European Environment Agency, '[Greenhouse gas emissions from transport in Europe](#)', 2022.
- <sup>4</sup> European Environment Agency, '[Freight transport demand – outlook from EEA](#)', 2007.
- <sup>5</sup> Ibid.
- <sup>6</sup> Eurocontrol, '[European aviation facing serious capacity challenges now and in the future](#)', 2018.
- <sup>7</sup> Eurocontrol, '[EUROCONTROL Data Snapshot](#)', 2021.
- <sup>8</sup> International Union of Railways (UIC), '[High Speed Rail – Fast track to sustainable mobility](#)', 2018.



The highlighted links in yellow are not under construction. The Investment Priority Rank is useful for the scheduling and implementation of the EU HSR Network. The rank is based on the ratio of the population of the cities connected by the HSR link over the length, i.e. the construction cost, of this link (Higher Ratio = More Beneficiaries)



JEAN HORNAIN

CEO of CITEO

# The Green Deal Industrial Plan: the cornerstone of an economic, environmental, and strategic European policy?

On the 20<sup>th</sup> of March the IPCC published its 6<sup>th</sup> synthesis report, reminding us of the interdependence of climate, ecosystems, biodiversity, and human societies. It concludes that, due to human activities, the global surface temperature has risen by 1.1°C in comparison with the pre-industrial era and thus challenging our objective to limit global warming to 1.5°C by the end of the century, as set in the Paris Agreement. It also recalls the impact on biodiversity, with 75% of terrestrial environments and 40% of marine ecosystems currently heavily degraded. A crisis, put back on the international political agenda with the COP15 leading, last December, to a historical agreement to protect biodiversity.

This climate emergency is compounded by a tense geopolitical context. The Covid-19 crisis and the invasion of Ukraine by Russia -sanctioned by the international community and the EU- has raised awareness on the strategic dimension of controlling European supply chains by its competitiveness in the green industry sector, challenged recently by the US' declarations with the Inflation Reduction Act<sup>1</sup> and by China industry.

Starting in 2019, the European Union engaged its political sustainable transition with the Green Deal, completed in March 2023, with the announcement of the Green Deal Industrial Plan marking the beginning of a new European economic strategy with the following guiding principles: ecology, industrialisation, competitiveness, strategic autonomy. This new strategy, composed of 3 legislative pillars (the Net-zero Industry Act, Critical Raw Materials Act and the reform



The UE responses to the international stakes

of the electricity market design) puts once again the circular economy as the key driver to achieve the Union's objectives.

As pioneer in sustainable development since the early 1990s in France, Citeo -French company in charge of the Extended Producer Responsibility for household packaging and graphic papers- is convinced that circular economy plays a major role in the development of a more resilient European economy. Pursuant its "raison d'être", as a purpose company, Citeo supports the Green Deal Industrial Plan and reaffirms the central role of circular economy, aiming to combine economic and environmental performances. Nonetheless, it is decisive to ensure a coherent European strategy, including with the European Biodiversity Strategy.

## For a green and low material transition in compliance with the European Biodiversity Strategy

Citeo puts the protection of biodiversity at the core of its "raison d'être" and outlines in its roadmap the mobilisation of its entire ecosystem and to promote common solutions for the preservation of biodiversity. Citeo fosters a circular society where the economic

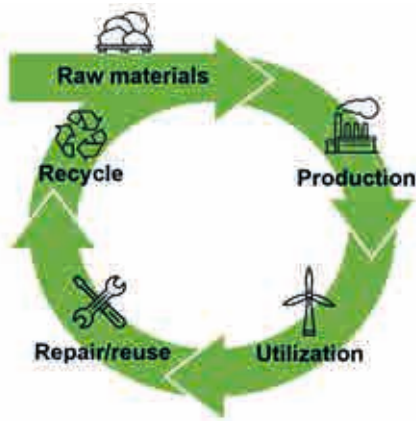
cycle and the natural cycle are sealed off from one another at every level of the value chain. This is why, and pushed by the Single-Use Plastic Directive, Citeo has particularly invested itself for the prevention of waste littering to preserve ecosystems.

*"Citeo believes that the preservation of ecosystems is part of the strategy to achieve industrial decarbonisation in Europe since the objective is twofold: to make the material accessible and to avoid drawing on natural resources."*

While the Critical Raw Materials and the Net-Zero Industry Acts aim to facilitate the granting of licence to speed up the development of the green industry and to enhance, in the case of the Critical Raw Materials Act, the supply of raw materials by promoting the extraction on European territory, it should not undermine the European Biodiversity strategy for 2030 which aims to put Europe's biodiversity on the path to recovery by 2030.

A transition at the heart of which the circular economy has a central role to play in articulating both green growth and decoupling at each step of the value chain.

1 The White House, A [guidebook](#) to the inflation reduction act's investments in clean energy and climate action, January 2023



A model of green transition with low raw materials

### The circular economy, a lever for strategic autonomy for raw materials

As experienced in 2021 for the packaging and graphic papers sector where the market faced tensions on the supply of paper pulp, virgin material is a limited resource. In this context of shortage, the European market for recycled paper materials has largely relieved the supply by providing 57 million tonnes of recycled paper. On the French scale alone, thanks to the work of Citeo and its ecosystem, the market provided more than 2 million tonnes of recycled paper. This shows the central role that recycling can play toward the strategic autonomy of the Union.

It is precisely why Citeo recognises the need for the Critical Raw Materials Act that aims to secure the supply chain of strategic raw materials and particularly the target of 15% of the annual consumption recycled by 2030. Citeo supports the establishment of robust targets for recycling and encourage the development of innovation in the recycling sector to ensure the development of a strategic EU green sovereignty. In the packaging and paper sectors, recycling rates are high: 72% in the household packaging sector and 62% in the paper sector. We know that there are significant development needs in all materials: industrialisation, improvement of the technical and environmental performances of the sectors, outlets, etc.

*"There is a need to multiply strategies and engage all stakeholders through eco-designing but also by maximising the use of resources (prevention, reuse, and recycling) which is crucial in terms of strategic sourcing."*

By ensuring permanent magnets' recyclability and requiring information on their composition to facilitate the work of recycling facilities, the European Commission

is moving toward the right direction with the Critical Material Act. Citeo recommends extending those specific dispositions to a larger list of products to build a more resilient EU market.

This is a strategic territorial asset that is linked to proximity. The challenge is to keep the already existing industry and encourage the competitiveness of materials.

### For a local, sustainable, and competitive reindustrialisation

Citeo believes industrial relocation makes it possible to have improved controls on the production by way of high-quality European standards -health, environmental, social- that are among the most ambitious. While this strategy will have a positive social and environmental impact, it should also be economically sustainable for businesses along the value chain. The EU must therefore provide mechanisms to support the European market.

The development of a competitive market for recycled materials is crucial for a successful green yet low material transition. This competitiveness is of two kinds, regarding the market of virgin material and the foreign market of recycle materials that are both more attractive price wise.

The market for recycled raw materials must ensure that recycled raw materials remains in the European market, as available resources, in quality and quantity and with value-added outlets. It must allow the reintegration of the material by focusing on high value-added applications. Financial and legal tools need to be mobilized to ensure the sustainability of a recycled materials market. Therefore, Citeo believes in the relevance of adopting complementary measures to ensure the resilience of the internal market and thus:

- Supports the new Regulation on Waste Shipments to avoid the flee of raw recycled material and increase the local supply in term of quantity and quality;
- Supports measures such as the Packaging and Packaging Waste Regulation setting mandatory recycled content targets to drive the demand for recycled raw materials, which should be accompanied with a tool granting obliged companies a fair access to secondary raw materials;
- Recommends extending the Carbon Border Adjustment Mechanism (CBAM), which defines an acceptable GHG emission threshold on all goods imported into the EU to strengthen the local market, to plastic;
- Calls for more transversality among the regulation and the sectors to promote

a global yet coherent circular economy strategy.

The reindustrialisation of the Union will allow the development of generate numerous employments in the circular economy ecosystem and the Greentech sector with a European workforce constituting a central element of the strategic sovereignty for the continent.

*"The Green Deal Industrial Plan should not be built in isolation from other European legislation and needs to provide stability and visibility to encourage the European industry to innovate and invest for the future."*



**FRANÇOIS RÉGIS  
MOUTON DE LOSTALOTLASSALLE**  
Regional Director Europe - IOGP

# Carbon capture for a productive and sustainable Europe

*“The science is clear. Industrial carbon removal is a necessary part of our climate toolbox”*

**Ursula von der Leyen**  
European Commission President

*“There is, my friends, no chance in hell that we will meet the global climate targets without CO<sub>2</sub> storage”*

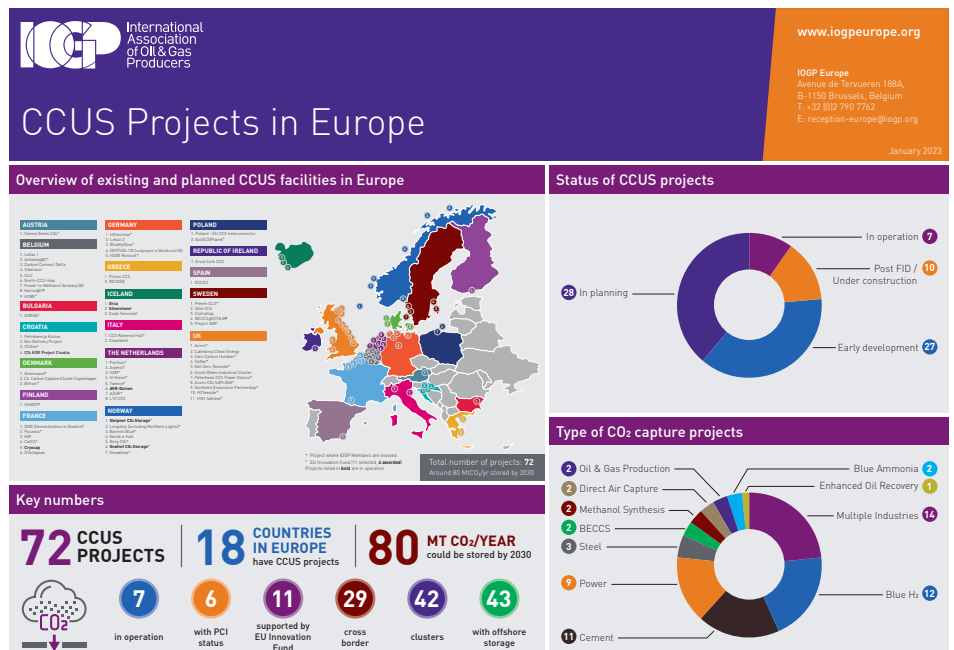
**Lars Aagaard**  
Danish Minister for Climate, Energy and Utilities

Strong and wise words at the recent launch of the the [Greensand project](#), a pioneering offshore carbon storage site just launched in the North Sea. This endorsement of carbon capture and storage (CCS) echoed the announcement of the European Commission’s [Net-Zero Industry Act](#), (NZIA) which sets the objective of an annual 50Mt storage injection capacity in the EU by 2030, requiring contributions from EU oil and gas producers. Although we understand we needed to start somewhere, this mandate on our companies is not great news and, while a commendable objective, certainly not the best way to regulate. Such an objective will be challenging for our industry to achieve within the timeframe, as the projects depend on factors partially outside the control of the obligated companies.

## A recognised and proven technology that now needs a value chain

CCS promoters have long said the technology was crucial for the future of industry in Europe, to keep it globally competitive, compatible with climate neutrality, and to safeguard the jobs, research and innovation associated with it. For decades, their calls found little favor within EU policymaking circles. The lack of an economic case for the technology prevented project development in Europe.

The NZIA’s recognition of the role of CCS as a key enabler of sustainable competitiveness for industry in the EU is a welcome and overdue development, as is the possibility for CO<sub>2</sub> storage projects to be recognized by Member States as ‘net-zero strategic projects’. Our sector is ready to work with EU institutions and national authorities to establish the needed measures and framework so that CCS deployment actually takes off and meets (and





potentially exceeds) the ambition laid down by the Commission.

### A wind of change

While factors such as the increasing costs of EU carbon permits (reaching [a high of €100](#) in February), the reduction of free allowances for industry, and the idea of European strategic autonomy (reinforced by the recent deployment of the Inflation Reduction Act in the US) help the commercial case for CCS, more funding and de-risking measures are needed to establish complex value chains from emitters to storage sites.

After years of inaction and doubt, there now seems to be general consensus in Europe on the need to come together and drive CCS deployment. The European Commission was among the first to act and launch a much-needed EU CCUS Forum in 2021, bringing together all value chain actors, academics and civil society to work on identifying and lifting barriers and accelerating deployment.

In early 2023, the Net Zero Industry Act took the discussion to the political level, proposing an EU ambition for 2030, to drive deployment and mobilize actors across the continent. Even Germany, a country long sceptical about CCUS, signed a declaration of intent with Denmark which acknowledges the technology's role in the fulfilment of national climate goals and recognizes the 'importance of science in the promotion and development of CCUS'. Finally...

The EU and Member States need to turn this newfound political momentum into urgent action on the ground, because while this is an extremely positive development, the window for action is very short: the EU has some months to get its regulatory framework in shape if it wants to achieve its 2030 CCUS ambition: important work on defining the requirements still needs to be undertaken

### Making the business case

CCS is considered a crucial strategy for reducing emissions due to its significant potential. However, given the late attention it got, the prospect of large-scale commercialization of CCS in the near future is fraught, as it faces technical, economic, and social barriers that bring about uncertainties, impacting investment decisions. CCS developers still need government assistance to initiate projects due to the risks associated with the new will to develop this technology at scale, the absence of a well-established value chain and economic model, and the early stage of industry development.

Despite the Commission's newfound enthusiasm, targets alone – and, in the NZIA's case, obligations – aren't sufficient to create a business case for CCS. The EU and Member States need to put in place mechanisms to fund and de-risk the CCS value chain, such as

contracts for difference. This mitigates the investment risk for companies and distributes the cost of CO<sub>2</sub> between private and public entities. Such contracts are especially pertinent for those contemplating investments in low-carbon technologies as they enhance the competitiveness of low-carbon solutions in the medium to long term. Further exploration of how the multiple possible funding sources for CCS project developers can be better streamlined is needed and the NZIA should simplify and accelerate the application process for funding.

### Projects lighting the way

The NZIA targets a 50Mt injection capacity by 2030. CCS projects, both planned and underway across the Europe (EU, EEA and UK) foresee a capacity of an estimated 80Mt. [Currently there are 30 storage projects](#) in different stages of development in Europe. These projects are best developed around industrial clusters that share part of the infrastructure in the CO<sub>2</sub> value chain, allowing significant reduction in development costs. The potential is there, but they will only take shape if there is a solid business case to underpin investments into projects. Individual Member States will also need to reconsider their positions on permitting CO<sub>2</sub> storage sites. The chart above outlines existing and planned CCS projects across Europe.

### Scaling up Hydrogen

One of the most overlooked and yet main benefits of CCS technology is its potential to decarbonize natural gas and help produce [very large amounts of low-carbon hydrogen](#) relatively quickly. By capturing and storing the CO<sub>2</sub> emitted during the steam methane or autothermal reforming process, low carbon hydrogen can achieve emissions reductions of up to 90% compared to traditional hydrogen production.

Not only would this accelerate the creation of a hydrogen economy by increasing the availability of volumes for consumers, but it would also provide an additional investment incentive for CCS. It's a win-win for everyone, climate included.

So far, the EU seems determined to put nearly all its eggs in the renewable hydrogen basket – a very risky bet. This classic European 'technology-specific' approach is in stark contrast with the US approach to hydrogen deployment: public support available to all hydrogen production methods but proportional to the latter's carbon intensity. A simple, climate-conscious and result-oriented approach. The speed and scale of investment in the US is telling.

But even if the EU persists in its current approach, the regulatory framework must

be made much more inclusive and pragmatic than it currently is. At the moment, there are too many legal and administrative barriers to the introduction of hydrogen into the gas grid. It is important that regulatory efforts adopt a technology-neutral approach to scaling up hydrogen, ensuring all low-carbon technologies can fulfil their potential.

One of the main advantages of low carbon (or 'blue') hydrogen production is that it can re-use existing natural gas infrastructure which makes it an attractive option for countries with established natural gas industries. In Europe, countries such as the Netherlands, Norway, and the UK have significant natural gas reserves and infrastructure, which makes them well-positioned to develop low carbon hydrogen production. [A recent study](#) confirms European oil and gas pipelines' ability to transport CO<sub>2</sub> and hydrogen cost-efficiently.

The establishment of a competitive hydrogen market and cost-effective, cross-border hydrogen infrastructure is crucial for the widespread adoption of hydrogen production and consumption. Leveraging CCS to accelerate this process is a no-brainer.

### The need for immediate action

Considering the targets proposed in the NZIA, the window to lift barriers and establish incentives is short – a couple of years at most. The EU needs to put its foot to the pedal on policy support for CCS. For CO<sub>2</sub> to be effectively captured, transported, processed, and permanently stored, all entities along the value chain need to have viable and sustainable business cases with signed agreements underpinning investments and defining their locations, capacities, and timing.

It is also crucial to simplify and speed up the funding and state-aid processes in the EU. The Commission clearly tried to solve the 'chicken and egg' issue by proposing an obligation on the storage side to reassure industrial emitters. But investments in storage capacity development needs to be underpinned by signed agreements with emitters or aggregators, otherwise they will simply lead to expensive stranded assets. The European Commission and all legislative actors, including Member States, must unanimously encourage the development of CCS. It is crucial for avoiding offshoring our emissions, while reducing the risk of repatriating more of our industry, jobs, and much of the accompanying research, development and innovation. Possibly for good.

Europe's industrial base, security and climate targets depend on it. We cannot miss it this time.



JEAN-DAVID-MALO

Director of the European Innovation Council  
and the SME Executive Agency

# The European Innovation Council (EIC) strives for clean technology and a cleaner, healthier world

With a record budget of **EUR 10 billion** for the period 2021-2027, the EIC is the EU flagship innovation programme of Horizon Europe, to identify, stimulate, develop and scale up breakthrough technologies and game-changing innovations. Supporting all stages of innovation in a bottom-up ("Open") but also in a top-down ("Challenges") approach, from research and development on the scientific underpinnings of breakthrough technologies, from validation and demonstration of breakthrough technologies and innovations to meet real world needs, to the development and scaling up of deep tech start-ups and SMEs, the EIC has the ambition, under the leadership of Commissioner GABRIEL, to become the "**EU fabric of unicorns**" with the aims notably (1) to contribute to the solutions to the various challenges we are confronted with (e.g. climate change, digital transition, energy crisis, health issues, food security, geopolitical instability, transformation of labour conditions, information/data security), (2) to participate to the EU economic and technological sovereignty in strategic areas and (3) to make Europe a leader in the new wave of deep tech innovation and start-ups in the ongoing global tech race. As such it contributes to the ambitious action plan set within the [New European Innovation Agenda](#).

In this frame it is without surprise that the EIC is currently providing around 30% of its funding in clean tech: it is indeed essential if we consider that the [International Energy Agency](#) predicts in its [Net Zero by 2050 Roadmap](#), that the path to net zero emissions from 2030 and by 2050 will rely on technologies and innovations not currently available, especially in strategic sectors such as carbon capture and utilisation. By doing this it contributes to the objective to strengthen Europe's net-zero energy technologies manufacturing and investment

ecosystem outlined in the Commission Communication on the Green Deal Industrial Plan, recently reinforced by the [Net-Zero Industry Act](#) Commission proposal.

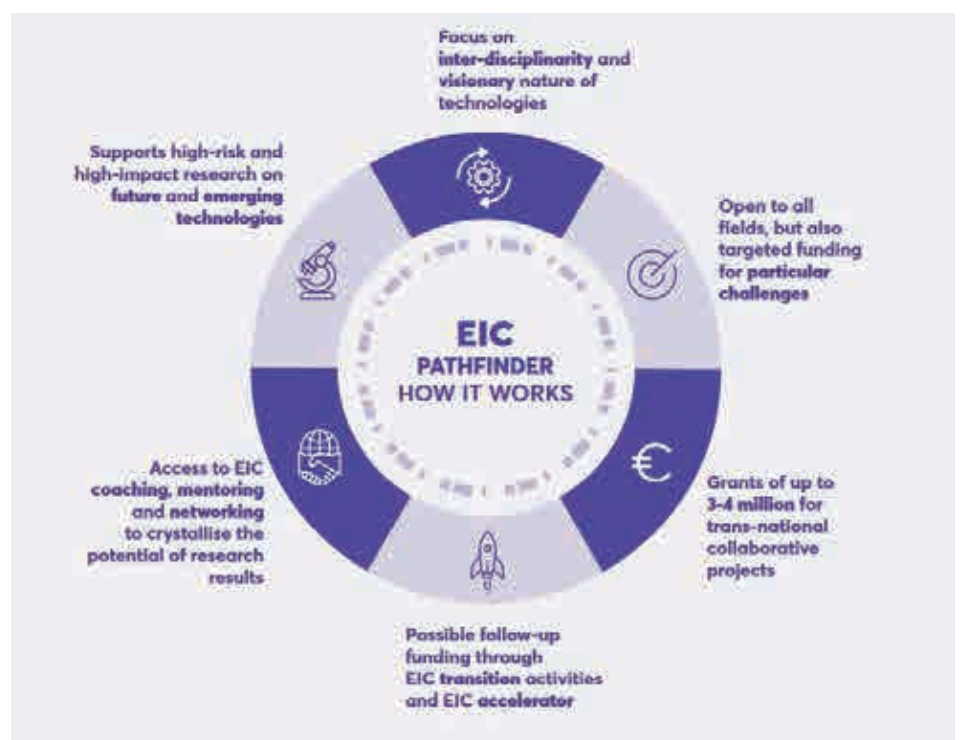
## An agile instrument for innovators from excellent early research to scaling-up of clean-tech innovation/ start-ups

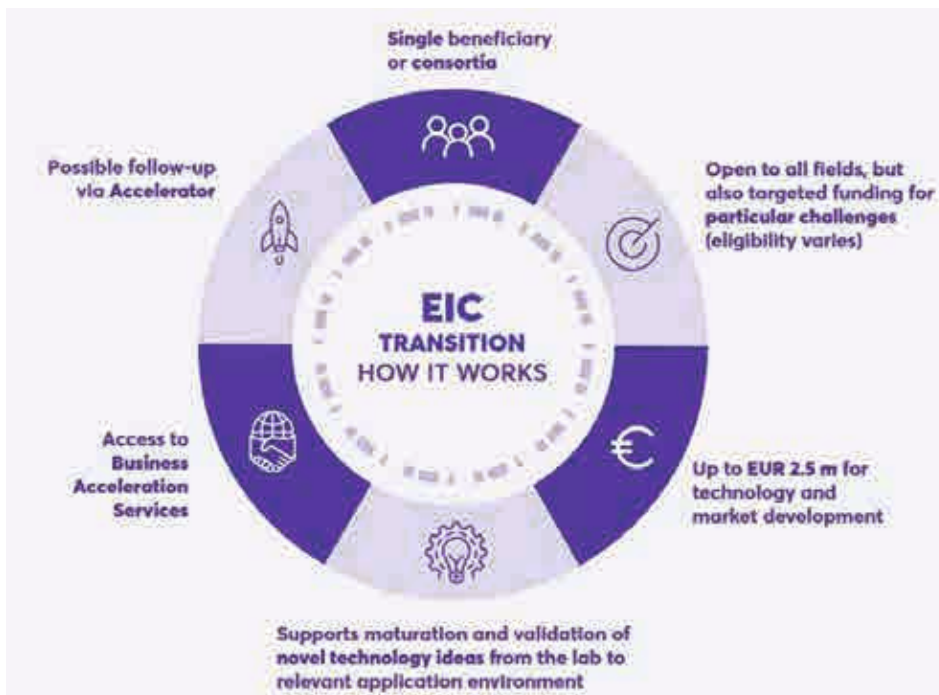
The EIC supports clean technologies, at different technological maturity levels, from early research to start-up and scale up, providing grants and direct equity to de-risk investments and facilitate crowding in of private investors. Implemented via annual calls for proposals, this support is mainly provided through 3 main schemes:

- The **EIC Pathfinder** supports advanced research (grants up to EUR 3-4 million)

implemented by consortia to develop the scientific basis to underpin breakthrough technologies. It provides support for the earliest stages of scientific, technological or deep-tech research and development. Pathfinder projects aim to build on new, cutting-edge directions in science and technology to disrupt a field and a market or create new opportunities by realising innovative technological solutions;

- The **EIC Transition** funds innovation activities implemented by small consortia or single entity that go beyond the experimental proof of principle in laboratory (grants up to EUR 2.5 million). It supports both the maturation and validation of novel technology from the lab to the relevant application environments as well as explorations and development of





a sustainable business case and business model towards commercialization;

- The **EIC Accelerator** supports single companies (principally SMEs, including start-ups) to scale up high-impact innovations with the potential to create new markets or disrupt existing ones. It focuses on deep tech where significant funding is needed over a long timeframe before returns can be generated ('patient capital'), by providing a unique combination of a grant up to EUR 2.5 million and a direct equity support up to EUR 15 million thanks to its **EIC Fund**.

### More than financial support

Beyond the financial support provided under its main schemes, the EIC offers its beneficiaries, through its **Business Acceleration Services**, a broad range of services, exposing them to business opportunities, investors, corporates, public/private procurers, and bringing them to international clean tech events (i.a. Arpa-e Summit, CES (USA), Ecomondo (Italy), Middle East Energy (Dubai)).

Moreover, **EIC Programme Managers** support beneficiaries with a pro-active portfolio approach, where even more ambitious techno-scientific goals are achieved, by grouping projects in thematic portfolios, comparing methodologies and results, proposing common actions and roadmaps to effectively translate research into innovation, and exploring synergies between projects to ensure maximum potential is achieved.

Last, but not least, the EIC is developing cooperation with key actors of the EU clean tech innovation ecosystem for the benefit of EU innovators (e.g. **MoU with EIT**, Letters of intent **with CHJU** and **Cleantech Europe**).

### Huge opportunities offered in 2023: join us!

To date, the EIC areas of intervention in clean tech are many, ranging from clean energy technologies to energy efficiency in final consumption, i.e. energy supplied directly to the consumer, transport, infrastructures for the net zero transition, agriculture and food, climate adaptation and mitigation, blue economy, environment and circularity in processes and materials. But more is coming in 2023: beyond our open calls, challenges have opened in topics such as clean cooling, diminishing embedded carbon in construction, sustainable electronics, resilient agriculture and environmental intelligence.

More information can be found in the **EIC 2023 Work Programme**.

Let's invest in the cleantech companies of the future!



KRISTIAN RUBY

Secretary General - EURELECTRIC

# Net Zero Industry – Walking the Tightrope of Competitiveness and Climate Action

Global industry is entering a new chapter: the age of clean energy manufacturing. In order to reach net zero, all manufacturing will need to transition to carbon-neutral processes. This is a gargantuan transformation, the likes of which the world has not seen since the industrial revolution in the 19<sup>th</sup> century.

It is not exactly making things easier that the surrounding environment is one of increasing ideological rivalry and geopolitical tension, where economic ties have become points of leverage between mutually dependent trading partners. Russia's invasion of Ukraine and its deliberate energy blackmail of the European Union is an obvious case in point.

In essence, the transformation to a net-zero economy is about replacing fossil fuels with clean electricity. A crucial implication is that we will move from a fuel-intensive to a raw material-intensive economy.

Yet, the EU finds itself at a competitive disadvantage today in several critical areas of clean tech manufacturing needed for this shift, with China as the indisputable leader in raw materials mining and processing as well as in manufacturing critical components for wind, solar, electrolyzers, batteries and semiconductors, amongst other things. In Europe, more than 90% of wafers and other solar PV components are imported from China, together with a quarter of electric cars and raw material-intensive batteries.

With the US adopting the Inflation Reduction Act, Europe must seek to increase the resilience and competitiveness of its clean manufacturing industry to become more attractive as an investment destination.

The Net Zero Industry Act, which was published recently by the European Commission, seeks to answer that need. It aims to have at least 40% of certain key technologies manufactured in the EU by 2030. It identifies eight strategic technologies with a high potential to

deliver on this benchmark including solar PV and solar thermal, onshore wind and offshore renewables, grid technologies, heat pumps and geothermal energy, batteries and storage, carbon capture and storage, and sustainable biogas and biomethane.

The measures devised to achieve this goal include: the **reduction of administrative burdens and simplification of permit-granting processes; an objective for CO<sub>2</sub> capture; rules for market access, which** require public authorities to consider sustainability and resilience criteria in public procurement or auctions; **Net-Zero Industry Academies** to enhance skills and ensure quality jobs in these essential sectors; and **regulatory sandboxes** to test innovative net-zero technologies and stimulate innovation.

The European electricity industry is still in the early stages of assessing the details of this new legislative proposal, but some initial observations can be made:

**Europe needs to act:** The rapidly evolving geopolitical situation requires the EU to take action. Russia's attempt at energy blackmail against the EU has exposed a serious vulnerability and has left us with no choice but to rely more on homegrown energy to decarbonise and reduce our dependence on foreign energy sources. A new liability could quickly develop in relation to the near-monopoly position of China in production of solar panels, especially when considering the public discussions in China to ban export of wafers.

**Electricity at the core:** The proposal rightly positions electricity at the centre of the net-zero industrial strategy. Almost regardless of what type of manufacturing we talk about in a net-zero system, electricity will play a role in supplying energy, whether directly or indirectly. Eurelectric research shows that, with the right investments and deployment pace, electricity generation can be fully decarbonised well before 2045. But of

course, this rests on the assumption of having ready access to the necessary hardware for generation as well as transport. As such, electric technologies should therefore be placed at the core of the Net Zero Industry Act.

**Robust measures required:** For a target of at least 40% domestic production by 2030 to be realistic, it must be backed by more robust measures. There are some positive elements among the proposed measures. The focus on lowering administrative burdens and easing permitting is welcome and necessary. Permits for industrial sites can easily take multiple years. To make the prospect of any substantial localisation of manufacturing realistic by 2030, the removal of red tape and eased permitting is absolutely essential.

To ensure steady demand, the Commission wants to require authorities to assess qualitative dimensions of offers given in public tenders, allowing them to choose ones that contribute to sustainability and resilience, even if they are more costly. While this may be needed, it also risks becoming a double-edged sword. Most importantly, it is crucial that the tendering procedures do not become too complex while keeping in mind the downstream impact on the cost of electricity generation.

More robust and concrete measures are needed in other areas as well, for instance in relation to skills and the so-called regulatory sandboxes. Also, the strategy will need to be backed by more concrete financial or fiscal measures – for instance, by establishing a stronger link to the EU multi-annual financial framework as well as the EU innovation policies. In short, there is plenty for the Council and Parliament to work on with this proposal.

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