Hydrogen as a Core Component of U.S. and EU Climate Policies: State Aid, Market Dynamics, and the Transatlantic Policy Divergence

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Abstract

This piece reflects on the implementation of the European Union's (EU) Green Deal Industrial Plan concerning hydrogen production and its implications for competition policy. A comparison is drawn between the United States' (U.S.) recently adopted Bipartisan Infrastructure Law (BIL) and Inflation Reduction Act (IRA), emphasizing the differences in their approaches, specifically with regard to the selectivity of aid measures. While the U.S. follows a non-selective approach, offering tax benefits to any company willing to produce in the United States, the EU promotes hydrogen production under the Important Project of Common European Interest program (IPCEI), an exceptionally massive transnational state subsidy program. The selectivity inherent in the IPCEI program could raise competition issues within the EU Single Market, thereby creating a less innovative and growing market than the U.S.'s non-selective approach, this paper aims to provide insights into the transatlantic policy divergence and its implications for the global climate and green energy agenda.

I. Introduction

The production of hydrogen is a cornerstone of the climate protection and energy policies of both the U.S. and the EU, playing a critical role in the success of the global energy transition.¹ Consequently, significant efforts are being exerted by these global players to facilitate and rapidly expand production capacities.² However, the impacts on trade and competition are not always taken into consideration. Current initiatives, such as the Important Projects of Common European Interest (IPCEI) framework, tend to disproportionately benefit wealthier and larger EU Member States, which possess the organizational and financial capacity to initiate IPCEIs.³ Notably, Germany and France have accounted for nearly 80% of the \notin 672 billion of state aid approved programs by the European Commission since February 2022.⁴ This trend⁵ underscores a disparity in fiscal and organizational capacities across EU Member States, raising concerns about the equitable distribution of resources and opportunities within the Union.⁶

II. Hydrogen Policy in the U.S. and the EU

American industrial policy, rooted in bipartisan tradition, adheres to the "Buy American Rule."⁷ This principle channels federal aid towards domestic goods as well as services and allocates government contracts to national champions like IBM and Boeing, along with key sectors such as renewable energy and manufacturing.⁸

Two recent laws in the U.S. — the Inflation Reduction Act (IRA) and Bipartisan Infrastructure Law (BIL) — illustrate a similar large-scale policy approach by provisioning unprecedented levels of investment in low-carbon technologies, including the development and application of clean

¹ See generally Presidential Joint Statement by President Biden and President von der Leyen, DAILY COMP. PRES. DOC. 202300182, https://www.whitehouse.gov/briefing-room/statements-releases/2023/03/10/joint-statement-by-president-biden-and-president-von-der-leyen-2/ (last visited on May 29, 2024).

²See generally Global Hydrogen Review 2023, Int'l Energy Agency, https://www.iea.org/reports/global-hydrogen-review-2023/executive-summary (last visited on May 29, 2024).

³ Niclas Poitiers & Pauline Weil, *Opaque and Ill-Defined: The Problems with Europe's IPCEI Subsidy Framework*, BRUEGEL, https://www.bruegel.org/blog-post/opaque-and-ill-defined-problems-europes-ipcei-subsidy-framework (last visited on May 29, 2024).

⁴ See Jorge Liboreiro, Germany, France Account for Most EU State Aid: Here's Why It's a Concern, Euronews https://www.euronews.com/business/2023/01/17/germany-france-account-for-most-eu-state-aid-heres-why-its-a-

concern (last visited on May 29, 2024). For the source document: *See generally* Eur. Comm'n, List of Member State measures approved under Temporary Crisis Transition Framework, https://competition-policy.ec.europa.eu/system/files/2023-12/State_aid_TCTF_decisions.pdf (last visited on May 29, 2024).

⁵ As of the end of 2023, the Commission has approved \notin 742 billion in state aid, with 48.4% allocated to Germany and 22.6% to France, while Italy accounts for 7.8% and the remaining EU Member States between 2.3% and 0% of a total amount. See Théo Bourgery-Gonse, ANALYSIS: EU subsidy race is on – and Germany is winning ithttps://www.euractiv.com/section/economy-jobs/news/analysis-eu-subsidy-race-is-on-and-germany-is-winning-it/, (last visited on May 29, 2024). For the source document: See generally Eur. Comm'n, List of Member State measures approved under Temporary Crisis Transition Framework.

⁶ See Henri Foy & Ian Johnston, The EU's plan to regain its competitive edge, FIN. TIMES, (Nov. 5, 2023),

https://www.ft.com/content/124b4cdb-deb9-49a0-b28d-d97838606661 (last visited May 3, 2024).

 ⁷ See Alessio Terzi ET AL., European industrial policy for the green and digital revolution, OXFORD ACAD.: SCI. AND PUBLIC POL'Y, 842, 844, (2023), https://academic.oup.com/spp/article/50/5/842/7192958.
⁸ See id.

hydrogen.⁹ With an allocation exceeding \$ 9.5 billion from the BIL and enhanced tax credits under the IRA, a framework is established for the accelerated expansion of hydrogen production and utilization within the U.S. over the next few years.¹⁰ The BIL outlines a 5-year investment in three sectors: \$8 billion for Regional Clean Hydrogen Hubs (H2Hubs) to boost clean hydrogen production;¹¹ \$1 billion for the Clean Hydrogen Electrolysis Program focusing on Research and Development and commercialization,¹² and \$500 million for the Clean Hydrogen Manufacturing and Recycling Program to enhance domestic supply chains.¹³ Additionally, the IRA introduces Clean Hydrogen Production Tax Credits (PTCs) with a four-tier incentive based on carbon intensity, alongside three supplementary tax credits supporting hydrogen projects, storage, and Carbon Capture and Sequestration (CCS).¹⁴ The overarching ambition of federal hydrogen policy is to establish commercial H2Hub as state-based ecosystems and drive the U.S. industry growth by lowering the costs associated with electrolysis, CCS and grid balancing.¹⁵

The U.S. hereby remains committed to a domestic policy, including a combination of grants, tax credits, and loan guarantees representing a largely incentive-based and non-selective approach.¹⁶ In contrast, the EU relies more on regulatory mechanisms while complementing them with selective programs and incentive-driven goals.¹⁷ The striking difference in strategies — one predominantly based on incentives, the other one on regulatory frameworks — highlights an ongoing tension and captures the evolving transatlantic environment of a "subsidy arms race."¹⁸ Consequently, the EU Green Deal Industrial Plan for the Net-Zero-Transformation responds to the

⁹See generally Inflation Reduction Act of 2022, Pub. L. No. 117-169, 136 Stat. 1818 with a commentary U.S. Dep't of Energy, *Transforming Clean Energy Financing and Supply Chains in the United States: LPO One Year After the IRA*, Energy.gov, https://www.energy.gov/lpo/articles/transforming-clean-energy-financing-and-supply-chains-

united-states-lpo-one-year-after (last visited May 29, 2024); *See also* Infrastructure Investment and Jobs Act of 2021, Pub. L. No. 117-58, 135 Stat. 429 with commentary U.S. Dep't of Energy, *DOE Establishes Bipartisan Infrastructure Law's \$9.5 Billion Clean Hydrogen Initiatives*, Energy.gov, https://www.energy.gov/articles/doe-establishes-bipartisan-infrastructure-laws-95-billion-clean-hydrogen-initiatives (last visited on May 29, 2024).

¹⁰ See generally U.S. Dep't. of Energy, *DOE Establishes Bipartisan Infrastructure Law's \$9.5 Billion Clean Hydrogen Initiatives*, https://www.energy.gov/articles/doe-establishes-bipartisan-infrastructure-laws-95-billion-clean-hydrogen-initiatives (last visited on May 4, 2024).

¹¹See generally U.S. Dep't of Energy, *Biden-Harris Administration Announces Historic \$7 Billion Funding Opportunity to Jump-Start America's Clean Hydrogen Economy*, https://www.energy.gov/articles/biden-harris-administration-announces-historic-7-billion-funding-opportunity-jump-start (last visited on May 29, 2024).

¹²See U.S. Dep't of Energy, *Clean Hydrogen Electrolysis Program*, https://www.energy.gov/eere/clean-hydrogen-electrolysis-program (last visited May 29, 2024).

¹³See U.S. Dep't of Energy, *Clean Hydrogen Manufacturing & Recycling*, https://www.energy.gov/eere/clean-hydrogen-manufacturing-recycling (last visited May 29, 2024).

¹⁴ See generally U.S. Dep't of Energy, Clean Hydrogen Production Tax Credit (45V) Resources, https://www.energy.gov/articles/clean-hydrogen-production-tax-credit-45v-resources (last visited on May 29, 2024). ¹⁵ See generally The White House, Biden-Harris Administration Announces Regional Clean Hydrogen Hubs to Drive Clean Manufacturing and Jobs, https://www.whitehouse.gov/briefing-room/statements-releases/2023/10/13/bidenharris-administration-announces-regional-clean-hydrogen-hubs-to-drive-clean-manufacturing-and-jobs/ (last visited on May 29, 2024).

¹⁶ See *id*.

¹⁷ See Terzi, supra note 7, at 842.

¹⁸ See David Kaufman ET AL., Green industrial policy will drive decarbonization, but at what cost to trade?, Int'l Monetary Fund, Finance & Development, https://www.imf.org/en/Publications/fandd/issues/2023/06/green-trade-tensions-kaufman-saha-bataille (last visited on May 29, 2024).

strategies employed by U.S. industrial policy, adopting a dual-level policy approach. On one level, the Net-Zero Industry Act is devised to mitigate geopolitical dependencies within supply chains and to counteract subsidy races by enabling the potential reallocation of investment aid in strategic green sectors.¹⁹ This element of the policy is designed to enhance the EU's competitiveness in external markets.²⁰ On a second level, the Act strives to maintain the integrity of the European Union's single market, specifically by preventing fragmentation within the internal market.²¹

III. The EU's Pursuit of IPCEI and its Implications for Competition

Within the last couple of years, the EU has started pursuing a more assertive and selective approach by revising state aid limitations and facilitating cross-border hydrogen projects under the Important Projects of Common European Interest program (IPCEI).²²

State aid can be defined as a decision of an EU Member State to provide resources or benefits to undertakings on a selective basis, in pursuit of economic and social objectives. Due to its anticompetitive effects and adverse impact on the EU Single Market, state aid is generally prohibited in the EU, pursuant to Article 107 of the Treaty on the Functioning of the EU (TFEU).²³ Nevertheless, there are different exemptions to this general rule, allowing the European Commission to assess and approve state aid on a case by case basis, such as for environmental reasons, including investments in green infrastructure or green fiscality-carbon taxes.²⁴

IPCEIs represent ambitious cross-border innovation and infrastructure projects, led and financed by a number of EU Member States that can benefit from such an exemption provided for in Article 107 (3) (c) TFEU.²⁵ Under the IPCEI program, EU Member States can pool their resources in order to jointly plan, implement and subsidize strategic projects, which are expected to make a significant contribution to EU policy objectives, where such efforts cannot be financed by the private sector alone.²⁶

Since IPCEIs are funded by the budgets of the participating EU Member States, it falls within their discretion to define the project scope, select participating companies, and manage the

¹⁹ See generally Lukas Hermwille et al., *Net-Zero Industry Act: The EU Commits to an Active Industrial Policy*, Wuppertal Inst. https://wupperinst.org/en/a/wi/a/s/ad/8558 (last viewed on May 29, 2024).

²⁰ See Terzi, supra note 7, at 848.

²¹ See generally Hermwille, supra note 18.

²² See Eur. Comm'n Communication 2021/C 528/02, art. 3.2.1 Nr. 14, 15, 18, Communication from the Commission Criteria for the analysis of the compatibility with the internal market of State aid to promote the execution of important projects of common European interest (Dec. 30, 2021).

²³ See Consolidated Version of the Treaty on the Functioning of the European Union art. 107, May 9, 2008, 2008 O.J. (C 115) 47 [hereinafter TFEU].

²⁴ See exemptions under *id*. at art.107 (3) TFEU.

²⁵ See Eur. Comm'n Press Release IP/21/624, The Commission, State aid: Commission adopts revised State aid rules on Important Projects of Common European Interest (Dec. 25, 2021),

https://ec.europa.eu/commission/presscorner/detail/en/IP_21_6245 (last visited June 2024).

²⁶See Eur. Comm'n Communication 2021/C 528/02, art. 1.3 Communication from the Commission Criteria for the analysis of the compatibility with the internal market of State aid to promote the execution of important projects of common European interest (Dec. 30, 2021).

implementation process.²⁷ However, as highlighted, the IPCEI program essentially serves as a state aid instrument, therefore requiring assessment and approval by the European Commission under state aid rules. To clarify the requirements for the eligibility of IPCEIs under Article 107 TFEU, the European Commission outlined detailed criteria in its revised IPCEI Communication.²⁸

While this approach is supposed to enhance the EU's Industrial Policy and its global competitiveness, it has to be noted that the IPCEI program is highly selective in two key aspects. Firstly, individual EU Member States join forces to form an exclusive, non-EU-wide cooperation, and secondly, these EU Member States select the participating companies, ideally but not necessarily through issuing tenders.²⁹ The selectivity inherent in this approach thus raises the potential for conflict with the creation of a level playing field within the EU.³⁰

To this date three major hydrogen projects have been established as IPCEI, involving 91 companies, 16 EU Member States plus Norway, and receiving approximately \in 17.5 billion in state aid.³¹ Following "Hy2Tech" in July 2022, and "Hy2Use" in September 2022, "Hy2Infra" emerged as the latest project, approved by the Commission in February 2024.³² It received \in 6.9 billion from seven Member States and attracted an additional \in 5.4 billion in private investment.³³ On the one hand, the establishment of these IPCEIs has prompted the Commission's Executive Vice President Margrethe Vestager to call them "an example of truly ambitious European cooperation"

information_en (last visited May 29, 2024).

³² See id.

²⁷See Practical Information on IPCEI, https://competition-policy.ec.europa.eu/state-aid/ipcei/practical-

²⁸ See Eur. Comm'n Communication 2021/C 528/02, art. 3.2.1 Nr. 14, 15, 18, Communication from the Commission Criteria for the analysis of the compatibility with the internal market of State aid to promote the execution of important projects of common European interest (Dec. 30, 2021). Projects are required to first and foremost provide an important contribution to EU objectives, demonstrably overcome market failure and deliver significant positive spill-over effects, thereby benefiting the EU economy and society at large); *see also* Eur. Comm'n Communication of the Commission 2021/C 528/02, art. 3.2.1 Nr. 16, 17, 19, Communication from the Commission Criteria for the analysis of the compatibility with the internal market of State aid to promote the execution of important projects of common European interest 30 (Dec. 30, 2021). To secure some degree of inclusivity and transnational cooperation, projects are required to involve at least four Member States, be structured in a transparent and non-discriminatory manner, and involve relevant co-financing by the companies receiving state aid. *See id*. Lastly, the European Commission in its revised Communication has established that IPCEI needs to avoid negative environmental impacts by conforming with the "do no significant harm" principle. *See id*.

²⁹See Nicolas Poitiers & Pauline Weil, *Opaque and ill-defined: the problems with Europe's IPCEI subsidy framework,* BRUEGEL, https://www.bruegel.org/blog-post/opaque-and-ill-defined-problems-europes-ipcei-subsidy-framework (last visited May 29, 2024).

³⁰ See generally David Kleimann ET AL., How Europe should answer the US Inflation Reduction Act, BRUEGEL, (Feb. 2023); see also id.

³¹ See Eur. Comm'n Press Release, Approved IPCEI in the hydrogen value chain, (2024), https://competition-policy.ec.europa.eu/state-aid/ipcei/approved-ipceis/hydrogen-value-chain_en?prefLang=de (last visited on June 3, 2024).

³³ See Eur. Comm'n Press Release IP/24/789,Commission approves up to €6.9 billion of State aid by seven Member States for the third Important Project of Common European Interest in the hydrogen value chain, https://ec.europa.eu/commission/presscorner/detail/en/ip_24_789 (last visited June 3, 2024).

that "shows how competition policy works hand in hand with breakthrough innovation."³⁴ On the other hand, a closer examination of the participating Member States and companies reveals a tendency for these projects to systematically favor wealthier and larger Member States along with companies that have the necessary organizational and financial resources to launch IPCEIs in the first place.³⁵ Notably, in Hy2Infra, 23 of 32 participating companies receiving state aid under the project are from Germany, including the country's largest industrial companies such as Air Liquide and RWE.³⁶

As noted above, the EU's approach is therefore one of cooperation around massive, targeted aid, exceptionally approved by the European Commission. The scholars Buigues and Sekkat have compared the different approaches to subsidies in the U.S. and EU and found the decentralized, less interventionist American model to be more successful, particularly in science and technology.³⁷ As we'll see now, this selective approach to granting massive aid will also have the effect of creating industrial giants sponsored by certain states, often the wealthiest within the European Union.³⁸ This will create a European market with a two-speed competition, with richer countries featuring concentrated, subsidized industries on one side, and poorer countries unable to integrate into the market on the other.

Introduced into EU law in 1951 with the ECSC Treaty, state aid legislation was designed to enable the European steel industry to maintain a competitive position in the global coal and steel market³⁹. As Professor Kahn points out, the early 1950s corresponded to "a project of integration delimited by circumstances."⁴⁰ to create a single coal and steel market, control institutions were set up, to avoid industrial protectionist measures by Member States.⁴¹ This marked the beginning of state aid law, at the heart of establishing a common market aimed at a particular industry seeking competitiveness with the United States, then experiencing a period of growth under the auspices of the Marshall Plan.⁴² Moreover, as Professor Gerbet highlights, it was impossible at the time to

³⁴ See Eur. Comm'n Press Release, IP/22/4544, State Aid: Commission approves up to €5.4 billion of public support by fifteen Member States for an Important Project of Common European Interest in the hydrogen technology value chain, (July 2022), https://ec.europa.eu/commission/presscorner/detail/en/ip_22_4544 (last visited June 3, 2024).

³⁵ See Donato Di Carlo & Luuk Schmitz, Europe first? The rise of EU industrial policy promoting and protecting the single market, 30 J. OF EUR. PUB. POL'Y, 2063, 2087, (2023),

https://www.tandfonline.com/doi/full/10.1080/13501763.2023.2202684

³⁶ See IPCEI Hy2Infra Workstreams, https://competition-policy.ec.europa.eu/document/download/72658017-0480-4f7d-9675-cb4bf87136bc_en?filename=2024_IPCEI_Hy2Infra_workstreams_en.pdf&prefLang=de (last visited June 3, 2024).

³⁷ See Pierre Buigues & Khalid Sekkat, *Public Subsidies to Business: An International Comparison*, 11 J. of INDUS. COMPETITION, AND TRADE, 1-24,1

https://econpapers.repec.org/article/kapjincot/v_3a11_3ay_3a2011_3ai_3a1_3ap_3a1-24.htm (last visited on June 3, 2024).

³⁸ *See* infra p. 8.

 ³⁹ See Sylvain Kahn, Histoire de la construction de l'Europe depuis 1945, 53-74 (Dalloz Librairie ed., 2e édition 2021).
⁴⁰ See id. at 53.

⁴¹ See id. at 53-74.

⁴²See id. at 56.

"build Europe from the top down,"⁴³ but cooperation in certain key economic sectors laid the foundation for the community's development.⁴⁴ This legislation has since become well consolidated and established, enabling competition within the EU. We now question this long established balance with the new implementation of the IPCEIs regime.

The economists, Juhász, Lane, and Rodrik,⁴⁵ in a critical analysis of industrial policies, find that without targeted government aid, companies focus directly on productivity. Their study shows that discretionary government choices encouraging one firm over another have often produced significant long-term effects on the structure of economic activity.⁴⁶ They highlight two problems: governments' tendency not to let underperforming companies fail, and the creation of excessive market power given to selected companies, leading to lobbying and political influence, thus diverting government efforts into activities that enrich private interests rather than social progress.⁴⁷ While government subsidies can promote economies of scale across sectors, these generate only modest aggregate welfare gains.⁴⁸ The quantitatively weak effects are due to the inelasticity of demand.⁴⁹ Thus, European governments, by establishing a massive targeted aid system, risk creating highly concentrated markets without the ensuing demand. In a targeted subsidy system, richer EU countries favor specific companies capable of applying for the subsidies, and for which state intervention will have an artificial dominant position effect⁵⁰ Indeed, subsidies tend to be collected by the biggest market players, which increases concentration.⁵¹ The selective approach of granting massive aid could have the effect of creating powerful yet highly concentrated industries.

Through empirical analysis, economist Philippon found in 2019 that European markets were more competitive than U.S. markets.⁵² At the time, he found concentration in the EU to be stable, compared with increasing concentration in the U.S.⁵³ However, the aforementioned mechanism could upset this balance and potentially return us to a situation of industrial protectionism feared since the 1950s.

⁴³*See* Pierre Gerbet, *La construction de l'Europe*, 78, (Armand Colin ed., 4th édition, Collection U. Histoire contemporaine, Paris: Armand Colin, 2007).

⁴⁴See id. at 79.

⁴⁵See Réka Juhász ET AL., *The New Economics of Industrial Policy* (Nat'l Bureau of Econ. Rsch., Working Paper No. 31538, 2023).

⁴⁶*See id*. at 4.

⁴⁷*See id*. at 6.

⁴⁸See id. at 7.

⁴⁹*See id*. at 7.

⁵⁰*See id*. at 6.

⁵¹See id. at 11.

⁵²See Thomas Philippon, *The Great Reversal: How America Gave Up on Free Markets*, 97 (Harvard University Press, 1st ed. 2019).

⁵³See id. at 110.

In 2018, economists Carril and Duggan⁵⁴ analyzed the impact of market structure on competition and costs. They found that market concentration⁵⁵ leads to fewer competitive tenders and more government-guaranteed contracts.⁵⁶ Applying this logic developed by Carril, Rodrigo and Duggan, this new market structure of hydrogen, while primarily aimed at mitigating climate change and responding to international competition, may result in the creation of dominant companies. As Professor Wu⁵⁷ emphasizes, there is a "curse of bigness": companies that become dominant through targeted massive state aid, in addition to having the freedom to raise prices and provide poor services, are likely to build a power that truly escapes the competence or control of a state, thus posing a significant democratic threat.

IV. Conclusion

In conclusion, to foster a new green industry, it is paramount to create an accessible market. Indeed, as Professors Aghion, Bechtold, Cassar, and Herz highlighted in 2018, competition enhances growth, drives innovation and boosts productivity.⁵⁸ Without regulation on competition between states, the largest firms could dominate, leading to increased profits at the expense of suppressed wages and restricted opportunities for investment, innovation, and development.

However, it is crucial to acknowledge that a market cannot be competitive if it does not exist. While a concentrated market is preferable to the absence of a market, especially in the context of hydrogen production, it is wise not to discard all competition rules to foster its emergence. Interestingly, a group of scholars, including Juhász, Lane, and Rodrik have demonstrated that globally coordinated industrial policies can lead to substantial benefits and reduced protectionism.⁵⁹ Recognizing the EU's challenges compared to the U.S. underscores the importance of strategic policy alignment — internationally and within the internal EU market — to avoid stifling innovation and foster a more sustainable and economically competitive future.

https://www.jstor.org/stable/j.ctv1fx4h9c (last visited on June 3, 2024).

⁵⁴See Rodrigo Carril & Mark Duggan, *The impact of industry consolidation on government procurement: Evidence from Department of Defense contracting*, 184 J. OF PUB. ECON. 104-141,104 (2020).

⁵⁵See id. at 2. This article uses the defense industry as a case study.

⁵⁶Contracts that require the federal government to pay the contractor for all costs incurred, plus a mark-up.

⁵⁷See Tim Wu, The Curse of Bigness: Antitrust in the New Gilded Age, (Columbia Global Reports, 2018),

⁵⁸See Philippe Aghion et al., *The Causal Effects of Competition on Innovation: Experimental Evidence*, 34 THE J. OF LAW, ECON., AND ORG., 162-195, (2018), 162 (last visited June 3, 2024).

⁵⁹See Réka Juhász ET AL., "*The New Economics of Industrial Policy*," (Working Paper, Nat'l Bureau of Econ. Rsch., Working Paper No. 31538, 2023).