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European Hydrogen and Industrial Policy: A Great Reset in 2025?

Introduction

The *European Green Deal (EGD)*, launched in 2020, marked the EU's ambition to become the first carbon-neutral continent by 2050. The EGD considerably boosted the appeal of hydrogen as a pivotal technology for decarbonising European manufacturing, energy, and transport. Subsequent strategies and regulatory packages such as *RePowerEU*, the updated *Renewable Energy Directive (RED)*, and the *Net-Zero Industry Act (NZIA)* elevated the small hydrogen molecule to a cornerstone of the technological transition to net-zero. These acts also marked a new phase in European industrial policy, one where European Institutions set EU-wide targets for production, import, and technological content; scale up subsidies for certain technologies; and select which types of projects should be prioritised.

The EGD initially drove high growth expectations for renewable (green) hydrogen and renewable energy. The hype peaked in early 2021 before collapsing due to cost inflation, high interest rates, as well as regulatory and manufacturing hurdles. By early 2025, some 'pure hydrogen' companies, such as electrolyser manufacturers, lost up to 90% of their peak market capitalisation. Today, the cost of green hydrogen is several times higher than anticipated in 2019, effectively rendering most industrial use cases uncompetitive. By mandating that green hydrogen projects be directly linked to new renewable energy generation, EU regulations inadvertently created additional barriers, which delayed project execution and inflating costs. As industrial deployment remains stalled and the 2030 EU targets approach, policymakers must grapple with fundamental trade-offs that will shape the future of Europe's hydrogen economy.

The Policy Trade-Offs of Green Hydrogen

The theoretical framework for industrial policy includes managing public goods, externalities and spillovers. It also addresses specific issues such as market failures, rents, government failures, political capture and the principal-agent problem. A major tenet of industrial policy is for public actors to provide ample support and protection for infant industries and new technologies through a range of targeted policy instruments. As a nascent, promising technology with significant cost and manufacturing hurdles associated with the need to jointly scale up production, transport and use, renewable (green) hydrogen is a prime candidate for targeted industrial policy. Here, the EU has assumed the role of a catalyst and coordinator, and, as this paper will argue, a pilot in the complex transitions from fossil fuels to renewable energy sources. For clarity, this paper distinguishes between green hydrogen - produced entirely from renewable energy - and low-carbon hydrogen, which includes hydrogen derived from fossil fuels but mitigated with carbon capture and storage.

The policy trade-offs of green hydrogen are significant. At a time when energy security, strategic autonomy and industrial competitiveness are some of Europe's top priorities for the next five years, and when the financial and political room to manoeuvre seems narrower than ever, European and national policymakers are facing 2025 with a stark choice. On the one hand, the bloc could press ahead as technological first-mover with an ambitious and expensive bet on green hydrogen, albeit at the risk of incumbent European industries losing competitiveness due to the high costs, efforts, and risks associated with the transition. On the other hand, politicians could decide to pivot instead, by relaxing the rules and giving the industry more time to scale up, for instance allowing low-carbon hydrogen with CCS as a transition step. However, this would still come at a cost and would not alleviate the risk of veering off course on

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the continent's difficult yet critical path towards energy security.

Hydrogen Policy Before the EGD

The European Commission has long favoured non-targeted, cross-sectorial policies with a particular emphasis placed on market competition. In line with this, the European Commission's *New Industrial Strategy*, unveiled in March 2020 in parallel with the EGD, presented a strategy mainly centred around intellectual property, competition and trade rules (including market-based instruments such as the Carbon Border Adjustment Mechanism, as a complement to the existing Emissions Trading System), and public procurement. Yet the strategy also explicitly recognised the role of clean hydrogen as a valuable energy carrier and foresaw additional sectorial or thematic policies, for instance related to energy-intensive industries, critical raw materials, and industrial ecosystems. Zooming in on hydrogen, when reviewing the current framework, one notices a step change in the nature and shape of European green industrial policy around the year 2020. Hydrogen technology has enjoyed stable longstanding financial and political support at EU level, with a technology-specific public-private partnership formed as early as 2004¹.

Before the EGD, financial support came mainly in the form of subsidies related to basic research, technological development, and early commercialisation. Dedicated research- and innovation-related subsidies gradually increased, from 145 million euros in the 5th Framework Programme (FP5) until 2004, to 665 million euros in Horizon 2020 (FP8) running until 2021. The existing scheme was overhauled with the launch of the Clean Hydrogen Partnership in 2021, which placed a renewed emphasis on scaling up, commercialisation, and co-financing from industrial and research partners. New initiatives were launched (e.g., Hydrogen Valleys) which coincided with new sources of financing at EU (e.g., Innovation Fund) and Member State (e.g., first hydrogen IPCEI) levels. As such, the advent of the EGD marked a clear impulse to speed up and shape hydrogen projects in ways that would serve various overarching EU interests, such as climate objectives but also regional policies and cross-border cooperation.

Two Years That Changed Everything

The years 2022 and 2023 marked an unprecedented effort to create a comprehensive regulatory environment for green hydrogen. Indeed, the Covid-19 pandemic, energy crisis, and Ukraine war triggered EU institutions to take faster, bolder action. First, the *RePowerEU Plan*, released in March 2022, confirmed the role of green hydrogen in serving both energy security and climate objectives. The plan set a target of 10 million tons of green hydrogen produced within, and 10 million tons imported to, the EU by 2030. Then, in February 2023, the Commission released its *Green Deal Industrial Plan (Net Zero Plan)*. The plan selected certain 'net-zero' technologies, including hydrogen, whose industrial scale up and deployment were seen as necessary to deliver on the EGD. Selected technologies would enjoy a simplified regulatory environment as well as faster and broader access to funding. This included the Hydrogen Bank, a new dedicated hydrogen auction-based subsidy scheme. This foresaw a "massive switch to fossil-free hydrogen as a storage medium, fuel and feedstock"² by 2030 and positioned green hydrogen as a key technology for energy security, alongside solar and wind.

Furthermore, the third recast of the *Renewable Energy Directive* in October 2023 introduced technology-specific targets for green hydrogen. By 2030 at least 42% of hydrogen used as fuel in industry will need to comply as being renewable. A separate delegated act also clarified criteria for renewable hydrogen. Finally, a legal act substantiating the Net Zero Plan, the *Net-Zero Industry Act (NZIA)* came into force in June 2024. The stated objective of the NZIA was to position domestic European industries favourably in the global market for low-carbon technologies. The act streamlines and harmonises various financing and project permitting processes across the EU, and introduces initiatives regarding skills, and best practices. More surprisingly, the act introduces a goal for the manufacturing capacity of net-zero technologies (including hydrogen) to meet at least 40% of the EU's total deployment needs by 2030. Despite these ambitious regulatory efforts, green hydrogen development has not proceeded as expected, encountering a range of financial, logistical, and industrial hurdles.

Costs Increases, Hurdles, and Stalled Developments

The EGD, combined with the prospect of comparable industrial policy support in other regions and of low-interest-rate financing, initially coincided with a period of euphoria for green hydrogen. Ambitious cross-border projects were formed and received financial support from the EU and from Member States. Initially, European industries ranging from steel production to transport infrastructure integrated green hydrogen into their sustainability strategies. However, the wave of supply chain disruptions, energy cost increases, inflation, and high interest rates seen between late 2020 and 2023 caused most large green hydrogen projects to gradually lose momentum and eventually get delayed or shelved. Few companies made final investment decision on their projects. Some of the awarded subsidies expired or were left unclaimed.

Pre-2021 business cases collapsed, with electrolyser manufacturers struggling to secure orders and scale up manufacturing. Most saw their stock price plummet, sometimes by as much as 90% from their peak in early 2021³. While not the main cause, strict EU rules for green hydrogen projects linked them to new renewable energy projects, which themselves suffered from supply chain disruptions, increased materials costs, and high interest rates. On the demand side, several sectors such as metals and base chemicals found themselves in a difficult economic position due to structurally higher energy costs and overcapacity in other parts of the world. These sectors are not able to absorb the increased input costs of green hydrogen and maintain their competitive position in global markets. Moreover, other issues arose, such as the lack of an at-scale transport and storage infrastructure linking supply and demand at EU level. As a result, the development of green hydrogen in Europe has stalled, and both industry and policymakers seem puzzled as to what comes next.

Low-Carbon Hydrogen

Low-carbon hydrogen is seen by many as a realistic alternative to green hydrogen. The financial support required is an order of magnitude lower than that needed for renewable hydrogen. The technology is available at scale and could unlock the necessary deployment of large-scale transport infrastructure. However, from a European policymaker's perspec-

tive, low-carbon hydrogen is an imperfect solution. With natural gas as its primary feedstock, it does not reduce the bloc's dependency on fossil energy imports and thus does little to alleviate the urgency to reduce energy imports. Moreover, due to legislative inertia, as well as the political costs involved, it seems unrealistic that the Commission will adopt a technology-neutral stance towards hydrogen. However, with some regulatory aspects still to be set, a balanced approach could still emerge combining the two technologies.

The EU's willingness to move the needle remains to be seen. For now, support for low-carbon hydrogen is limited to announcements already made. This includes a new definition and methodology for calculating emissions, expected through a delegated act in 2025. EU policymakers may consider the hydrogen framework complete and limit their role to that of existing trade and funding competencies, as well as cross-border coordinator and demand aggregator. Moreover, the EU is expected to hold firm on already enacted targets and push Member States to pick up the funding baton. National governments can make use of State Aid provisions as well as specialised instruments such as auctions as a service, to close the funding gap and de-risk critical projects on their territory⁴. This is consistent with the principle of subsidiarity given the leeway national governments have in reaching their national emission reduction targets.

Conclusion: A Great Reset in 2025?

While pre-EGD initiatives followed the traditional EU policy toolbox, recent instruments signal a clear shift in European industrial policy attitudes. Domestic production targets and content requirements are innovative in the sense that they deviate from liberal order-type recommendations. These policies prioritise European manufacturing and foster new technologies, supporting market creation and scale-up. They arguably reflect the EU's bid to position its net-zero industries as forward-looking in a potentially competitive future global market. But the speed at which these policies were enacted also underlines the EU's dire need to decrease its incumbent industry's dependency on expensive, imported energy and remain competitive in the short-to-medium term.

The new Commission has committed to launching a new, wide-ranging *Clean Industrial Deal* in its first 100 days in office⁵. The plan will constitute the backbone

of the EU's new industrial decarbonisation strategy for the next five years. It will focus on economic competitiveness and on supporting both carbon-intensive, difficult-to-abate sectors and new technologies. The range of instruments could include incentivising investments, promoting reskilling, and enforcing quotas in public procurement. It is widely expected that market-based and competition-friendly instruments will remain favoured, though support is mounting for a more state-centred form of industrial policy⁶. Given current geopolitical shifts, the EU is

unlikely to rely on past strategies. As for green hydrogen, a great reset in 2025 is unlikely. That said, the planned ramp up of domestic renewable energy production and infrastructure, together with consistent financial support across value chains may ultimately make certain business cases favourable again. Although the initial excitement surrounding green hydrogen has waned, sustained policy support, infrastructure investment, and regulatory clarity will be crucial in ensuring that it remains a pillar of Europe's clean energy transition.

References

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