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21/2025 RESEARCH REPORT

Towards a progressive industrial policy for the Twin Transformation in the European Union

Synthesis Report

Werner Raza Vienna, December 2024



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ABBREVIATIONS

€	Euro
Bn	billion
CCS	Carbon Capture and Storage
CCU	Carbon Capture and Utilization
CINEA	European Climate, Infrastructure and Environment Agency
CRM	Critical Raw Materials
CRMA	European Critical Raw Materials Act
DARPA	Defense Advanced Research Projects Agency
EC	European Commission
ECA	European Chips Act
ECB	European Central Bank
EDG	European Green Deal
EDR	Energy Dependency Rate
EEA	European Environmental Agency EEA
EFSI	European Fund for Strategic Investments
EIB	European Investment Bank
EIC	European Innovation Council
ERC	European Research Council
ESG	Environmental, Social and Corporate Governance
ESM	European Stability Mechanism
EU	European Union
EU-ETS	EU Emission Trading System
EVs	Electric Vehicles
GBER	General Block Exemption Regulation
GDIP	Green Deal Industrial Plan
GDP	Gross Domestic Procut
GFC	Global Financial Crisis
GHGs	Greenhouse Gas Emissions
ICMs	Informal coordination mechanisms
ICT	Information and Communication Technologies
IEA	International Energy Agency
IP	Industrial Policy
IPCEIs	Important Projects of Common European Interest
IPRs	Intellectual Property Rights

JTM	Just Transition Mechanism
LNG	Liquified Natural Gas
MoU	Memorandum of Understanding
NECPs	National Energy and Climate Plans
NGEU	NextGenerationEU programme
NGOs	Non-Governmental Organizations
p.a.	per annum
PDA	Project Development Assistance
PEPP	Pandemic Emergency Purchase Programme
PoEs	Pockets of Efficiency
RRF	Recovery and Resilience Facility
SCF	Social Climate Fund
SGP	Stability and Growth Pact
SRMs	Strategic Raw Materials
TCF	Temporary Crisis Framework
TFEU	Treaty on the Functioning of the European Union
TJTPs	Territorial Just Transition Plans
TTCs	Twin Transformation Councils

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EXECUTIVE SUMMARY

Industrial Policy is back

After decades of marginalization, industrial policy (IP) is back on the political agenda. While this shift in economic policy discourse in principle is to be welcomed, from a progressive economic and political point of view, it is very important to carefully think about the why, how and for whom of industrial policy. What are the motivations for IP, which objectives shall be achieved, who should be the beneficiaries of IP, who shall sit at the table when it comes to taking decisions, and finally, who will be responsible for implementation? These are precisely the questions, that have motivated a research project, that ÖFSE – the Austrian Foundation for Development Research, has been conducting in cooperation with Arbeiterkammer Wien.

While the principal motivations for IP in the European Union, i.e., the climate crisis and the digital transformation, seem straightforward, many related critical issues remain unresolved and need to be addressed in the coming years. For, the concept of the Twin Transformation focusses on the complementarities between digital technologies and the green transformation. The intention is thus to exploit the potentials of the two processes for mutually supporting each other. Given the manifold dimensions of the two processes, there is however also space for conflicts and trade-offs between them, which will require political governance and management.

Bring the State back in

Given the magnitude of the challenges posed by the Twin Transformation, markets alone will not deliver on the required changes in time. In the face of significant externalities and coordination failures, the case for industrial policy is now also supported by the (liberal) economic mainstream. In line with the work of Mariana Mazzucato, the Twin Transformation will not only need public support as an addition to a market-driven transformation, but must be led by an entrepreneurial state. Successful IP requires a clear definition of objectives, responsibilities and instruments. Key requirements are effective state capacities, an organizational structure that provides for embeddedness and autonomy, societal support and private sector/civil society participation, as well as the continuous management of policy trade-off and (distributive) impacts.

Pronounced external dependencies of the EU

Against the backdrop of both an accelerating climate crisis and a rapidly deteriorating geopolitical environment, the current situation poses particular challenges to the European Union. For, the EU economy is relatively open and too heavily dependent on exports for economic growth. Its external dependencies on the import side relate in particular to energy (oil, gas), critical raw materials, as well as green & digital technologies and products. Since the outbreak of the war in Ukraine, its security dependence on NATO and the US, respectively, has become acute. The multi-level governance framework with a rather complex and variegated distribution of powers between Member States and the Union, as well as widely divergent state capacities amongst Member States render the EU ill-equipped to cope with emerging challenges.

A plethora of IP programs at EU and Member State level

In response to these challenges, the EU has embarked on a number of large industrial policy initiatives since the mid-2010s. These include, notably, the European Green Deal (EGD), the NextGenerationEU program with the €750 bn Recovery and Resilience Fund (RFF), the Re-PowerEU energy package, and a number of specific industrial policy initiatives, including the Important Projects of Common European Interests (IPCEIs), the European Chips Act, and the Green Deal Industrial Plan, amongst others. In particular the EGD represents a comprehensive

policy package, with a focus on meeting the EU's climate and environmental targets, via (i) carbon-pricing (ETS), (ii) financial support programs (e.g. InvestEU) and (iii) sector regulations.

The Status-Quo: a complex structure, uneven implementation, fragmented funding

A preliminary assessment of the EU IP landscape points to three major problems: Firstly, many initiatives at the expense of coherence and strategic outlook. Given the sequence of exogenous shocks and challenges hitting the EU since 2020, a plethora of programs and instruments have been enacted during the last five years. The result of this has been, secondly, a complex institutional structure with demanding processes: While the EGD was primarily approached with a focus on sector regulations and the deployment of price instruments, in particular carbon-pricing within the ETS, industrial policy in a more systematic way became prioritized as a consequence of the Pandemic and the Ukraine crisis. Most notably, besides the focus on energy security this triggered new efforts to promote green and digital technologies. The policy approach thus shifted to one favoring incentive mechanisms via grants and loans. In contrast to peer countries such as the US and Japan, given the EU institutional structure, the enacted subsidy programs and instruments are rather complex in nature, with a variegated distribution of competences between the EU and Member States in accordance with the EU acquis. As a consequence, policy coherence suffered and implementation has been uneven, critically depending on the institutional capacities of national bodies. Access to project financing is typically based on application and monitoring processes with strict formal conditionalities requiring significant upfront resources from applicants. Thirdly, the funding structure is characterized by fragmentation and intransparency. With the exception of NextGenerationEU as a temporary emergency funding mechanism, EU level funding remained circumscribed. It essentially consisted in reshuffling regular budgetary resources for the purposes of the Twin Transformation, which then went into diverse existing & new funds supplemented by NGEU money. Large disbursements of public resources happened at the level of Member States, particularly in those with significant fiscal power (e.g. Germany and France), while thanks to the NGEU the lack of own funds in most countries was temporarily remedied. Incentives for private investors via EU guarantees and co-funding under the de-risking approach as well as green finance reforms did raise money, but in overall quantitative terms, private investment for the Twin Transformation remained below expectation.

Tackling four major deficits of the current IP approach

Upon the basis of the changing geopolitical environment and a number of critical reports on the European economy (Letta Report, Draghi Report) published in Spring 2024, the strategic outlook of Twin Transformation policies has recently been reshaped by the new European Commission's focus on competitiveness and economic security. This poses a threat to reaching the EU's climate and environmental targets. Notwithstanding progress during the last five years, their attainment will require fresh and heightened ambition in the years to come. For a reinvigorated policy approach to the Twin Transformation, four deficits of the current approach will have to be tackled. These are:

(1) The lack of a coherent strategic outlook: The conceptual debate has meandered from decarbonization due to Paris commitments via resilience/security of supply motivations during Covid-19 to strategic autonomy and technological sovereignty due to the war in Ukraine and the rivalry with China. This had led to a proliferation of IP initiatives which are mostly ad-hoc and poorly coordinated. Trade-offs between policy objectives are not systematically considered. The recent shift to competitiveness is problematic, both on conceptual (supply-side approach, deregulation) and foreign policy terms (zero-sum logic, security dilemma). Instead, the conceptual basis for the Twin Transformation should be built upon a vision of "Defensive Regionalism", instead of offensive mercantilism as advocated by the Commission. EU economic development should become investment and wage-led.

- (2) The problem of legitimacy: The Twin Transformation process produces winners and losers. The mobilization of public support thus depends on three critical factors: (i) a common vision of change (grand narrative), (ii) voice & participation (input legitimacy); and 3) delivering on outcomes (output legitimacy). So far, the account on all three elements is lacking. Implementation of social support measures (Just Transition Programs, EU Social Fund) has been slow, and there is no coherent vision of a social compact necessary for securing long-term support for the Twin Transformation.
- (3) Multiple governance deficits: Public administrations in the EU lack IP expertise and capacities. Instead, they rely on the consulting industry. The EU innovation system promotes too little innovation as a consequence of deficient institutional structures. The lack of co-ordination between EU MS as well as between the MS level and the EU level results in parallel structures, where stronger MS pursue their own agendas. The directionality of public financial support for the corporate sector is lacking, with the potential of (social) conditionalities in the framework of funding agreements remaining unexploited.
- (4) The counterproductive macro-financial framework: with an investment gap of 2 % 4.5 % of EU GDP p.a., the (reformed) EU fiscal framework (SGP) is not fit for purpose given the investment needs of the Twin Transformation. The prevailing de-risking approach to private sector finance is not delivering, with Member State fiscal capacities being by and large insufficient to provide the requisite funding: The supporting role of monetary policy remains below capacity, with the ECB hesitating to promote green finance;

A progressive EU Twin Transformation Agenda

A central conclusion from our analysis is that implementing the Twin Transformation is first and foremost a political process. Thus, while in many areas, e.g. solar PV, wind turbines, batteries, heat pumps, electric vehicles, mature technological solutions already exist, the **major threats to the green and digital transformation have to do with economic, social and political risks**. While some of these risks, e.g. those emanating from increased geopolitical conflict or from global pandemics, are beyond the EU's direct sphere of influence, others such as e.g. political and social resistance or lack of resources, can be overcome by determined political action within the EU.

Given the profoundness of the required changes and its long-term nature, a successful Twin Transformation process will depend on promoting its legitimacy over the next 25 years. Evidently, this is easier said than done. Against the current background of multiple crises, which exacerbate societal anxieties, the challenge of the coming five years consists precisely in reinserting confidence both to citizens, workers and the business sector that the strategic agenda initiated with the European Green Deal needs not only to be maintained, but accelerated. This will place heavy demands on EU institutions and national governments. Both will have to balance the exigencies of the long-term strategic Twin Transformation agenda with those of managing more frequent short-term crisis situations. To perform this, governments will need enlarged capacities and capabilities. Nonetheless, even the most capable government will not be able to do all of that alone. The cooperation of social actors supporting the strategic trajectory of the Twin Transformation will be pivotal. As legitimacy forms the basis of the social bond between governments and the members of society, a reinvigoration of the Twin Transformation agenda will depend on mobilizing new sources of both input and output legitimacy. To this end, a policy agenda for the Twin Transformation, must be based upon the vision of a transformation society based on solidarity (see Figure). Such a vision must guarantee to all citizens that during the transformation period up to 2050 the social safety net will be kept intact and indeed expanded via a pan-European public services agenda fostering the foundational economy. The skills agenda proposed by the Commission in the Competitiveness Compass must be complemented by an active labor market policy guaranteeing the right to training to workers, and establishing the public sector as the employer of last resort. Upon this basis, six pillars encompass the critical policy areas for the Twin Transformation Agenda.



Pillar 1 focusses on enhancing spaces for participation. Deliberative democracy beyond institutionalized politics needs to be strengthened to allow citizens to co-shape the Twin Transformation. To this end, **European Citizen Assemblies** should be used to elaborate proposals for specific problem areas. Such inputs should be taken up by newly established **Twin Transformation Councils (TTCs)**, both at the level of Member States and the EU. TTCs are composed of members from EU institutions, national governments, and civil society including the corporate sector, trade unions, NGOs and academia. They (i) should strengthen horizontal & vertical coordination, (ii) make strategy adjustments and identify high-priority issues for implementation, and (iii) assess progress, identify and remediate problems.

Structural transformation processes as profound as the Twin Transformation will inevitably result in producing a significant number of winners and losers, including workers, companies and regions. Thus, **ensuring a fair distribution of benefits and costs represents Pillar 2.** The existing Just Transition Mechanism (JTM) will not suffice to remedy regional effects. So far program implementation has been slow, and the phase-out by end 2026 not only poses a risk to sustainable impact, but might deepen the already widespread frustration of rural populations. Given the long-term nature of the structural change processes affecting regions, stronger support mechanisms on a permanent basis are required. This could be achieved by putting the JTM on a permanent basis, and/or by expanding on the new Social Climate Fund. In any case, given severe bottlenecks, stronger implementation capacities at the national and regional level will be required.

Against the outlook of missing many of the EU's 2030 climate and environmental targets (including the key target of reducing GHG emissions by 55 %), **Pillar 3** must concentrate on **doubling-down on the Twin Transformation agenda**, with more ambitious action in six priority areas:

- (i) a stronger focus on reducing (fossil fuel) energy and material consumption by (i) promoting energy efficiency, and by (ii) accelerating the roll-out of the circular economy;
- (ii) a **massively scaled-up EU investment program into renewable energy**, with a focus on solar, wind, geothermal, and green hydrogen.
- (iii) an **EU mobility strategy** that prioritizes massive investments in railway infrastructure, supports electrified public transport at all territorial levels, and reduces private vehicle use via the promotion of car sharing and similar measures.
- (iv) an **EU strategic industries strategy** that defines which productive activities deserve special treatment under (i) security of supply considerations including disaster preparedness, and for (ii) closing innovation gaps in high-tech industries.
- (v) an **EU digital sovereignty strategy** that (ii) safeguards democratic control of the digital sphere via stringent regulation, and (ii) promotes forms of public digital infrastructures;
- (vi) a European food industry strategy with two focus areas: (1) unfair competitive practices, including on pricing and other contractual terms, should be subjected to stronger regulation; (2) The promotion of organic farming should be stepped up.

Pillar 4 underscores the need to promote an **EU governance framework based upon strong capacities & capabilities as well as agile stability**. Public institutions currently lack the capacities and (dynamic) capabilities to guide and manage the Twin Transformation effectively. What is more, when it comes to fostering innovation, the innovation agency landscape is characterized (i) by administrative overload, (ii) risk aversion and a lack of agile stability to promote radical innovation, and (iii) by a narrow understanding of innovation that prioritizes technological innovation over social innovation. Innovation governance thus needs to be improved, by e.g. (i) allowing for a more diverse set of stakeholder representation in governance bodies (e.g. boards, advisory committees), and (ii) by a stronger coordination of the innovation agency ecosystem across the EU, with the EC working towards revising mandates to allow for more diverse forms of innovation policy while accepting a higher risk of failure; and (ii) by reducing administrative requirements for both national implementing agencies and applicants, thus freeing up resources to promote learning and thematic interchange.

Pillar 5 focusses on the need to close the EU investment gap for the Twin Transformation. With respect to public investment, that would amount to annual amount of €180 bn to € 400 bn. Instead of doubling-down on the prevailing, but disappointing de-risking approach by pushing for a full European Capital Markets Union, as proposed by the Commission, the more efficient strategy consists in setting up a **three-tiered public funding structure**, including (i) **an EU Transformation Fund**, with a capitalization of 1 % of EU GDP over a ten-year time period raised through common EU borrowing, (ii) an **increased EU budget for the next MFF** period starting in 2028 (via e.g. a mix of more ETS resources, and new EU taxes), and (iii) **ECB monetary financing** (e.g. asset purchases of green bonds).

Last but not least, given the high level of external dependencies, the EU will need a new approach to cooperate with partner countries, in particular in the Global South, on a global Twin Transformation (**Pillar 6**). Given changing global political power relations and a weakened EU position, the EU must base its external relations on equal partnerships and mutual benefit-sharing. This will in particular entail ii) **strict adherence to and comprehensive application of the highest ESG standards** for mining and production activities, (ii) **EU support for technology transfer and the build-up of a processing industry and value chain in producer countries**, including through skills development for the domestic workforce and R&D cooperation programs with the EU; and (iii) **fair-benefit sharing** with respect to mining/exploration contracts and pricing mechanisms. Based upon a realist analysis of the importance of Chinese green technology for the timely implementation of the green transformation in particular, maintaining cooperative bilateral relations with China will be pivotal.

ZUSAMMENFASSUNG

Das Comeback der Industriepolitik

Nach Jahrzehnten der Marginalisierung steht die Industriepolitik (IP) wieder auf der politischen Tagesordnung. Während diese Verlagerung des wirtschaftspolitischen Diskurses grundsätzlich zu begrüßen ist, ist es aus arbeitnehmerorientierter, wirtschaftlicher und politischer Sicht sehr wichtig, sorgfältig darüber nachzudenken, warum, wie und für wen Industriepolitik betrieben wird. Was sind die Beweggründe für IP, welche Ziele sollen erreicht werden, wer sollen die Nutznießer:innen von IP sein, wer soll mit am Tisch sitzen, wenn es darum geht, Entscheidungen zu treffen, und schließlich, wer ist für die Umsetzung verantwortlich? Genau diese Fragen waren der Anlass für ein Forschungsprojekt, das die ÖFSE (Österreichische Forschungsstiftung für Internationale Entwicklung) in Zusammenarbeit mit der Arbeiterkammer Wien durchgeführt hat.

Während die Hauptmotivationen für IP in der Europäischen Union, d.h. die Klimakrise und die digitale Transformation, eindeutig zu sein scheinen, bleiben viele damit verbundene kritische Fragen ungelöst und müssen in den kommenden Jahren angegangen werden. Das Konzept der doppelten Transformation konzentriert sich nämlich auf die Komplementarität zwischen digitalen Technologien und der grünen Transformation. Es geht darum, die Potenziale beider Prozesse zu nutzen, um sich gegenseitig zu unterstützen. Angesichts der vielfältigen Dimensionen der beiden Prozesse gibt es jedoch auch Raum für Zielkonflikte zwischen ihnen, die eine politische Steuerung erfordern.

Den Staat zurück ins Spiel bringen

Angesichts des Ausmaßes der mit der doppelten Transformation verbundenen Herausforderungen werden die Märkte allein die erforderlichen Veränderungen nicht rechtzeitig herbeiführen können. Angesichts von erheblichen externen Effekten und weitverbreiteten Koordinationsversagens wird aktive Industriepolitik nun auch vom (liberalen) wirtschaftlichen Mainstream unterstützt. Aufbauend auf den Erkenntnissen der neueren Forschung, insbesondere von Mariana Mazzucato, ist es wichtig zu erkennen, dass die doppelte Transformation nicht nur öffentliche Unterstützung als Ergänzung zu einer marktgesteuerten Transformation benötigt, sondern von einem unternehmerischen Staat aktiv betrieben werden muss. Eine erfolgreiche IP erfordert eine klare Definition von Zielen, Verantwortlichkeiten und Instrumenten. Zentrale Voraussetzungen dafür sind effektive staatliche Kapazitäten, gesellschaftliche Unterstützung und die Beteiligung des Privatsektors/der Zivilgesellschaft sowie das kontinuierliche Management von politischen Kompromissen und Verteilungswirkungen.

Ausgeprägte externe Abhängigkeiten der EU

Vor dem Hintergrund einer sich beschleunigenden Klimakrise und eines sich rapide verschlechternden geopolitischen Umfelds stellt die aktuelle Situation die Europäische Union vor besondere Herausforderungen. Denn die EU-Wirtschaft ist stark exportorientiert und relativ offen. Ihre externe Abhängigkeit auf der Importseite bezieht sich insbesondere auf Energie (Öl, Gas), kritische Rohstoffe sowie grüne und digitale Technologien und Produkte. Auf der Exportseite hängt das Wachstumsmodell vom offenen Weltmarktzugang ab, insbesondere zu den großen Volkswirtschaften USA und China. Seit dem Ausbruch des Krieges in der Ukraine ist die sicherheitspolitische Abhängigkeit der EU von der NATO bzw. den USA akut geworden. Der bestehende Multi-Level-Governance-Rahmen mit seiner komplexen Kompetenzverteilung zwischen den Mitgliedstaaten und der Union sowie stark voneinander abweichenden staatlichen Kapazitäten in den einzelnen Mitgliedstaaten erschwert die Bewältigung der neuen Herausforderungen.

Eine Fülle von IP-Programmen auf EU- und Mitgliedstaatsebene

Um auf die aktuellen Herausforderungen zu reagieren, hat die EU seit Mitte der 2010er Jahre eine Reihe industriepolitischer Initiativen auf den Weg gebracht. Dazu gehören insbesondere der Europäische Green Deal (EGD), das NextGenerationEU-Programm mit dem 750-Mrd.-Euro-Fonds für Konjunkturbelebung und Widerstandsfähigkeit (RFF), das RePowerEU-Ener-giepaket und eine Reihe spezifischer industriepolitischer Initiativen, darunter die wichtigen Projekte von gemeinsamem europäischem Interesse (IPCEI), die Europäische Chip-Gesetzgebung und der Green-Deal-Industrieplan, um nur einige zu nennen. Insbesondere der EGD stellt ein umfassendes Paket dar, das sich auf die Erreichung der Klima- und Umweltziele der EU konzentriert, und zwar vor allem über (i) Kohlenstoffpreise (ETS), (ii) finanzielle Unterstützungsprogramme (z. B. InvestEU) und (ii) sektorale Regelungen.

Status-Quo: komplexe Struktur, uneinheitliche Umsetzung, fragmentierte Finanzierung

Eine vorläufige Bewertung der EU-Programm- und Politiklandschaft weist auf drei Hauptprobleme hin. Erstens, viele Initiativen auf Kosten von Kohärenz und strategischer Perspektive. Angesichts der Abfolge exogener Schocks und Herausforderungen, mit denen die EU seit 2020 konfrontiert ist, wurde in den letzten fünf Jahren eine Fülle von Programmen und Instrumenten aufgelegt. Das Ergebnis ist zum einen ein komplexes institutionelles Gefüge mit anspruchsvollen Prozessen: Während der EGD in erster Linie sektorale Regulierungen und den Einsatz von Preisinstrumenten, insbesondere der Kohlenstoffbepreisung im Rahmen des ETS, fokussierte, wurde als Folge der Pandemie und der Ukraine-Krise die Industriepolitik in systematischerer Weise priorisiert. Neben der Konzentration auf die Energiesicherheit löste dies vor allem neue Anstrengungen zur Förderung grüner und digitaler Technologien aus. Der politische Ansatz verlagerte sich daher auf Anreizmechanismen in Form von Zuschüssen und Darlehen. Im Gegensatz zu vergleichbaren Ländern wie den USA und Japan sind die Förderprogramme und -instrumente in der EU aufgrund ihrer institutionellen Struktur recht komplex, wobei die Zuständigkeiten zwischen der EU und den Mitgliedstaaten gemäß den kompetenzrechtlichen Vorgaben verteilt sind. Infolgedessen litt die politische Kohärenz, und die Umsetzung verlief uneinheitlich, da sie von den jeweiligen institutionellen Kapazitäten der nationalen Stellen abhängt. Der Zugang zur Projektfinanzierung basiert in der Regel auf Antrags- und Monitoring-Verfahren mit strengen formalen Auflagen, die den Antragstellern erhebliche Vorleistungen abverlangen. Drittens ist die Finanzierungsstruktur durch Zersplitterung und starke Ungleichheiten gekennzeichnet. Mit Ausnahme von NextGenerationEU als temporärem Notfall-Finanzierungsmechanismus blieb die Finanzierung auf EU-Ebene begrenzt. Sie bestand im Wesentlichen darin, reguläre Haushaltsmittel für die Zwecke der doppelten Transformation umzuschichten, die dann in verschiedene bestehende und neue Fonds flossen, die durch NGEU-Gelder ergänzt wurden. Auf der Ebene der Mitgliedstaaten wurden umfangreiche öffentliche Mittel ausgezahlt, vor allem in den Ländern mit großer Finanzkraft (z. B. Deutschland und Frankreich), während der Mangel an Eigenmitteln in den meisten anderen Ländern dank der NGEU Gelder vorübergehend behoben wurde. Anreize für private Investoren durch EU-Garantien und Kofinanzierung im Rahmen des De-Risking-Ansatzes sowie die Förderung eines grünen Kapitalmarkts brachten zwar Geld in die Kasse, aber insgesamt blieben die privaten Investitionen für die doppelte Transformation hinter den Erwartungen zurück.

Beseitigung der vier größten Defizite des derzeitigen IP-Konzepts

Auf der Grundlage des sich verändernden geopolitischen Umfelds und einer Reihe von kritischen Berichten über den Zustand der europäischen Wirtschaft (Letta-Bericht, Draghi-Bericht), die im Frühjahr 2024 veröffentlicht wurden, wird die strategische Ausrichtung der doppelten Transformation derzeit durch den Fokus der neuen Europäischen Kommission auf Wettbewerbsfähigkeit und wirtschaftliche Sicherheit umgestaltet. Dies stellt eine Gefahr für die Erreichung der Klima- und Umweltziele der EU dar. Ungeachtet der Fortschritte in den letzten fünf Jahren wird die Erreichung dieser Ziele in den kommenden Jahren neue und ehrgeizigere Anstrengungen erfordern. Für einen erneuerten wie auch dynamischeren Ansatz zur Gestaltung der doppelten Transformation müssen vier zentrale Defizite der bestehenden Politik angegangen werden. Diese sind:

- (1) Das Fehlen einer kohärenten strategischen Perspektive: Die konzeptionelle Debatte hat sich von der Dekarbonisierung aufgrund der Pariser Verpflichtungen über Resilienz-/Versorgungssicherheitsmotivationen während Covid-19 bis hin zu strategischer Autonomie und technologischer Souveränität aufgrund des Krieges in der Ukraine und der Rivalität mit China entwickelt. Dies hat zu einer Vielzahl von Initiativen geführt, die meist ad hoc und schlecht koordiniert sind. Abwägungen zwischen politischen Zielen werden nicht systematisch vorgenommen. Die jüngste Verlagerung auf die Wettbewerbsfähigkeit ist sowohl in konzeptioneller Hinsicht (angebotsseitiger Ansatz, Deregulierung) als auch in Bezug auf die Außenpolitik (Nullsummenlogik, Sicherheitsdilemma) problematisch. Stattdessen sollte die konzeptionelle Grundlage für die doppelte Transformation auf der Vision eines "defensiven Regionalismus", und nicht auf dem von der Kommission befürworteten offensiven Merkantilismus beruhen. Ökonomische Entwicklungsimpulse sollten auf einer Investitionsoffensive und einer produktivitätsorientierten Lohnpolitik beruhen.
- (2) Das Problem der Legitimität: Die doppelte Transformation wird Gewinner: und Verlierer:innen hervorbringen. Die Mobilisierung öffentlicher Unterstützung hängt daher von drei entscheidenden Faktoren ab: (i) einer gemeinsamen Vision des Wandels, (ii) Mitsprache und Beteiligung (Input-Legitimität), und 3) das Erzielen von Ergebnissen (Output-Legitimität). Bislang bleiben alle drei Elementen unterentwickelt. Die Umsetzung sozialer Unterstützungsmaßnahmen (Programme für einen gerechten Übergang, Sozialer Klimafonds) verlief bislang schleppend, und es gibt keine kohärente Vision eines Sozialpakts, der notwendig wäre, um die langfristige Unterstützung für die doppelte Transformation zu sichern.
- (3) **Vielfältige Defizite in der Verwaltung:** Den öffentlichen Verwaltungen in der EU fehlt es an Fachwissen und Kapazitäten für Industriepolitik. Stattdessen bestehen große Abhängigkeiten von der Consulting-Branche. Das EU-Innovationssystem fördert zu wenig Innovation als Folge mangelhafter institutioneller Strukturen. Die mangelnde Koordinierung zwischen den EU-Mitgliedstaaten sowie zwischen den Mitgliedstaaten und der EU-Ebene führt zu Parallelstrukturen, in der die stärkeren Mitgliedstaaten ihre eigene Agenda verfolgen. Die Direktionalität der öffentlichen finanziellen Unterstützung für den Unternehmenssektor ist unzureichend, wobei das Potenzial von (sozialen) Konditionalitäten im Rahmen von Finanzierungsvereinbarungen weitgehend ungenutzt bleibt.
- (4) Der kontraproduktive makrofinanzielle Rahmen: Mit einer Investitionslücke von 2 bis 4,5 % des EU-BIP pro Jahr ist der (reformierte) finanzpolitische Rahmen der EU (SWP) angesichts des Investitionsbedarfs der doppelten Transformation kontraproduktiv. Der vorherrschende De-Risking-Ansatz für die Mobilisierung von privaten Finanzmitteln ist unter den Erwartungen geblieben. Die fiskalischen Kapazitäten der Mitgliedstaaten sind zu gering, um die erforderlichen Mittel bereitzustellen: Die Rolle der Geldpolitik ist unterentwickelt, und die EZB ist bislang nicht zu einer entschlossenen Förderung grüner Finanzierungen bereit.

Eine progressive EU-Agenda für die doppelte Transformation

Eine zentrale Schlussfolgerung aus unserer Analyse ist, dass die Umsetzung der doppelten Transformation in erster Linie ein politischer Prozess ist. Während in vielen Bereichen, z. B. Photovoltaik, Windkraftanlagen, Batterien, Wärmepumpen, Elektrofahrzeuge, bereits ausgereifte technologische Lösungen existieren, liegen die größten Gefahren für die grüne und digitale Transformation in den wirtschaftlichen, sozialen und politischen Risiken. Während einige dieser Risiken, z. B. diejenigen, die von zunehmenden geopolitischen Konflikten oder globalen Pandemien ausgehen, außerhalb des direkten Einflussbereichs der EU liegen, können andere, wie z. B. politischer und sozialer Widerstand oder fehlende Finanzmittel, durch entschlossenes politisches Handeln innerhalb der EU überwunden werden.



In Anbetracht des Umfangs der erforderlichen Veränderungen und des langfristigen Charakters des Prozesses hängt der Erfolg der Transformation davon ab, dass seine Legitimität in den nächsten 25 Jahren gefördert wird. Dies ist offensichtlich leichter gesagt als getan. Vor dem aktuellen Hintergrund zahlreicher Krisen, welche gesellschaftliche Ängste verschärfen, besteht die Herausforderung der kommenden fünf Jahre darin, den Bürger:innen, Arbeitnehmer:innen und dem Unternehmenssektor wieder das Vertrauen zu vermitteln, dass die mit dem Europäischen Green Deal eingeleitete strategische Agenda nicht nur fortgeführt, sondern beschleunigt werden muss. Dies wird hohe Anforderungen an die EU-Institutionen und die nationalen Regierungen stellen. Beide werden die Erfordernisse der langfristigen strategischen Agenda der doppelten Transformation mit denen der Bewältigung häufigerer kurzfristiger Krisensituationen in Einklang bringen müssen. Um dies zu bewerkstelligen, werden die Regierungen erweiterte Kapazitäten und Fähigkeiten benötigen. Doch selbst die fähigste Regierung wird nicht in der Lage sein, all dies allein zu tun. Die Zusammenarbeit der gesellschaftlichen Akteure, welche die doppelte Transformation unterstützen, wird von zentraler Bedeutung sein. Da Legitimität die Grundlage für die soziale Bindung zwischen den Regierungen und den Mitgliedern der Gesellschaft bildet, ist eine Wiederbelebung der Transformationsagenda von der Mobilisierung neuer Quellen der Input- und Output-Legitimität abhängig. Zu diesem Zweck muss eine politische Agenda für die doppelte Transformation auf der Vision einer solidarischen Transformationsgesellschaft beruhen (siehe Abbildung). Eine solche Vision muss allen Bürgerinnen und Bürgern garantieren, dass das soziale Sicherheitsnetz während des Transformationszeitraums bis 2050 intakt bleibt und durch eine paneuropäische Agenda für öffentliche Dienstleistungen, sogar erweitert wird. Die von der Kommission im Kompass für Wettbewerbsfähigkeit vorgeschlagene Qualifizierungsagenda muss durch eine aktive Arbeitsmarktpolitik ergänzt werden, die den öffentlichen Sektor als Arbeitgeber der letzten Instanz etabliert. Auf dieser Grundlage umfassen sechs Säulen die entscheidenden Politikbereiche für die Agenda für die doppelte Transformation.

Säule 1 konzentriert sich auf die Verbesserung der Partizipationsmöglichkeiten. Die deliberative Demokratie jenseits der institutionalisierten Politik muss gestärkt werden, um den Bürger:innen die Möglichkeit zu geben, die Transformation mitzugestalten. Zu diesem Zweck sollten Europäische Bürger:innenräte genutzt werden, um Vorschläge für bestimmte Problembereiche zu erarbeiten. Solche Beiträge sollten von den neu eingerichteten Räten für die doppelte Transformation (Twin Transformation Councils, TTCs) aufgegriffen werden, sowohl auf der Ebene der Mitgliedstaaten als auch auf der Ebene der EU. Die TTCs setzen sich aus Mitgliedern der EU-Institutionen, der nationalen Regierungen und der Zivilgesellschaft einschließlich des Unternehmenssektors, der Gewerkschaften, der NROs und der Wissenschaft zusammen. Sie sollen (i) die horizontale und vertikale Koordinierung verstärken, (ii) Strategieanpassungen vornehmen und Themen mit hoher Priorität für die Umsetzung identifizieren und (iii) Fortschritte bewerten sowie Probleme identifizieren und beheben.

Strukturelle Transformationsprozesse, die so tiefgreifend sind wie die doppelte Transformation, werden unweigerlich zu einer beträchtlichen Anzahl von Gewinner:innen und Verlierer:innen führen, darunter Arbeitnehmer:innen, Unternehmen und Regionen. Die Gewährleistung einer gerechten Verteilung von Nutzen und Kosten bildet daher **Säule 2**. Der bestehende "Just Transition Mechanism" (JTM) wird nicht ausreichen, um negative regionale Auswirkungen zu beheben. Bisher wurde das Programm nur langsam umgesetzt, und der geplante Ausstieg bis Ende 2026 stellt nicht nur ein Risiko für die nachhaltige Wirkung dar, sondern könnte die bereits weit verbreitete Frustration der ländlichen Bevölkerung noch verstärken. Angesichts des langfristigen Charakters der strukturellen Veränderungsprozesse in den Regionen sind daher stärkere und dauerhafte Unterstützungsmechanismen erforderlich. Dies könnte erreicht werden, indem der JTM auf eine dauerhafte Basis gestellt wird und/oder indem die Sozial- und Kohäsionsfonds (inkl. des neuen Social Climate Fund) erweitert wird. In jedem Fall sind auch stärkere öffentliche Umsetzungskapazitäten auf nationaler und regionaler Ebene erforderlich.

Angesichts der Aussicht, viele der Klima- und Umweltziele der EU für 2030 zu verfehlen (einschließlich des Ziels, die Treibhausgasemissionen um 55 % zu senken), muss sich **Säule 3** auf die beschleunigte Umsetzung der Transformationsagenda konzentrieren, mit ehrgeizigeren Maßnahmen in sechs vorrangigen Bereichen:

- (i) eine stärkere Konzentration auf die Verringerung des Energie- und Materialverbrauchs durch (i) die Förderung der Energieeffizienz und (ii) die beschleunigte Einführung der Kreislaufwirtschaft;
- (ii) ein **massiv aufgestocktes EU-Investitionsprogramm** für erneuerbare Energien mit Schwerpunkt auf Solar- und Windenergie, Geothermie und grünem Wasserstoff.
- (iii) eine EU-Mobilitätsstrategie, die massiven Investitionen in die Eisenbahninfrastruktur Vorrang einräumt, elektrifizierte öffentliche Verkehrsmittel auf allen territorialen Ebenen unterstützt und die Nutzung privater Fahrzeuge durch die Förderung von Carsharing und ähnlichen Maßnahmen reduziert.
- (iv) eine strategische EU-Industriestrategie, die festlegt, welche produktiven T\u00e4tigkeiten unter (i) dem Aspekt der Versorgungssicherheit, einschlie\u00dflich der Katastrophenvorsorge, und (ii) der Schlie\u00dfung von Innovationsl\u00fccken in Hochtechnologiebranchen eine besondere Behandlung verdienen.
- (v) eine EU-Strategie f
 ür digitale Souver
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 ät, die (ii) die demokratische Kontrolle der digitalen Sph
 äre durch strenge Regulierung sicherstellt und (ii) Formen
 öffentlicher digitaler Infrastrukturen f
 ördert;

(vi) eine Transformationsagenda für die europäische Lebensmittelindustrie mit zwei Schwerpunkten: (1) unlautere Wettbewerbspraktiken, auch bei der Preisgestaltung und anderen Vertragsbedingungen, sollten einer strengeren Regulierung unterworfen werden; (2) die Förderung des ökologischen Landbaus sollte intensiviert werden.

Säule 4 unterstreicht die Notwendigkeit, einen EU-Governance-Rahmen zu fördern, der auf starken Kapazitäten und Fähigkeiten sowie auf agiler Stabilität beruht. Öffentlichen Einrichtungen fehlen derzeit die Kapazitäten und (dynamischen) Fähigkeiten, um die doppelte Transformation wirksam zu steuern und zu verwalten. Darüber hinaus ist das System an Innovationsagenturen in der EU gekennzeichnet durch (i) administrative Überlastung, (ii) Risikoscheu und einen Mangel an agiler Stabilität, um radikale Innovationen zu fördern, und (iii) durch ein enges Verständnis von Innovation, das technologischen Innovationen Vorrang vor sozialen Innovationen einräumt. Die Innovations-Governance muss daher verbessert werden, indem z. B. (i) eine vielfältigere Vertretung der Interessengruppen in den Entscheidungsgremien (z. B. Vorständen, beratenden Ausschüssen) ermöglicht wird und (ii) das Ökosystem der Innovationsagenturen EU-weit stärker koordiniert wird, wobei die Europäische Kommission auf eine Überarbeitung der Mandate hinwirken sollte, um vielfältigere Formen der Innovationspolitik zu ermöglichen und dabei ein höheres Risiko des Scheiterns in Kauf zu nehmen: und (ii) indem die administrativen Anforderungen sowohl für die nationalen Durchführungsagenturen als auch für die Antragsteller verringert werden, wodurch Ressourcen zur Förderung des Lernens und des thematischen Austauschs frei werden.

Säule 5 konzentriert sich auf die Notwendigkeit, die EU-Investitionslücke für die doppelte Transformation zu schließen. Bei den öffentlichen Investitionen würde sich dies auf einen jährlichen Betrag von 180 bis 400 Mrd. EUR belaufen. Anstatt wie von der Kommission vorgeschlagen, den vorherrschenden, aber enttäuschenden De-Risking-Ansatz auszubauen und auf eine vollständige europäische Kapitalmarktunion zu drängen, besteht die effizientere Strategie darin, eine dreistufige öffentliche Finanzierungsstruktur einzurichten, einschließlich (i) eines EU-Transformationsfonds mit einer Kapitalausstattung von 1 % des EU-BIP über einen Zeitraum von zehn Jahren, basierend auf gemeinsamer EU Verschuldung, (ii) eine Aufstokkung des EU-Haushalts für den nächsten MFR-Zeitraum ab 2028 (z. B. durch eine Mischung aus mehr EHS-Mitteln und neuen EU-Steuern) und (iii) eine verstärkte monetäre Finanzierung grüner Investitionen durch die EZB (z. B. durch den Ankauf von grünen Anleihen).

Nicht zuletzt wird die EU im Lichte der starken externen Abhängigkeiten einen neuen Ansatz für die Zusammenarbeit mit Partnerländern, insbesondere im globalen Süden, im Rahmen einer globalen doppelten Transformation benötigen (**Säule 6**). Angesichts sich verändernder weltpolitischer Machtverhältnisse und einer geschwächten europäischen Position auf der Weltbühne muss die EU ihre Außenbeziehungen auf gleichberechtigte Partnerschaften und gegenseitigen Vorteilsausgleich gründen. Dazu gehören insbesondere ii) die strikte Einhaltung und umfassende Anwendung der höchsten ESG-Standards für Bergbau- und Produktionstätigkeiten europäischer Unternehmen im Ausland, ii) die Unterstützung der EU für den Technologietransfer und den Aufbau einer Verarbeitungsindustrie bzw. einer Wertschöpfungskette in den Erzeugerländern, unter anderem durch die Qualifizierung der einheimischen Arbeitskräfte und wissenschaftlich-technologische Kooperationsprogramme mit der EU, und iii) eine faire Verteilung der Gewinne aus Bergbau-/Explorationsverträge und eine faire Preisgestaltung. Auf der Grundlage einer realistischen Analyse der Bedeutung chinesischer grüner Technologie für die rasche Umsetzung der grünen Transformation wird vor allem die Aufrechterhaltung kooperativer bilateraler Beziehungen mit China von zentraler Bedeutung sein.

1. INTRODUCTION

Industrial policy (IP) is back. This renaissance is perhaps surprising. During the neo-liberal period of the last 30 years industrial policy was completely banned from economic discourse, though of course it took place under different labels, e.g. innovation and technology policy. While this shift in economic policy discourse in principle is to be welcomed, from a progressive economic and political point of view, it is very important to carefully think about the why, how and for whom of industrial policy. What are the motivations for IP, which objectives shall be achieved, who should be the beneficiaries of IP, who shall sit at the table when it comes to taking decisions, and finally, who will be responsible for implementation? These are precisely the questions, that have motivated this report and the underlying project, that ÖFSE – the Austrian Foundation for Development Research, has been conducting in cooperation with Arbeiterkammer Wien (the Chamber of Labour of Vienna), during the last year.

While the principal motivations for IP in the European Union, i.e., the climate crisis and the digital transformation, seem straightforward, many related critical issues remain unresolved and need to be addressed in the coming years.¹ For, the concept of the Twin Transformation focusses on the complementarities between digital technologies and the green transformation. The intention is thus to exploit the potentials of the two processes for mutually supporting each other. Given the manifold dimensions of the two processes, there is however also space for conflicts and trade-offs between them, which will require political governance and management. IP will have to play an important role in addressing both complementarities and trade-offs.

Since the start of the Russian aggression against Ukraine, geopolitical changes have become an important motivating factor of industrial policy in the EU. The rivalry between the US and China, and most recently the confrontational policies of the second Trump administration against Europe have made it clear that the age of the liberal international order from which the EU profited so tremendously, has come to an end. As things stand at this moment, the EU is arguably ill-prepared for the upcoming age of geopolitical competition and transactional politics. Against pressures emanating both from the international level as well as from domestic politics in the form of rising nationalist-populist political movements, the EU will have to fundamentally revamp its political and economic strategy in the years to come. In the political domain, political integration will have to be strengthened, including in the area of external and security policy. In the economic domain, a much stronger and pro-active role of the state will be required to increase the resilience of the EU productive system, reduce excessive external dependencies, and mobilize the necessary financial and administrative capacities and capabilities to promote the Twin Transformation. In the social domain, the safeguarding of social and regional cohesion amidst turbulent times will become even more important. Industrial policy will undoubtedly acquire a critical role in coping with these multiple challenges.

These are precisely the issues that are discussed in this report. The underlying intention is to stimulate a debate between progressive scholars, trade unions, civil society, and policy-makers at national and EU levels. For this purpose, in its last section the report outlines a policy agenda for the design of EU Industrial Policy for the medium-term future, that will hopefully support the work of trade unions as well as of progressive civil society in the period up to 2030.

¹ In the academic and policy literature, both the terms "transition" and "transformation" are often used interchangeably. While not being mutually exclusive, the term "transition" implies adaptation within existing frameworks, seen as a process of gradual improvement. Thus, it tends to downplay the profoundness of the required changes to social and economic life, as well as to institutional frameworks (Hölscher, Wittmayer, and Loorbach 2018). In the report we will use the term "transformation", unless we reference documents that explicitly use the term "transition".

Before we delve into an in-depth discussion on IP in subsequent sections, it is necessary to conduct a short assessment of where the EU stands with respect to both processes, i.e. the green and digital transformation, which we will discuss in turn.

Implementing the green transformation

By way of implementing the EU's obligations under the Paris Climate Agreement, the EU has passed the European Climate law package in June 2020 (Regulation (EU) 2021/1119). The law stipulates that Europe's economy and society will become climate-neutral by 2050. The law also sets the intermediate target of reducing net greenhouse gas emissions (GHGs) by at least 55 % by 2030, compared to 1990 levels. As stipulated by the law, in February 2024 the Commission has recommended a second intermediate target to reduce net GHG emissions by at least 90 % by 2040 relative to 1990. As of yet, legal codification of this target is still pending. Climate neutrality by 2050 means achieving net zero greenhouse gas emissions for EU countries as a whole, mainly by cutting emissions, investing in green technologies and protecting the natural environment.

Relative to 1990, by the end of 2022 GHG emissions had been reduced by 32.5 % (EEA data). Preliminary data suggest a further 8 % drop of CO2 emissions in 2023 (CREA 2024). Many factors and policies, such as the increased share of renewables as well as energy efficiency improvements, have contributed to lowering GHG emissions in the EU. In the past three decades, most sectors in the EU reduced their GHG emissions. The notable exceptions are transport and, more recently, agriculture. Though the European Environmental Agency (EEA) expects GHG emissions to decrease steadily over the coming years, it is estimated that EU GHG emissions in 2030 will be only 47 % lower than in 1990 under a 'with additional measures' scenario, i.e. a scenario that already includes measures that EU member states are planning to implement in the years to come. In other words, additional efforts above and beyond what is currently planned will be necessary to reach the 2030 target of a 55 % reduction. By way of illustration, the RePowerEU Energy Strategy stipulates a target of 750 GW of Solar PVs to be installed by 2030. Member States' National Energy and Climate Plans (NECPs), as revised in 2023, only add up to a combined 687 GW by 2030, thus indicating a gap of 63 GW, that will have to be closed via efforts going beyond what is currently planned. In contrast, the growth of Solar PV deployment in 2024 has slowed compared to the 2021–2023 period, and annual growth rates are projected to remain at a moderate 3 % - 7 % in the period up to 2028 (Solar-Power Europe 2024). Also with respect to reaching the proposed 2040 GHG reduction target, studies show that while technically feasible, reaching the 90 % reduction target will require massive expansion of renewable electricity generation, drastic reductions in fossil-fuel use, energy efficiency measures and deep electrification of end-use sectors during the 2030s (Heussaff et al. 2024).

Besides GHG emission reductions, the EU faces massive challenges in the areas of biodiversity, land use and material consumption. Europe's biodiversity continues to decline at an alarming rate, with three-fourths of habitats assessed showing poor or bad conservation status. By the end of 2022, protected areas covered 26.1 % of European Union land, with 18.6 % of EU land designated as Natura 2000 sites and 7.5 % under other complementary national designations. The EU biodiversity strategy for 2030 sets out a target of protecting at least 30 % of EU land by 2030. While the area reported as protected since 2011 has increased by 1.8 %points, growth has stalled in the last years.²

With respect to material consumption, although since 2010 the EU's material footprint has remained relatively stable at 6.1 billion tons in 2020, this level of consumption is not sustainable and is higher than the global average. Increasing the circular material use rate would reduce

² See EEA Biodiversity website at: <u>https://www.eea.europa.eu/en/topics/in-depth/biodiversity?activeTab=fa515f0c-9ab0-493c-b4cd-58a32dfaae0a</u> (accessed 30 December 2024).

the extraction of natural resources and related environmental impacts. In 2021, recycled material accounted for 11.7 % of the material used, an increase of less than one percentage point since 2010. Progress has thus been slow and the EEA assesses the likelihood for achieving the stated objective of doubling the circularity rate by 2030 to be low (EEA 2024).

In sum, while during the last five years progress has been made in many areas, effectively implementing the EU's climate and ecological agenda will necessitate significant additional efforts relative to the EU's (and Member States) current level of commitments. In fact, a recent study found that of the 154 EU Green Deal targets, 32 are currently 'on track' and 64 are identified as 'acceleration needed', meaning that they are working but more progress is needed to meet the targets on time. Fifteen of the targets are found to be 'not progressing' or 'regressing', and for 43 of the targets no data are currently available (European Commission 2025b). Thus, in many critical areas the EU is likely to fail its 2030 targets (see also overview assessment of Figure 1.1.). Given the current political fatigue in all matters ecological, mostly as a consequence of corporate lobbying and far-right propaganda, the coming years will need to see a reinvigoration of the green transformation agenda. For, notwithstanding the momentum built-up since 2020, the green transformation is a long-term process. With climate change underway, climate science has provided clear-cut evidence that any further postponing of action will increase the economic costs of climate mitigation in the future by a multiple. Above all else, it will take a heavy toll on human life, that could have been entirely avoided (Drever 2024; Waidelich et al. 2024).

Implementing the digital transformation

While the green transformation is legitimized by the simple fact that without the required changes to our ways of production and consumption, life on Planet Earth might eventually face extinction, the rationale for the digital transformation is primarily social and economic in nature. Scientific progress has generated new technologies, including telecommunications, robotics, digital platforms, artificial intelligence, or cloud computing, that have become pervasive features of modern life, and thus increasingly transform both production and consumption models across the world. As such, the digital transformation might best be defined as consisting of all processes at all levels in society involving infrastructure, services, applications and human behavior that depend on a digital representation of knowledge and computer power. Given this broad conceptualization, the impacts of digital technologies on societies are manifold. They may lead to tensions with e.g. the safeguarding of civil rights, raise concerns with respect to their effects on employment, or induce debates on the role of social media for the quality of public deliberation. On the other hand, their more intensive deployment in production and work processes may be seen as desirable, given their productivity-enhancing qualities. Or, their use in military technology may be seen as necessary for national security.

Digital processes closely interact with the green transformation. While there is a case that the digital transformation has the potential to support the green transformation, the opposite is also true. Digital technologies and applications, for instance depend on the expanded availability of certain natural resources and critical raw materials. Digital technologies such as artificial intelligence require large amounts of electric energy, the production of which may lead to harmful environmental impacts. Whatever the specific impacts, digital processes are deeply transformative. Their interaction with different social domains hence needs political mediation and guidance. Industrial policy has a role to play for both enhancing complementarities and for mitigating tensions and remedying trade-offs between the two transformations.

Although the comeback of industrial policy is thus in principle welcome, it is important to situate industrial policy in the wider policy environment and define its role in pursuing public policy objectives. This raises the question of legitimacy. The recently published and highly influential Draghi Report on European competitiveness make the case for industrial policy to be primarily

employed for promoting the EU's innovative capacities and capabilities, thereby arguing that without a more productive economy, it will not be possible to pursue other public objectives such as the green transformation or to safeguard the welfare state: "If Europe cannot become more productive, we will be forced to choose. We will not be able to become, at once, a leader in new technologies, a beacon of climate responsibility and an independent player on the world stage." (Draghi 2024, 01). The statement thus implies that, if push comes to shove, trade-offs between competitiveness and environmental sustainability need to be resolved to the benefit of the former. Though, to his credit, the Draghi Report make proposals to foster areas of complementarity, reversing the order of priorities in this way would be problematic. Complementarities should be exploited to the extent possible. The overarching importance of the green transformation must however not be sacrificed at the altar of competitiveness. Precisely, because the priority-setting between conflicting policy goals during a process of profound structural change is of such importance, industrial policy must be embedded in inclusive democratic forms of deliberation and debate. We will devote special attention to this issue in the report.

Structure of report

Against the background of such an understanding of the Twin Transformation, the goal of this report thus consists, firstly, in providing a critical assessment of recent industrial policy initiatives for the Twin Transformation. Upon this basis, secondly, a policy agenda for the next five years will be proposed. In Section 2, in order to inform our subsequent debate about the challenges of the Twin Transformation in the EU, we will start by consulting the recent academic literature about the critical success factors for industrial policy. Section 3 provides an assessment of the EU's economic model and its external dependencies, given that the implementation of the two transformation agendas is of course shaped by the structural qualities of the existing EU political economy. Section 4 gives an overview of the EU Twin Transformation agenda during the last legislative period, i.e. from 2019–2024. Upon this basis, Section 5 focusses on four problem areas of the prevailing EU Twin Transformation agenda. These are (i) the lack of legitimacy and strategic outlook; (ii) the democratic deficit; (iii) the governance problems, and (iv) the investment gap. Finally, Section 6 provides a concluding outlook and outlines a progressive policy agenda for the Twin Transformation for the period up to 2030.

Figure 1.1.: EU green transformation targets – current status and ass	sessment
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Domain	Target	Current Status	Likelihood of reaching target
Greenhouse Gas Emissi- ons	Reduce net GHG emissions by at least 55% compared to 1990 levels by 2030.	As of 2023, emissions are 37% below 1990 levels. Current poli- cies project a 51% reduction by 2030, falling short of the target.	Notwithstanding significant progress, the EU is not fully on track to meet its 2030 target.
Renewable Energy	Achieve a 42.5% share of re- newable energy in the EU's to- tal energy consumption by 2030.	In 2024, wind and solar accounted for 29% of electricity genera- tion. Solar power surpassed coal, accounting for 11% of the EU's electricity mix.	Notwithstanding significant progress, the EU is not fully on track to meet its 2030 target.
Energy Efficiency	Improve energy efficiency by at least 11.7% until 2030 com- pared to 2020 baseline sce- nario	The EU has implemented various measures to enhance energy efficiency, but specific data on the current percentage improve- ment is limited.	While efforts are underway, the lack of detailed data makes it challenging to assess progress accurately. Continued focus on energy efficiency initiatives is crucial to meet the 2030 target.
Nature Restoration	Restore at least 20% of de- graded land and sea areas by 2030.	Progress has been slow, and current efforts are insufficient to meet the 2030 target. Political shifts and reduced regulations are further threatening biodiversity goals.	With little progress, the EU is not on track to meet its 2030 target.
Protecting Land and Sea	Protect at least 30% of EU land and sea areas, with 10% under strict protection for biodiversity by 2030.	The EU has designated significant portions of land and sea for protection; however, achieving the strict protection target re- mains challenging due to varying national commitments and en- forcement levels.	With little progress, the EU is not on track to meet its 2030 target.
Pollinators	Reverse the decline of pollina- tors by 2030.	The decline of pollinators continues due to habitat loss, pesticide use, and climate change. Initiatives are in place, but measurable improvements are limited.	Without significant changes in agricultural practices and habitat restoration, reversing the decline of polli- nators by 2030 remains unlikely.
Tree Planting	Plant 3 billion trees across the EU by 2030 in addition to a business-as-usual-scenario.	Tree planting initiatives have been launched with limited success so far (approx. 24 million trees recorded by end of 2024), Com- prehensive data on the number of trees planted to date is not readily available.	To meet the ambitious target, accelerated planting efforts and monitoring are necessary.
Waste Reduction	Reduce residual municipal waste by at least 50% by 2030 and promote reuse and repair.	Progress varies among member states, with some achieving sig- nificant waste reduction, while others lag behind. Overall, the EU is not on track to meet the 50% reduction target.	With variegated progress, the EU is not on track to meet its 2030 target.

Domain	Target	Current Status	Likelihood of reaching target
Material Use	Double the circular material use rate from 11.7% in 2020 to 23.4% by 2030	The EU's circularity rate has seen modest improvements; how- ever, substantial increases are needed to meet future targets.	Current efforts are insufficient; intensified focus on recycling and sustainable material use is essential.
Plastics	Ensure that all plastic packag- ing is recyclable or reusable by 2030.	Initiatives to improve plastic packaging recyclability are under- way, but challenges persist in collection, sorting, and recycling processes.	Achieving full recyclability or reusability by 2030 is ambitious and will require significant advancements in packaging design and recycling infrastructure.
Air Quality	Reduce by 2030 the number of premature deaths caused by air pollution by 55% com- pared to 2005 levels.	Air quality has improved in many regions, leading to a decrease in pollution-related health issues; however, disparities exist across the EU.	Continued efforts to reduce emissions from transport, industry, and agriculture are necessary to meet the health-related air quality target.
Water Pollution	Reduce by 2030 nutrient losses (nitrogen and phospho- rus) by 50% and pesticide use by 50%.	Nutrient runoff and pesticide use remain significant issues, with limited progress toward the reduction targets.	Substantial changes in agricultural practices and strengthened regulations are required to achieve these water pollution reduction goals.
Chemical Pollution	Reduce the use of chemical pesticides and more hazard- ous pesticides by 50% by 2030.	Trends show a decrease in the use of chemical pesticides, more efforts to reduce the use of more hazardous pesticides are nec- essary	Achieving a 50% reduction will necessitate stricter regulations and the development of safer alterna- tives.
Marine Pollution	By 2030, reduce plastic litter at sea by 50% and microplastics released into the environment by 30%.	Initiatives to address marine pollution have been implemented, but plastic litter and microplastic pollution remain pervasive. Re- cent reports show that significant improvements regarding plastic litter at sea were achieved, with further progress called for.	With progress in most EU regions, further adherence to and expansion of comprehensive strategies en- compassing waste management, public awareness, and product design changes are required.
Critical Raw Materials	Secure at least 10% of EU de- mand for critical raw materials from domestic sources and 40% from recycling by 2030.	Challenges include very low recycling rates for many critical raw materials, insufficient recycling capacity and long permitting pro- cesses for mining projects.	Proactive measures, including massive investments in recycling technologies and mining are necessary, but will not remedy the situation until 2030 sufficiently to reach targets.

Notes: Colored assessment of likelihood in right-hand column to be interpreted as: Red color: with current policies target will most likely not be met; Orange color: target will be likely met by individual Member States and/or for specific sub-targets; Green color: progress so far makes reaching the target likely. Source: author's elaboration, based on information from European Environmental Agency and other sources

2. THE THEORETICAL CASE FOR INDUSTRIAL POLICY

What precisely is industrial policy? How should it be motivated? And what are necessary requirements for successful IP? By drawing on the recent academic literature, these questions will be shortly discussed in this section.

2.1. Defining industrial policy

Though a commonly used term in the economic policy debate, explicit definitions of IP are rare and people often have different understandings of the term. Following Juhász, Lane, and Rodrik (2023, 4), we define "*industrial policies as those government policies that explicitly target the transformation of the structure of economic activity in pursuit of some public goal*". The goals to be achieved can vary greatly and are not confined to traditional economic objectives such as promoting innovation, productivity, or economic growth. Instead, they could also extend to promoting the climate transition, to increasing the security of supply with critical medicines, to promoting regional development, or to support organic agriculture. Though traditionally focused on manufacturing, it is important to note that in this definition IP could also entail the promotion of other economic sectors, including services and agriculture. For this reason, some authors have proposed to use alternative terms, such as productive development policies or structural transformation policies (Fernández-Arias et al. 2016). Notwithstanding the merits of such terms, the widespread use of the term industrial policy continues unabatedly. For reasons of convenience, we will thus use the term industrial policy in this report.

2.2. Motivating industrial policy

Throughout history, different arguments have been advanced to support industrial policy, both from an economic and political perspective. In the following, we will first consider conventional economic arguments, before discussing a number of rationales often neglected by the liberal economic mainstream.

The more recent mainstream economics discussion has focused attention on market failures as the principal rationale for IP. Juhász, Lane, and Rodrik (2023), for instance, refer to different kinds of market failures. Externalities refer to situations, in which economic activities might lead to social costs and benefits, respectively, which are unaccounted for in private business decisions. Thus, private productive activities may harm society in the case of e.g. generating environmental pollution, or alternatively confer a benefit to society, e.g. in the case that a (mining) company diversifies its supply chain, which in turn generates security of supply benefits for society at large. Another form of market failure are coordination (or applomeration) failures. i.e., situations in which the profitability of a firm depends on the activities of other firms, either because certain goods and services are complements, or because they are upstream or downstream activities in a value chain. Without government intervention, private opportunity costs might prevent investment in such activities, notwithstanding their social value. A third rationale discussed by Juhász, Lane, and Rodrik (2023) refers to activity-specific public goods, i.e. situations in which a certain economic activity depends on specific types of public goods (e.g. investment in a port, or road infrastructure) and governments have to decide which public good to provide.

To be sure, all types of market failure are pervasive in economic life. As such, the concept of market failure provides a general justification for government intervention, which *a-fortiori* can be applied to IP interventions more specifically. There are however other economic rationales for IP, that go beyond the scope of market failures, but are pertinent to legitimize the types of

industrial policy required for in our current circumstances. These relate to two issues in particular: the nature of production and of structural transformation, and the role of the state (Andreoni and Chang 2019; H.-J. Chang and Andreoni 2020).

A critical feature of production in capitalist economies is that it entails commitments under uncertainty. Such commitments, particularly as they relate to investment into new production technologies for the green or digital transformation, are specific and irreversible, and happen in the uncertain expectation of future profits by selling future products in the market. Although (large) firms dispose of some possibilities to reduce this uncertainty, by e.g. taking over competitors, by controlling suppliers or by advertising and marketing, the risk of engaging in such investments is often considered too high. What is more, as investment decisions are driven by expected profitability, decisions are critically influenced by what investors consider an appropriate profit rate (or return on investment). Given the profound financialization of our economies with shareholders in the driver's seat, required profit rates are typically high, and revenue flows are expected to start soon after the upfront investment. Investors benchmark investments against other available investment options, e.g. in real estate, or in financial assets. High uncertainty and profitability benchmarks under financialization thus act as constraints on private sector investments into productive capabilities. Consequently, the private sector will likely underinvest and the pace of the desired structural transformation of the economy will remain below expectation. To unlock productive investment thus requires state intervention via different forms of industrial policy, e.g. by generating demand via public procurement, by constraining foreign competition via tariff protection, by providing subsidized public loans or investment guarantees, or by extending affordable financing via public development banks.

Even in the case, that private investment takes place at the required scale, the ensuing structural transformation of the economy will lead to problems, that may require government action. In contrast to the neoclassical idea that structural change will be a rather smooth process driven by comparative advantage, in modern complex economies this is rarely the case. In the process of structural transformation, the interdependencies between sectors tend to unfold in a disproportionate way across the sectors and production activities. As Andreoni and Chang (2019, 13) emphasize, "this means that not everything changes *at the same speed* or *at the same time*. Different sectors (and their constituting activities) will expand at different growth rates, each of them following different structural cycles." For instance, the shift to electric vehicle production in the EU entails not only the build-up of an entire production system including the sourcing and processing of the required raw materials, battery production, car parts assembly, and final assembly, but is also dependent on investment into a public charging infrastructure and in renewable energy production, as well as the re- and upskilling of the workforce.

What is more, structural interdependencies tend to trigger circular and cumulative processes of development and underdevelopment, as already highlighted by Gunnar Myrdal in the 1950s (Myrdal 1958). Thus, structural dynamics are not only disproportionate across sectors of the same economy, they also tend to be non-linear across countries. Some countries may be more successful in promoting structural change than others, with the result being increased structural heterogeneity in a macro-region and marked growth differentials between countries. In the case of the EU, this will call for extending regional and cohesion policies.

Early movers will not only develop a number of sectors first, but in doing so they are also engaged in a gradual process of domestic technological development. In many cases this process also means that these early industrialisers are the first to acquire dominant positions in the manufacturing of production technologies. Given that structural change and technological development are thus intertwined, and time is of the essence in acquiring a dominant position not only in the production of the respective goods and services, but also in the development of the respective production technology, it is unsurprising that latecomers will typically use the existing technology supplied by the early movers (by way of import and emulation) (Reinert 2009). The fact that, for instance, China as a late comer (relative to the EU) has arrived at

dominating the global solar panel industry, follows this logic. It would not have been possible without massive industrial policy support (Raza et al. 2021). These structural interdependencies and the tensions that might appear in the process within and between all involved economic sectors as well as across countries, particularly in the EU, thus need to be actively managed.

Apart from the economic factors discussed so far, there are also political factors that speak to the desirability of industrial policy. As is well-known, the global political order is composed of sovereign nation states. The concept of sovereignty is intricately linked to a particular state territory and a citizenry residing in the former. The political freedom of a state and its citizenry to maintain its independence depends not only on international law, but also on its economic and technological capacities and capabilities. Although (inter-)dependencies between states, and in particular of the economic type, are to some extent unavoidable and indeed desirable (e.g. access to raw materials, technologies etc.), they can be used to constrain the political choices of other state polities, or, in other words, be "weaponized" for one's own political ends (Farrell and Newman 2019). The notion of liberty as non-dependency and collective autonomy dates back at least to Machiavelli's idea of the Free State and has acquired a prominent role in the de-colonization debates of the 19th and 20th centuries, with prominent 19th century figures such as Hamilton. List. Carev as well as 20th century structuralist economists including Prebisch, Furtado and Sunkel making the case for industrial development (Ahumada 2023). By improving productive capabilities and pursuing (late) industrialization by way of state-led industrial policy strategies, countries at the periphery of the capitalist world economy could achieve an autonomous position, where they would not depend on the arbitrary will of foreign powers and their companies.

By focusing on the other side of the coin, so to speak, the international relations' literature, and in particular the Realist School, has maintained that (i) it is states that define the framework conditions for the global economy, (ii) the prime agenda of states and in particular of great powers is to maximize their national security, and (iii) that countries' ability to pursue their security interests in the international domain depends not only on superior military powers, but above and behind that on its financial and technological powers, which in turn are predicated on the size of its economy and of its population (Gilpin 1975; Mearsheimer 2014). The security interests of particularly great powers motivate their governments to pro-actively invest in the productive and technological capabilities of their economies so as to safeguard their sover-eignty and avoid dependencies on other countries with respect to critical goods, services or technologies.

Apart from its power-political connotations, the security rational can be extended to include other forms of security, including security of supply with essential goods and services (e.g. agricultural commodities, drugs). For reasons of political legitimacy, governments particularly in emergency situations as exemplified by the Corona pandemic, have a duty to supply its populations with certain essential goods and services. Given that in such situations international trade and transport might be interrupted, or that foreign governments deliberately restrict exports of such goods precisely for prioritizing local consumption, a certain level of domestic production is required, which can only be secured via industrial policy interventions.

Both in the context of a changing international political environment with increased inter-state competition, and with respect to security of supply in the context of heightened crisis dynamics due to climate change or pandemics, security considerations have become important rationales for industrial policy.

2.3. Implementing successful industrial policy

Any industrial policy will have to be implemented. Whether or not this is done efficiently and effectively, will decide upon its success. Basically, requirements for successful industrial policy can be categorized into political, institutional and (macro-)economic requirements.

Political requirements

Based on a critical reading of in particular the literature on the Developmental State (Fine et al. 2013; Woo-Cumings 1999), the fundamental political requirement for successful IP is the existence of a societal coalition supporting IP. The corporate sector, but particularly in a democratic political system, also significant segments of civil society including trade unions, the media as well as academia, need to agree on the basic need and strategic trajectory of IP. Given often widely divergent ideological beliefs and substantive interests in modern societies, such an agreement cannot be taken for granted, but needs to be actively constructed and sustained. In contrast to the traditional focus of the IP literature on the - seemingly self-evident - desirability of late industrial development, i.e. the build-up of industrial and technological capabilities as well as capacities in societies hitherto based on resource extraction and traditional agriculture, the more recent discussion in the EU and other industrialized countries has been motivated by specific societal and economic challenges, including security of supply for essential products (e.g. pharmaceuticals), the build-up of technological capacities in strategic sectors (e.g. semiconductors), or industrial policy for the green transition (e.g. in the case of e-mobility and battery technologies). In contrast to a more bottom-up and market-driven approach to IP, respectively, with the role of the state confined to a regulatory as well as incentivizing role, the influential work of Marianna Mazzucato has emphasized that industrial policy initiatives of this type should be pioneered by a state, that performs an entrepreneurial function (Mazzucato 2015, 2021). Specific societal challenges should be concretized into 'missions', with well-defined objectives, responsibilities, performance criteria and applicable instruments (Mazzucato, Doyle, and Kuehn von Burgsdorff 2024). The entrepreneurial state will however only be able to define and sustainably implement its missions, if it is supported by a coalition of social forces.

Institutional requirements

As support for IP needs to be maintained over the longer-term, IP needs an institutional structure, both for purposes of an ongoing process of adaptation, as well as for the eventual mediation of any disagreements emerging along the way. The requisite institutional setup will critically involve the government, both in its role as a political leader of IP and mediator of any potential conflicts, but also in terms of implementing industrial policy via its administrative apparatus. Political leadership should be instituted at the highest level of government, preferably in the office of the prime minister (or in the case of the EU the President of the Commission). Given the silo structure of existing political systems (e.g. ministries, or DGs in the Commission), strong horizontal coordination of the diverse entities competent for specific industrial policies is of the essence. The latter is meant to include both coordination at the political level, e.g. via a standing council, composed of ministers and led by the prime minister (or EC Commissioners and EC President, respectively), and coordination among the different ministries and agencies tasked with implementation of specific policies. The coordination of administrative implementation should typically reside with an IP agency, i.e. a separate entity outside the standard ministerial bureaucracy, that reports directly to the prime minister and/or the minister competent for industrial policy. Clearly, institutional setups might differ in detail, given states' specific bureaucratic cultures. The important lesson from the IP literature is that for any IP strategy to be successful, strong political leadership and close coordination is of critical importance.

A third lesson refers to administrative implementation. Based on a Neo-Weberian understanding of the bureaucratic state and extensive empirical research on successful IP implementation in East Asia, the concept of the 'embedded autonomy' of the state has been highlighted as a critical success factor in the literature (Evans 1995). The state agencies in charge of implementing IP policies need to be closely related to the respective economic sectors, and public officials have to command expertise and in-depth technical and practical knowledge about the workings of particular industries (Kattel, Drechsler, and Karo 2022). On the other hand, above and beyond this embeddedness, the responsible state agencies also need to retain a level of autonomy. Firstly, vis-à-vis the respective IP sectors. Otherwise, corporate capture might eventually follow, with state agencies unable to implement long-term strategies and objectives. while their ability to mediate between divergent actors and interests might become compromised. Secondly, a degree of autonomy is also necessary vis-à-vis the political level. Based on a clearly spelled-out political mandate, i.e. an industrial policy strategy with clear objectives, timelines, responsibilities, performance indicators and monitoring/reporting obligations, the competent IP agencies should be able to implement the strategy without undue short-term interference from the political system. Also, to enable flexible management, the agency should be at least partially exempted from standard administrative procedures of due process. To this end, the IP literature typically recommends to either institutionally separate the responsible IP entity from the line ministerial bureaucracy (i.e. by creating an independent agency reporting directly to the prime minister), or at least to invest the responsible ministerial entity with special powers (e.g. by reporting directly to the minister, or by granting the right to recruit experts directly under special arrangements, etc.). With respect to recruiting and human resource management principles in general, a strong meritocratic culture is seen as essential for success.

State capacities and their build-up are thus essential for implementing industrial policies and for maintaining directionality. Again, this cannot be taken for granted, but will need time and effort. After some three decades of neoliberalism and public austerity, state capacities in many industrialized countries, including in the EU, have been systematically eroded, with technical capacities and capabilities having been outsourced to the private consultancy industry in particular (Mazzucato and Collington 2023). It is thus important to systematically include the dimension of institutional capacity-building into any IP strategy at the EU as well as Member State level.

Expanded state capacities can potentially also include a more active role of the public sector in production through state-owned enterprises (SOEs).³ Public ownership might be justified on various grounds. First, natural monopolies in specific industries in which technological conditions dictate that there can be only one supplier, potentially leading to high monopoly profits and decreased output without proper regulations and/or regulated SOEs. Second, capital market failure, that is, a situation – pervasive in contemporary shareholder capitalism – in which private investors do not invest in novel high-risk industries with high long-term potential returns due to the short-termism and risk-aversion, respectively, of financial markets. In such a situation, a government-run development bank should finance risky long-term projects, either to support private sector pioneers, or to trailblaze SOE investment into a new sector or technology. Third, the existence of externalities and spill-overs, for example by investing in industries that benefit other industries (e.g. basic inputs industries) and the provision of inputs or services below market prices. Fourth, SOEs can address broader social needs as they do not have to be exclusively profit-oriented, and, as such, can play an important role in the context of more output-inclusive industrialization regimes (Chang 2003; 2007). The recent surge in renewable energy communities and cooperatives illustrates, for instance, that not-for-profit organizations have an important role to play in the provision of local public services (COME RES 2023).

³ SOEs may come in different forms, including both for profit companies (e.g. (publicly traded) stock corporations) and not-forprofit companies (e.g. cooperatives).

At the international level, sovereign wealth or development funds have acquired a prominent role in recent decades as a conduit to promote investment into strategic industries (Raza et al. 2021). While existing at the Member State level (e.g. Solidium in Finland, ÖBAG in Austria), the EU has so far not followed through on the idea of establishing a European Sovereignty Fund. Public ownership in this context is either motivated by the desire to develop a strategic sector by strengthening the capital base of a company (via equity participation), or by the desire to safeguard national (security) interests (e.g. to prevent hostile takeovers). In the latter case, it might suffice for the government to hold a minority stake (e.g. 25 % + 1 share) or a golden share, i.e. a share that gives special rights to governments with respect to certain strategic decisions of a company.

Macroeconomic requirements

Finally, industrial policy needs to be supported by accommodative macroeconomic policies. Historical precedent, indeed, suggests that macroeconomic mismanagement bears responsibility for many failed cases of late industrialization. By promoting structural change industrial policy typically focusses on the supply-side of the economy, thus often overlooking relevant demand side constraints. These can take the form of overvalued exchange rates, unsustainable trade deficits, external debts, foreign currency shortages, increased inequalities, and resultingly, domestic underconsumption (Storm 2020).

Relevant policy areas thus relate in particular to fiscal and monetary policies, including exchange rate policy. The latter should provide for stable exchange rates vis-à-vis major trade partners and prevent the national currency from being overvalued (Bresser-Pereira and Rugitsky 2018). Capital controls might be used to regulate potentially destabilizing short-term capital flows, or to manage foreign currency reserves (particularly in the case of low-income countries).

Interest rates should remain low and ideally not exceed the average growth rate of GDP, which entails to resort to alternative means (e.g. price caps, coordinated wage policy) to fight surges of inflation, if necessary. Monetary policy might also indirectly support industrial policy via various means, e.g. by purchases of government bonds or those of public development banks. Fiscal policy should support IP by providing various financial incentives (e.g. guarantees, grants, subsidized loans), by designing an investment-friendly tax system, by using government procurement for stimulating domestic production, or by actively managing public ownership in state-owned enterprises (Ocampo 2020).

3. KEY CHARACTERISTICS OF THE EU POLITICAL ECONOMY

To provide a basis for the subsequent discussion of EU industrial policy for the Twin Transformation, in this section we will present a short overview of (i) the prevailing macroeconomic regime (or growth model) of the EU, as well as (ii) of the economic dependencies of the EU economy, all against the backdrop of the recent changes in the global political economy.

3.1. The EU's growth model

The prevailing macroeconomic regime, including its current problems such as low growth and productivity dynamics (see e.g. Draghi 2024), has its roots in the institutional setup of the EU. as enshrined since the early 1990s in the EU's legal framework through a series of reforms. Very broadly, the setup consists of two major policy paradigms. With respect to the real economy, the focus has been on creating and deepening the Single Market via a process of predominantly negative integration. The essential elements thereof included the liberalization of economic sectors, the dismantlement and privatization of public companies including restrictions on state aid and government procurement, the partial deregulation of the labor market, a sector and product market regulatory approach favoring mutual recognition over harmonization, as well as a horizontal approach to promoting research and innovation. With respect to the financial economy, a restrictive approach has been adopted for both fiscal and monetary policy, as enshrined in the Stability and Growth Pact and the ECB mandate, respectively. The internationalization of the banking sector, though in regulatory matters remaining in the joint remit of both the EU and Member States, was by and large supported. Protective elements of the economic policy setup were mostly maintained for agriculture, while territorial cohesion was addressed through regional and cohesion policies.

While arguably the creation of the Single Market with its focus on promoting intra-EU trade has had a growth-enhancing effect during the 1990s and early 2000s, and the institutional setup showed some capacity to accommodate the different national growth models within the EU during the first decade after the millennium, the restrictive bias of fiscal and monetary policies eventually turned out to be a liability, once the EU was hit by a major economic crisis, i.e. the Global Financial Crisis (GFC) of 2007/08 (Johnston and Matthijs 2022). For one, the heavy austerity imposed upon the EU periphery in the aftermath of the GFC severely curtailed domestic consumption and investment, thus leaving export demand as the only avenue to propel economic growth. Thus, starting around 2010, under the pressure of the neo-mercantilist core of the EU led by Germany, the entire Eurozone nolens volens shifted to an export-led growth model. Together with another set of fiscal governance reforms (the Six Pack and Two-Pack), which also included a new Excessive Imbalances Procedure heavily constraining domestic consumption and investment, the draconian spending cuts imposed by the Troika on the countries of the EU's southern periphery, in particular Portugal, Italy, Greece and Spain, in combination with high risk premia on public debt demanded by financial markets were not only successful in severely curtailing fiscal space and precluding any fiscal stimulus programs in the crisis countries, but in the Eurozone more generally. Although under the leadership of Mario Draghi, the ECB resorted to an extremely expansive monetary policy stance, with ultra-low interest rates and unprecedented quantitative easing, i.e. bond purchase programs, monetary policy alone was not able to reinstate economic dynamism. As a result of these policies, the macroeconomic performance of the EU economy deteriorated significantly. Growth during the 2010s remained weak, falling to an average of 1.6 % p.a. during 2010-2019 (as against an average 2,3 % p.a. during 1999–2008). Total real investment in the EU fell from a pre-GFC high of 23,6 % in 2007 to 19,9% in 2014, and recovered to some 22 % of GDP only at the end of the decade (Eurostat data).

The little growth happening in the EU was thus mostly premised on external demand. The EU's trade surplus in goods and services increased from some 1,5 % pre-GFC to more than 4 % in the mid-2010s, and remained at some 3.5 % until 2020 (see Figure 3.1). In other words, the EU relied on the rest of the world to buy its goods and services, with exports to China increasing at a particularly strong pace, while the importance of the US as an outlet for European products declined somewhat (Guarascio et al. 2024). As long as growth in emerging markets remained strong and the US pursued a consumption- and debt-led growth trajectory, this strategy seemed sustainable. The external dependence it created for the EU's growth model could however backfire, once other countries reverted to more protectionist policy stances or an exogenous shock hit the global economy.



Figure 3.1.: Net extra-EU Export of Goods and Services 1995–2004

Source: author's elaboration, based upon data from AMECO database

The first shock came indeed with the outbreak of the Corona Pandemic in early 2020. The immediate consequence was the break-down of many global supply chains, including of critical medical supplies, and the halting of large segments of economic activity due to the enacted lock-downs. After a short moment of paralysis, the EU in combination with Member States reacted with a coordinated effort to contain the crisis and support the flailing economy. Emergency policies included both fiscal measures to the tune of $\in 1,3$ trillion (SURE program, ESM Pandemic crisis support, NextGenerationEU), and monetary measures (including the PEPP program worth more than $\in 1$ trillion). What is more, the fiscal rules of the SGP as well as restrictions on state aid were temporarily suspended. Under the NGEU program, EU Member States including the notoriously skeptical Germany agreed for the first time to issue common European debt. As a consequence of the pandemic, the policy stance started to shift towards promoting the resilience of (critical) supply chains, and to foster the "open strategic autonomy" of the EU economy with respect to critical goods, technologies as well as infrastructures.

The second shock erupted upon the EU political scene with the Russian aggression against Ukraine in February 2022. The ensuing energy crisis resulted in massive price hikes, particularly of natural gas, and led the EU to diversify energy supplies. As a consequence, headline inflation surged to some 9 % in 2022, sank to some 6 % in 2023, and remained above the ECB's target rate of 2 % for the most part of 2024. Only in November 2024, with 2,1 % inflation fell again in line. Fiscal policy reacted to the Ukraine crisis with expansive measures, on the one hand to stabilize the economic and social effects of the price surge, and on the other hand to increase defense spending. In raising interest rates rather quickly, with a peak rate of 4,5 % reached in December 2023, the monetary policy response of the ECB to inflation was conventional. The motivation had to do with the desire to foreclose the possibility of a wage-price spiral. That however amounted to a mis-diagnosis, as the ensuing wage increases in effect followed prices, and in general remained moderate. With real wages falling, households across the EU actually suffered an unprecedented cost of living crisis, that caused considerable social distress and political unrest (EuroMemo Group 2023, 2024). What is more, by fighting inflation via making investment and consumption more expensive, the ECB deliberately accepted a dampening effect on EU economic activity. EU GDP growth fell from 3,5 % in 2022 to 0,5 % in 2023, with a moderate increase to 0,9 % projected for 2024 (European Commission). As inflation was the consequence of an external shock hitting the EU's economy, it could have been fought more effectively by introducing systematic price controls of the strategic sectors of energy and food, and with windfall profits (of energy companies in particular) taxed by governments and used for compensatory policies (Weber and Van't Klooster 2024). Thus, the overall results of the crisis response measures consisted in a permanently higher price level and a slowdown of economic activity, both of which have had a negative effect on the cost structure and thus the competitiveness of companies, as well as on the welfare of private households (EuroMemo Group 2025).

The year 2024 witnessed the unfolding of a paradoxical situation. The external outlook deteriorated significantly, with the rivalry between the US and China on the rise, the EU economy suffering from increased Chinese competition and an overall subdued global economic outlook. Above all else, the return of Donald Trump to the US presidency developed from a looming threat to becoming a certainty in early November. Internally, the political fallout of the pandemic and the energy shock reverberated throughout Europe by way of strengthening extreme right-wing parties and earning them electoral successes in Portugal, France, Austria, and also at the European elections in June. In defiance of these developments, economic policy-making in the EU was keen to return to normal. The ECB continued to phase-out quantitative easing programs, and started to moderately lower key interest rates by 1.35 %-points during the second half of 2024 (from 4.5 % in June to 3.15 % in December). The reform of the Stability and Growth Pact agreed upon in April 2024 included only minor modifications, while the core principles were retained. With the application of the new rules to kick-in with the fiscal year 2025, many EU countries will likely suffer a new phase of fiscal austerity (de Grauwe 2025).

By way of summary, the EU reacted to the shocks emanating from the Pandemic and the war in Ukraine with an expansionary fiscal stance and an ambivalent monetary policy (expansive in response to Covid-19, restrictive in response to the Ukraine war). The reinstatement of the reformed SGP in June 2024, the refusal to continue with the practice of issuing common EU debt as well as the phase-out of the exemptions to state aid regulations, however, signaled the return to the *status-quo-ante* institutional setup. As a consequence, in the years to come macroeconomic policy will become restrictive again, with a new wave of austerity across the EU on the horizon, and the ECB having returned to monetary orthodoxy. Thus, while the EU's export-oriented growth model has harshly suffered from these developments, the macroeconomic regime has essentially remained unchanged. Growing geopolitical rivalries, and in particular the trade policy stance of the Trump administration will arguably render the EU's exportled growth model increasingly obsolete. Thus, a major shift of the growth model towards one led to a higher degree by domestic investment and consumption looks imminent.

3.2. External economic dependencies of the EU economy

The EU's external dependencies do not only relate to exports, but also to imports. Its productive structure basically depends upon the import of intermediate inputs as well as of energy and diverse raw materials, which in turn are used for the production of higher value-added products by its large manufacturing sector. Both the availability and cost of these imports have been negatively affected by recent geopolitical developments. Broadly, import dependencies can be subsumed into the three categories of (i) technological dependencies, (ii) energy dependencies, and (ii) (critical) raw materials dependencies. We discuss each of these in turn.

3.2.1. Technological dependencies

During the period of neoliberal globalization since 1990, EU companies have increasingly builtup global production networks. These networks rely on a value chain composed of a sequence of highly specialized manufacturing steps, executed by subsidiary companies or outsourced suppliers, which in turn are spread over different countries. As a consequence, the importance of imported intermediate inputs has increased, with its share growing since the mid-1990s in the case of the EU from some 7 % in 1995 to 11 % in 2018 (Guarascio et al. 2024). In contrast to both the US and China, which saw constant and decreasing shares of intermediate imports, respectively, after the GFC of 2008, the EU has become more import dependent particularly in high-tech inputs, which are more difficult to substitute, thus greatly increasing its vulnerability to supply chain disruptions or weaponized interdependence (Farrell and Newman 2019), i.e. the exploitation of economic dependencies for political reasons.

Technological dependencies of the EU are particularly pronounced in digital and green technologies. In digital technologies, dependencies relate both to the US (e.g. semiconductors, digital platforms, cloud computing) and to China (e.g. telecom equipment, 5G). Patent data shows that the EU is increasingly lagging behind both the US and China, when it comes to patenting new semiconductor and ICT technologies, which in turn will increase technological dependencies in the future. As far as digital platforms and social media are concerned, a particularly problematic aspect relates to the monopolization of intellectual assets, such as data, knowledge, and the control of narratives, by a few leading, and mostly US corporations, all of which represents a significant loss of digital sovereignty (Rikap et al. 2024).

As far as green technologies are concerned, EU dependencies are concentrated upon China. While on the basis of international patent statistics, the EU remains a technological leader in energy generation, transmission and distribution as well as in wind energy, during the last one and a half decades, China has become the technology leader in solar/photovoltaics and in energy storage & batteries (Guarascio et al. 2024). What is more, China has also become the global manufacturing center for almost all green technology products, controlling 80 % of the manufacturing capacity for solar PVs, some 60 % for onshore wind, close to 80 % for batteries, and some 40 % for electrolyzers and heat pumps (see Figure 3.2). Given the project pipelines as of 2023, the International Energy Agency does not expect this distribution of manufacturing capacity between China and the rest of the world to change significantly until 2030.



Figure 3.2.: Regional shares of manufacturing capacity of clean technologies, 2022–2030

Source: International Energy Agency (2023, 12)

3.2.2. Energy dependencies⁴

Despite the steady rise of renewable energy sources over the last three decades, the EU energy portfolio still relies heavily on fossil fuels. As of 2022, oil and natural gas play a dominant role, representing about 60 % of the total energy supply. Unsurprisingly, there is considerable heterogeneity across EU Member States in terms of energy mix, reflecting the varied natural resources, geopolitical and economic ties with major global (fossil fuel) players. Though the share of renewables in total EU energy consumption has steadily increased during the last decades and is estimated at 24.1 % in 2023, meeting the minimum EU target of 42.5 % for 2030 will demand more than doubling the rates of renewables deployment.⁵

What is more, although energy policy has long been a priority in Europe's push for a green transition, and with both the war in Ukraine and the surge in energy prices underlining its urgency, the EU still suffers from a relatively high dependency on energy imports. As measured by the Energy Dependency Rate (EDR), i.e. the share of imported energy required by a country to meet its total energy needs, overall dependency increased by 11 %- points, going from 52 % in 1995 to 63 % in 2022. While the import reliance for oil has remained steady and close to 100 % since the mid-1990s, the dependence on natural gas imports saw a substantial rise of nearly 30 %-points since 2014, reaching nearly 100 % in 2022 (see Figure 3.3.).

The discussion in this chapter is largely based upon Guarascio, Reljic, and Zezza (2024), one of the background papers commissioned for this project.

For data on EU energy consumption, see the European Environment Agency's website [HERE].



Figure 3.3.: Import Dependency Rate by source, EU27, 1995–2022

Source: Guarascio, Reljic, and Zezza (2024, 14)

External energy dependency (particularly on fossil fuels) is however not only problematic with respect to the green transformation. Depending on the distribution on energy suppliers, it risks to amplify the EU's vulnerability to geopolitical risks and supply disruptions. The Russian war on Ukraine, which saw the weaponization of Russian gas, serves as a stark example. Vulnerability is not solely about the volume of energy imported but also how concentrated these imports are among different suppliers. In this context, the Herfindahl-Hirschman index (HHI) serves as a measure of the potential risk associated with limited supplier diversity, with higher HHI values indicating a higher risk of supply disruption due to geopolitical tensions or market volatility. Figure 3.4 illustrates total energy import dependency against external import dependency (from extra-EU countries) and import concentration (as measured by HHI), respectively. The panel on the left-hand side shows how countries positioned further to the right are more dependent on energy imports from outside the EU, thus more exposed to geopolitical risks and supply chain vulnerabilities. Lithuania, Italy, Spain and Greece are notable examples. The panel on the right exhibits import concentration amongst EU member states, with Lithuania, Slovakia and Hungary, but also Germany exhibiting high import concentration levels.

Due to the EU sanctions imposed upon Russia since 2022 on imports of crude oil and petroleum products, diversification happened rather quickly, with imports from Russia plummeting in 2023 by some 86 % (against 2019), while total EU import volumes remained largely unchanged. Import volumes of natural gas decreased in total, and became more diversified (with LNG imports from the US and Qatar on the rise), although Russia remained an important source of gas (both for pipeline gas and LNG).

By way of conclusion, though the energy crisis has shown that oil and gas remained available to the EU thanks to successful diversification efforts, two repercussions have turned out problematic. Firstly, energy has become more expensive. By mid-2024, compared to the price levels at the end of 2021, prices of natural gas (net of taxes) both for EU households and companies roughly had doubled, with the gas consumption mix shifting in favour of the more expensive LNG gas.⁶ With respect to electricity, again by mid-2024, compared to prices at the end of 2021, prices (net of taxes) both for EU households and companies had risen by some 50 %. Compared to the US, EU industries face gas prices that are roughly four times and electricity prices that are two times higher (Draghi 2024, 10).

⁶ See Eurostat analysis, at <u>https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Natural_gas_price_statistics</u> (accessed 30 December 2024).


Figure 3.4.: Energy Import dependency, dependency from extra-EU countries and HHI-index concentration, 2022

Source: Guarascio, Reljic, and Zezza (2024, 15)

Secondly, diversification has created new dependencies for the EU. In particular, the nexus between the EU's energy dependency and its security dependency upon the US, has weakened its bargaining power. The EU is expected to buy certain amounts of LNG gas and of oil from the US (and its allies), with little bargaining power over prices and conditions. Given this state of affairs, besides increasing energy efficiency as well as reducing overall energy consumption, the energy transition to renewables presents the only viable mid- to long-term option to overcome the EU's existing energy dependencies and vulnerabilities.

3.2.3. Raw material dependencies

The technologies necessary for implementing the Twin Transformation depend on the availability of specific raw materials and minerals. Economic forecasts expect global as well as European demand for such critical minerals to expand significantly, although within wide margins. But even the most conservative of the IEA scenarios for the expected development of mineral demand for clean energy technologies expects a doubling of demand by 2040. Unfortunately, for many of these, the EU is highly dependent on imports (see Figure 3.5. for examples). Minerals production typically is concentrated on specific countries. China dominates the field of critical raw materials, controlling nearly all of heavy rare earth elements, 91 % of magnesium and 76 % of silicon metal supplies worldwide. Similarly, the Democratic Republic of the Congo commands over 60 % of the global cobalt market, while South Africa holds a share of 71 % for platinum and Russia 40 % of palladium (Allianz Research 2023, 6). Thus, in many cases import dependency and concentration go hand in hand.



Figure 3.5.: EU import dependency of selected Strategic Raw Materials, 2023

Note: Import reliance is calculated as (Import – Export) / (Domestic production + Import – Export), in other words as the share that net imports contribute to the amount of domestically available supplies. Source: Tröster, Papatheophilou, and Küblböck (2024, 23)

Given increased political awareness of the importance of these raw materials, the European Commission has published a list of Critical Raw Materials (CRM) since 2011 and updated it every three years.⁷ Raw materials are deemed "critical" when they show higher economic importance to EU industry and higher risks of supply shortages compared with most of the other raw materials. The number of raw materials assessed as critical by the EU has more than doubled, from 14 in 2011 to 34 in 2023 (see Figure 3.6). The latest CRM list of 2023 introduces the new category of strategic raw materials (SRMs). A material is designated as strategic based on its significance for so-called relevant strategic technologies for the green and digital transition or for defense and aerospace. In addition, the assessment takes into account the projected global demand growth for these SRMs and potential production constraints.

Due to economic and political reasons, the domestic supply of such materials is limited, although in principle sizable deposits for many CRMs exist within the EU's borders. While a comprehensive and reliable assessment of EU geological potential is largely missing, proven reserves for e.g. lithium, cobalt, nickel, graphite, and manganese show that domestic supply for critical raw materials could be increased substantially through expanded mining in the EU (Righetti and Rizos 2023). This would however not provide a short-term solution. Average global lead times for developing a mining project from discovery to extraction take some 16 years, with the main challenge not being the regulatory/permitting process with an average duration of 1.5 years, but the exploration stage with 12 years (Manalo 2023). Thus, ramping up mining within the EU to meet higher demand for critical raw materials arguably presents a long-term challenge, that will need to balance ecological and social impacts, particularly on local communities, with security of supply objectives under the Twin Transformation.

⁷ See <u>https://rmis.jrc.ec.europa.eu/eu-critical-raw-materials</u> for a comprehensive overview of the CRM list.



Figure 3.6.: Number of Critical Raw Materials (CRM) according to EU classification

Source: Tröster, Papatheophilou, and Küblböck (2024, 6)

An alternative approach to cater for increasing CRM demand consists in the recycling of materials. As Figure 3.7 shows, there are only three SRMs that currently have end-of-life recycling input rates of 25 % or higher. Conversely, for four SRMs, the end-of-life recycling input rate is currently even below 1 %, including lithium. Current low recycling rates are due to a number of factors, including lacking technologies, high costs, or the lack of end-of-live products (e.g. in the case of lithium-ion batteries). Against this background, a recent study suggests that extraction and imports will remain the primary source of critical minerals until the decade between 2030 and 2040. Secondary supply will become the biggest source for all metals but silicon only by 2050 (Gregoir and Van Acker 2022, 60).





Source: Tröster, Papatheophilou, and Küblböck (2024, 24)

4. Assessing EU industrial policy initiatives for the Twin Transformation

4.1. Industrial Policy in the aftermath of the Eurozone crisis

Since the 1990s, European policy had pushed back government involvement in the economy and reduced the role of public intervention. With the Single Market, the early 1990s saw an acceleration of European integration. European Monetary Union and the Maastricht Treaty limited state capacities for industrial policy. This (neo)liberal economy trajectory was deeply embedded in European institutions. A new consensus saw the role of the State as that of market "regulator". Selective policies, targeting particular fields, were to be abandoned as the market knew best which industries and firms were most efficient. The result has been a general loss of policy influence on the direction of industrial change in Europe, dragging down EU competitiveness and leading European countries towards a serious divergence in terms of industrial production and investments. According to UNCTAD statistics, from 2007 to 2017, the fall in Europe's world share in manufacturing value added amounted to 6.8 %-points, while during the same period the US and Japan lost only 2.2 %-points. Moreover, since the outbreak of the Global Financial Crisis in 2007, industry patterns across Europe started to diverge significantly (see Figure 4.1.). While the industrial production of Eastern European economies including Poland and the Nordic countries recovered quickly from the recession and the EU-27 as a whole returned to pre-crisis levels after a decade, Southern Europe suffered a prolonged stagnation. Italy and Spain experienced dramatic losses of 25 % of output in the aftermath of the crisis and had only witnessed small improvements by the end of the 2010 decade. In France, by 2019 industry production was still about nine points below its 2008 level (Pianta, Lucchese, and Nascia 2020, 2). While recovery after the Corona shock was swift, the war in Ukraine led to rather uniform stagnation in production across the EU.



Figure 4.1.: Volume of production in EU-27 and in the main European economies (2008–2023, monthly data, Index 2008=100)

Source: author's elaboration, based on Eurostat Production in industry monthly data [sts_inpr_m_custom_15120868]

For Europe as a whole the pattern of divergence post-GFC has had wide-ranging conseguences. Market mechanisms had operated in a way that increased concentration of industrial production, leaving Europe with a manufacturing base exhibiting a growing polarization between a center, i.e. a production system led by Germany and involving firms from surrounding countries (Central-East European economies including Austria), and a periphery including Italy, Spain, Greece, and Portugal. The latter countries' possibility to survive as locations of industrial production has thus been increasingly called into question (Celi et al. 2018; Stöllinger et al. 2013). In addition, the changing balance of power in industrial production in Europe seemed to be particularly related to growing disparities with respect to the technological intensity of output: according to Eurostat national account estimates, during the period 2007–2016. Germany increased its share of European value added in high-tech manufacturing by about 6 %-points (from 36 % to 42 %), while Eastern European economies have roughly retained their shares. Contrariwise, during the same period losses emerged in most other countries, including France (-1.1 %-points), Finland (-0.9), Italy (-0.8), Sweden (-0.6), Spain (-0.4), suggesting a deepening technological divide between European economies (Pianta, Lucchese, and Nascia 2020).

Against the backdrop of these developments, in the aftermath of the Eurozone crisis the European Commission exhibited a renewed interest in industrial policy, stressing the centrality of manufacturing for Europe's future (European Commission 2012, 2014, 2017). In response to stagnating investment in Europe, in late 2014 the EU Commission launched the "Juncker Investment Plan," with the aim of supporting the recovery of public and private investment in Europe. In 2015, the European Fund for Strategic Investments (EFSI), the main tool of the Juncker Plan, was created and institutionally embedded in the EIB (European Union, 2015). EFSI was setup with rather limited EU funds (€21 bn), the underlying idea being that via public funds private financial resources could be leveraged.

By December 2020, EFSI had approved €102.1 billion in financing, which was expected to generate €540.3 billion in total investments.⁸ The success of the EFSI program thus illustrated the seriousness of Europe's investment gap and the mismatch between public investment needs and idle private financial resources. The success of EFSI in leveraging private money notwithstanding, an independent evaluation concluded that EFSI failed to meet expectations in the financing of more innovative start-ups and early stage growth SMEs. Designed as a "demand driven instrument" with no goal of economic convergence among Member States, funds were concentrated in a few major EU countries. At the end of 2017, France, Italy, and Spain had received 44.5 % of total investment (European Commission 2018a).

Overall, although industrial policy in the 2010s acquired a new significance, the approach by and large remained orthodox. With the focus put on horizontal policies, funding prioritized research and innovation, infrastructure and SMEs. Under the existing fiscal rules, public funding remained circumscribed and focused on leveraging private capital. EFSI was arguably the role model, for what later was characterized by the critical academic literature as the de-risking approach, where the State tried to attract private capital to investment ventures by assuming most of the economic risks (Gabor 2023; Gabor and Braun 2023; Skyrman 2024). Though programs like EFSI were relatively successful, relative to peer competitors like the US and China, overall investment activity (public and private) in the EU however remained below potential.

⁸ See EIB website on EFSI: <u>https://www.eib.org/en/products/mandates-partnerships/efsi/index?utm_source=chatgpt.com</u> (accessed 30 December 2024).

4.2. The European Green Deal

When confronted with a new pan-European wave of environmental activism in 2018/19, in December 2019, the incoming Von der Leyen-Commission launched its proposal for a European Green Deal (EGD), a wide-ranging package of legislation with the aim (i) to reduce emissions of greenhouse gases in the EU to net-zero by 2050, (ii) decouple economic growth from resource use, and (iii) ensure a "just and inclusive" transition in the European Union by "leaving no place and no person behind" (see Figure 4.2. for an overview of objectives).⁹ The EGD was presented as a long-term commitment to the transition to a low-carbon economy in alignment with the climate goals of the 2015 Paris Agreement. It defined a roadmap to make Europe the first carbon-neutral continent by 2050, reviewing as well as introducing EU legislation in several areas relevant for the green transition. With the plan, the European Union intended to bring Europe's greenhouse gas emissions target for 2030 to at least 55 percent of 1990 levels, becoming fully carbon-neutral by 2050. To this end, it wanted to develop a green and circular economy, and support the digital transformation of society. The strategy has been accompanied by a Just Transition Mechanism, a program which supports sectors and regions particularly affected by decarbonization. Through it, the EU Commission hoped to reduce the resistance of EU member states (e.g. the Central and Eastern European countries), whose production model depends to a high(er) degree on carbon, as well as to ensure greater acceptance by the European citizenry at large (Pianta and Lucchese 2020).



Figure 4.2.: The objectives of the European Green Deal

 $Source: https://eur-lex.europa.eu/resource.html?uri=comnat:COM_2019_0640_FIN_ENG_xhtml.COM_2019_0640_FIN_ENG_12002.jpg$

Sector Policies of the EGD

The EGD comprises a broad set of sector policies, including in particular climate, energy, mobility, housing/buildings, agriculture and food, the preservation and restoration of ecosystems and biodiversity (see Figure 4.3 for an overview). The "Fit for 55"- legislative package proposed by the EC in mid-2021 specified many of the objectives set out in the EGD. It included a set of

⁹ See the EC's dedicated EGD website: <u>https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en</u> (accessed 30 December 2024).

measures for a far-reaching restructuring of the economy, putting the emphasis on the promotion of renewable energy, energy efficiency in buildings, emission standards for cars, energy taxation, emissions trading and R&D related to the green transition. The RePowerEU plan, presented by the EC in March 2022, i.e. in the immediate aftermath of the start of the war in Ukraine, raised the targets for energy efficiency compared to the Fit for 55 – package and accelerated the expansion of renewable energies. On a practical level, it meant that funds were added to the Recovery and Resilience Plan (EuroMemo Group 2025).

With more than 100 pieces of legislation associated with the EGD having been either concluded or still being in the pipeline, it is beyond the scope of this report to assess these regulations in any detail. Some preliminary observations on progress as well as challenges can however be made. According to the European Green Deal Barometer, an annual expert survey, considerable progress has been achieved in the energy and transport sectors, largely thanks to Fit-for-55 and RePowerEU. Experts are divided on whether the climate target set for 2040 (of a 90 % GHG reduction) is sufficient for the EU to achieve the objectives of the Paris Agreement. Similarly, almost half (45 %) of those with expertise on ensuring a just transition believe progress made towards mainstreaming the principle since 2019 has been poor, while just transition features as one of the Top-2 areas for higher prioritization. More ambitious reforms are required in certain areas that have largely been overlooked so far, particularly in food, biodiversity and pollution & toxic free environments (European Green Deal Barometer 2024).

The EU Emission Trading System (EU ETS)

Although already established in 2005, the EU ETS is an important element in the overall EGD. Being a cap and trade system, polluters from electricity and heat generation, industrial manufacturing, aviation, and most recently from maritime transport have to buy emission allowances. The latter are sold in auctions, and may be traded. As the cap decreases in line with the EU climate targets, so does the supply of allowances to the EU carbon market. With allowances becoming scarce, prices should rise, which in turn should motivate companies to increasingly invest in decarbonizing their production processes. The system operates in all EU countries plus Iceland, Liechtenstein and Norway and covers around 40 % of all EU GHG emissions. Until recently, the efficacy of the system was limited as upon the basis of a specific benchmarking system a sizable number of allowances was given away for free to companies in specific sectors, including power generation, heavy industry (steel, cement) and aviation. Thus, with the price per allowance remaining below €20 per ton on average until 2020, the system's steering effect was limited, contributing only 7.3 % to the overall GHG reduction during that period (Döbbeling-Hildebrandt et al. 2024). As free allowances will be phased-out until 2030 (until 2026 for aviation), the steering effect will likely increase in the coming years. Thus, a major shortcoming of the existing system should be remedied. In addition to the existing ETS, an ETS2 was created in 2023. This new system will address the GHG emissions from fuel combustion in buildings, road transport and additional sectors, whose emission reductions so far have been insufficient. ETS2 will become fully operational in 2027.

With some \in 200 bn raised so far, ETS revenues are distributed (i) to Member States, which must use at least 50 % for green investment, and (ii) to EU level instruments, including the Innovation Fund, Modernisation Fund, and from 2026 onwards, the new Social Climate Fund (see section 4.3 for funding instruments).¹⁰

¹⁰ For more information see EC websites: https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets_en; https://climate.ec.europa.eu/news-your-voice/news/2024-carbon-market-report-stable-and-well-functioning-market-drivingemissions-power-and-industry-2024-11-19 en?utm_source=chatgpt.com (accessed 30 December 2024).





Source: author's elaboration



Industrial Policy under the EGD

Related to industrial policy, the initial policy focus of the EGD was on promoting a circular economy via a Circular Economy Action Plan including efforts to ecologically design products and facilitate the repair of products. With the 2020 EU Industrial Strategy (and its update in 2021 following the Corona Pandemic), the EC however aimed at fostering the resilience of the Single Market and the Open Strategic Autonomy of the EU, including by the monitoring of strategic dependencies and the promotion of industrial alliances. To date, 11 industrial alliances have been formed (e.g. on Batteries, Clean Hydrogen, Photovoltaic Industry, Plastics, Processors and Semiconductors, Raw Materials). The alliances are essentially consultative bodies, with no funding or decision-making powers. With respect to the stated aim of accelerating the twin transition, the Strategy promoted, amongst others, (i) the decarbonization of steel production, and (ii) the promotion of joint research projects under the Horizon Europe partnerships.

However, with the outbreak of the energy crisis following the Russian war in Ukraine as well as the industrial policy initiatives of the Biden administration (in particular the Inflation Reduction Act), industrial policy increasingly moved to the core of EU policy-making in the context of the EGD. In February 2023, the Commission published the Green Deal Industrial Plan (GDIP) with the aim to create a more supportive environment for scaling up the EU's manufacturing capacities for net-zero technologies and products required to meet Europe's ambitious climate targets (European Commission 2023a). The Strategy rests on four pillars (i) a predictable and simplified regulatory environment; (ii) faster access to funding; (iii) enhancing skills; and (iv) open trade for resilient supply chains. With respect to the first pillar, the Commission introduced a number of initiatives, in particular the Net Zero Industry Act (European Commission 2023d). The latter provides a simplified regulatory framework – e.g. via shorter time limits for permitting processes and the one-stop-shop principle for administrative processes – in order to increase the manufacturing capacities of technologies and products that are key to meet climate neutrality goals, such as batteries, windmills, heat pumps, solar, electrolyzers, as well as carbon capture and storage technologies. With respect to the second pillar on funding, the Strategy does not introduce any new funding programs, but the aim is to facilitate the use of existing EU funds for financing clean tech innovation, manufacturing and deployment, with a focus on REPowerEU, InvestEU and the Innovation Fund. It is against this background that the EC Investment Needs Assessment concluded that "while funding possibilities have recently increased, the current EU budget has insufficient possibilities for supporting the objectives of the Net-Zero Industry Act and for ensuring a level-playing field between Member States, relative to the identified public investment needs." (European Commission 2023c, 3). With respect to pillar three, the skills agenda, the Strategy by and large refers to already existing initiatives, e.g. the European Skills Agenda and the European Pact for Skills, as well as to existing support programs for skills acquisition under the Just Transition Mechanism, the European Regional Development Fund, and the European Social Fund. Besides referencing existing trade policies, new measures under Pillar 4 (Trade) include initiatives for promoting secure, sustainable and affordable global supply of raw materials via the promotion of a Critical Raw Materials Club, Clean Tech/Net-zero Industrial Partnerships, and a new export credit strategy. At the time of writing (end 2024), only little progress had been achieved on these initiatives.

With respect to critical raw materials, more concrete steps have been taken with the **European Critical Raw Materials Act (CRMA)** of May 2024 (European Union 2024). As part of Pillar 1 of the GDIP, its objective is to enhance the supply of critical raw materials (CRMs) for relevant industries and strategic technologies by fostering extraction, processing, and recycling within the EU. While it sets concrete and ambitious benchmarks for the first time, they are legally non-binding. Key elements of the CRMA include legal changes to expedite permitting processes for strategic projects linked to strategic raw materials (SRMs). The regulation aims to streamline approval procedures by granting strategic projects "public interest" status and by imposing stricter permitting timelines. Since the approval process represents only a fraction of the overall lead time required to establish mining projects, it remains unclear whether the Act will significantly reduce the total time required to implement a project. The CRMA also introduces obligations related to recycling and circularity, national exploration programs, data collection, risk monitoring, and increased transparency. These measures serve various aims, including securing CRMs from secondary sources, gaining a better overview of potential supply shortages, and fostering public acceptance of raw material projects.

Though not formally a part of the EGD, Important Projects of Common European Interest (IPCEIs) have been promoted by the EC as a complementary tool of industrial policy to promote the green and digital transformation. On the basis of Article 107(3)(b) of the Treaty on the Functioning of the European Union (TFEU), public financial support to promote the execution of an important project of common European interest may be considered compatible with the internal market. In 2014 (with an update in 2021), the Commission published a Communication specifying the criteria for the compatibility with the internal market of State aid to promote the execution of IPCEIs. Since IPCEIs have to be supported from national budgets (though under the RFF also EU funds were made available for IPCEI funding), Member States are however in the driving seat to form an IPCEI, identify the scope of the projects and select participating companies and projects. For the time being, a centrally managed EU IPCEI fund does not exist, though the Commission supports a platform - the Joint European Forum for IPCEI – facilitating their establishment. At the end of 2024, 10 IPCEIs were in operation. With a focus on the microelectronics value chain (2 IPCEIs), the hydrogen value chain (4 IPCEIs), the battery value chain (2 IPCEIs), cloud computing (1 IPCEI) and the health value chain (1 IPCEI), the large majority is focused on supporting research and development as well as projects of first industrial deployment. One IPCEI (the Fehmarn Belt fixed rail-road link) is dedicated to infrastructure. With participation of 22 Member States. IPCEIs have mobilized some €91 bn in investments so far, of which €37 bn is state aid, the rest being private co-funding.¹¹ Recent assessments (Eisl 2022; Schmitz, Seidl, and Wuttke 2024) identify two principal problems with the existing IPCEI structure: (i) the lack of common European funding for IP-CEIs, particularly as the RFF funds will be phased-out in 2026, and thus funding will depend on national fiscal space, which is highly divergent amongst Member States; and (ii) the high administrative burden associated with the approval process, with stringent eligibility and compatibility criteria to be met by project applicants.

Initially proposed in February 2022 and adopted in September 2023, the European Chips Act (ECA) intends to reinforce the semiconductor ecosystem in the EU, ensure the resilience of supply chains and reduce external dependencies. Its specific objective is to ensure Europe meets its digital decade target of doubling its global market share in semiconductors to 20 % by 2030. Thus, a crucial difference between the Chips Act and the microelectronics IPCEIs is that IPCEI rules require novelty beyond the global state-of-the-art. The ECA introduced noteworthy initiatives, including in particular a strategic mapping of the semiconductor sector; a virtual design platform to lower the barriers to entry to chip design, especially for SMEs and start-ups; different equity and debt solutions for SMEs and startups under the Chips Fund; competence centers in each member state to facilitate access to the virtual design platform and pilot lines; and a European Semiconductor Board comprising EU member states, which advises the European Commission. (Kleinhans 2024). Most of these activities refer to ECA Pillars I (Chips for Europe Initiative promoting R&D) and III (Coordination & Monitoring). Pillar II incentivizes public and private investments in manufacturing facilities for chipmakers and their suppliers. The Chips Act foresees a total funding volume of 43 bn EUR, of which 11 bn EUR will be provided for R&D and innovation (mostly through existing funds supplied via Horizon Europe and the Digital Europe Programme). The remaining volume for investments in new

¹¹ For more information see DG Competition dedicated IPCEI website: <u>https://competition-policy.ec.europa.eu/state-aid/ip-cei_en</u> (accessed 30 December 2024).

manufacturing capacity (Pillar II) is expected to come from the Member States and private companies. In addition, the EU will also set up a Chips Fund to facilitate access to debt financing and equity, in particular for start-ups, scale-ups, SMEs and small mid-caps. This will be implemented by the European Innovation Council and InvestEU (though by the end of 2024 implementation is still pending).

Initial assessments of the ECA have pointed to a number of shortcomings: Firstly, for state aid exemptions under Article 107 TFEU to be applicable, national funds must be directed to "firstof-kind" manufacturing facilities. Consequently, a bias to promote leading-edge semiconductor production (2–3 nm) has been introduced, which not necessarily fits the needs of downstream European producers (e.g. in the car industry), which typically need chips that are produced at larger sizes above 10 nm. Moreover, chips made in Europe will likely be more expensive than the products of Asian competitors and may find it difficult to find a market.¹² Secondly, the target of a 20 % world market share will not necessarily reduce external EU dependencies. given the highly diversified technologies produced in the semiconductor global value chain with transnational division of labor, low levels of substitutability, and strong customer-supplier alliances. Instead, from a geopolitical perspective, the EU should more specifically look at which elements of its domestic semiconductor value chain is of strategic importance for others, i.e., at reverse dependencies and indispensability. Thirdly, institutional capacities and capabilities for market monitoring, formulation of policies and coordination between EU Member States and with international partners is severely lacking in the EU, while the existing governance structure of support programs is complex and non-transparent (Dachs 2023; Kleinhans 2024).

4.3. Sources of funding for the Twin Transformation

Unsurprisingly, the funding strategy for the Twin Transformation is based upon a number of components It combines particularly elements including (i) existing (though adapted) instruments (e.g. Horizon Europe, the Innovation Fund, InvestEU), (ii) new instruments (e.g. the Just Transition Fund, Social Climate Fund), and (iii) temporary exemptions from EU state aid rules to facilitate member state funding. Table 4.1 provides an overview of EU funding instruments. In the following, we will in turn discuss the main elements of the funding agenda. The role of private finance and of monetary policy will be addressed in more detail in section 5.4.

Existing and adapted instruments

A number of existing EU programs have been adapted to include the promotion of the Twin Transformation. In the following we will concentrate on discussing three core programs, i.e. Horizon Europe, the EU Innovation Fund, and the InvestEU program. The programs are supposed to cover the full project development cycle, i.e. from basic research to applied research, proof of concept, pilot, demonstration, scale-up and roll-out phase.

Horizon Europe, the EU's core program for supporting research & innovation for the period 2021–2027, is endowed with an indicative budget of €93.5 bn. The Twin Transformation challenges have been included in the program particularly in the following ways: Firstly, a large proportion of funds has been dedicated to Pillar II on Global Challenges & European Industrial Competitiveness. €53.5 bn will be earmarked for research on Health (Cluster 1), Digital, Industry & Space (Cluster 4), Climate, Energy & Mobility (Cluster 5), Food, Bioeconomy, Natural Resources, Agriculture & Environment (Cluster 6). A further €13.6 bn will go into Pillar III on Innovative Europe. Thus, in total some 70 % of funds are dedicated to Twin Transformation challenges. Secondly, new instruments have been introduced, including the **European Inno**-

¹² The moratorium declared by INTEL in September 2024 on the construction of large manufacturing sites in Magdeburg and in Poland despite € 10 bn in subsidies granted by the German governments are seen by some experts as suggesting the economic non-viability of large-scale production in the EU (INDUSTRIEMAGAZIN 2024; Jahn, Olk, and Volkery 2024).

vation Council. With a budget of €10 bn, the Council provides both grants and equity investment to start-ups for innovations with breakthrough and scale-up potential that are too risky for private investors. Also, upon the model proposed by Marianna Mazzucato (European Commission, 2018), five EU Missions have been formulated, i.e. transdisciplinary programs intended to achieve a bold, inspirational and measurable goal within a set timeframe. Missions include both research and action (e.g. education & training, living-labs, lighthouses etc.).¹³ Lastly, European partnerships between research organizations and private companies on defined objectives are supported.

Set-up within the framework of the EU Emission Trading System (EU-ETS) already in 2003, the EU Innovation Fund supports projects for (i) innovative low-carbon technologies and processes in energy-intensive industries, including products that can substitute carbon-intensive ones, (ii) carbon capture and utilization (CCU), as well as the construction and operation of carbon capture and storage (CCS) facilities; (iii) innovative renewable energy generation, (iv) energy storage, as well as (v) net zero mobility (maritime, aviation, road transport) and buildings. Disbursements from the Fund are destined for highly innovative technologies and flagship projects that can bring about significant emission reductions. Financial support is provided via grants covering up to 60 % of eligible costs. The financial resources operated by the fund are raised through the monetization of 530 million ETS allowances. Under the assumption of an average carbon price of €75 per ton during the period 2020–2030, this would amount to a total of €40 bn in terms of expected revenues for the Fund. Besides the Commission, the governance structure of the Fund is rather complex and includes (i) CINEA (European Climate, Infrastructure and Environment Agency) as the implementing body, the (ii) EIB as providing project development assistance (PDA), and managing the monetization of the Innovation Fund allowances from the EU ETS and the Innovation Fund revenues; and finally (iii) participating Member States, which are consulted on key decisions, including decisions to launch calls for proposals, the maximum amount of funding to be made available for project development assistance, and the pre-selection of projects for grants.

In 2020, the EC started the **InvestEU program** as successor to EFSI. Funded for the EU budget period 2021–2027 and based on the model of the Juncker Plan, the InvestEU Fund combines EFSI and 13 other – formerly independently managed – EU financial instruments and is expected to stimulate more than €372 billion of public and private investment. An EU budget guarantee of €26.2 billion backs the investment of the European Investment Bank Group and other financial partners. The program focusses on four policy areas: (i) small and medium-sized businesses, (ii) research, innovation and digitalization, (iii) sustainable infrastructure, and (iv) social investments and skills. 30 % of overall funding must be used for green investment. As regards the project development cycle, support is provided for the scaling and rolling-out of projects. As of June 2024, a total of €280 bn of investment had been mobilized, with most funding going into energy as well as mobility projects.

New EU Funding Instruments

A major, though as it turned out, temporary funding mechanism consisted in the issuance of common EU debt. Initially motivated by the economic repercussions of the Corona Pandemic, the **NextGenerationEU (NGEU) package** established a fund with a total volume of up to €806,9 bn. The program operates from 2021 to 2026, and is tied to the regular 2021–2027 budget of the EU's Multiannual Financial Framework (MFF). Funds will be more or less evenly disbursed as both grants and loans. The largest part, i.e. €723,8 bn will be allocated via its core instrument, the Recovery and Resilience Fund (RRF). Remaining funds are distributed

¹³ The five missions are: (1) Adaptation to climate change, including societal transformation, (2) Combatting Cancer, (3) Healthy oceans, seas, coastal & inland waters, (4) Climate-neutral & smart cities, (5) Soil health & food. See website: <u>https://research-and-innovation.ec.europa.eu/document/download/9224c3b4-f529-4b48-b21b-879c442002a2_en?file-name=ec_rtd_he-investing-to-shape-our-future.pdf</u> (accessed 30 December 2024).

via other instruments, including REACT-EU (€50.6 bn), Horizon Europe (€5.4 bn), InvestEU (6.1 bn), European Agricultural Fund for Rural Development (€8.1 bn), and the Just Transition Fund (€10.9 bn). The money borrowed by the EU on private capital markets will be repaid using the EU's own resources, starting in 2028 and extending until 2058.¹⁴ NGEU funds are used for a variety of purposes. Some 30 % shall supposedly be used for climate-related action, and more than 50 % for "modernization"-related policies in a number of thematic areas, including research & innovation, climate and digital transition, preparedness, recovery and resilience (incl. health). More specifically, with the establishment of the RePowerEU plan in May 2022, €225 bn have be designated for projects reducing the EU's dependence on Russian fossil fuels by fast-forwarding the clean transition. Access to funds has been conditional upon the adoption by the Commission of national recovery and resilience plans. National allocation of funds clearly favors peripheral EU member states, with Spain, Italy, Poland, Greece, Portugal, and Romania receiving 61.5 % of total grants ¹⁵.

Established in June 2021, the Just Transition Mechanism (JTM) is a new instrument of the Cohesion Policy 2021-2027. The JTM supports the regions, sectors and workers most affected by the transition towards climate neutrality, in particular by promoting the economic diversification and reconversion of the most-affected territories and helping people to adapt in a changing labor market. The JTM consists of three pillars: (i) the Just Transition Fund with an initial endowment of €19.7 bn, (ii) a dedicated InvestEU scheme to crowd-in private investment, estimated at €10 – €15 bn, and (iii) a public sector loan facility managed by the EIB, with the latter providing up to €6–8 bn in loans as finance partner, while the Commission provides up to €1.3 billion in grants. In total, the Commission hopes to mobilize €55 bn over the period 2021–2027 under the JTM. Access to funds is conditional upon (i) Member States' adherence the to the EU's 2050 climate objectives and the Commission's approval of Territorial Just Transition Plans (TJTPs) submitted by the Member States. These plans define the regions and sectors affected by the green transformation, and lay out regional development objectives, time plans as well as policies. Upon adoption of the TJTPs, national or regional authorities are responsible for selecting the projects to be funded. Contributions are based on a co-funding model, with EU funding (50 % – 85 % of eligible costs depending on the type of region) complemented by Member States' allocations under the European Regional Development Fund and the European Social Fund Plus.¹⁶

In 2023, the EC established the **Social Climate Fund** as an additional instrument to manage the social effects of the green transition. The fund will be endowed with a maximum of €65 bn from ETS-2 revenues, i.e. income from carbon pricing on buildings and road transport to be started as of January 2027. To access the fund, by June 2025 EU member states must submit Social Climate Plans outlining how they intend to use the resources. Countries must co-fund at least 25 % of the costs of their Social Climate Plans, increasing the overall mobilized resources to €87 billion between 2026 and 2032. It will however be possible to fund national top-ups with ETS-2 revenues retained at national level (Sgaravatti and Tagliapietra 2025).

(Temporary) adaptations of existing EU state aid rules

As a consequence of both the EGD, the Corona Pandemic and the 2022 energy crisis, the EU has also resorted to adapting its regulatory framework on state aid. Thus, a higher level of flexibility was given to Member States in using national-level public funds for defined purposes.

¹⁴ For more information see the respective EC website: <u>https://commission.europa.eu/strategy-and-policy/recovery-plan-eu-rope_en</u> (accessed 30 December 2024).

¹⁵ See <u>https://commission.europa.eu/document/download/e2bde9ed-38b5-42c5-9f38-f9f0b2731134_en?filename=recov-ery_and_resilience_facility_.pdf</u> (accessed 31 December 2024).

¹⁶ For more information see the respective EU website: <u>https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/just-transition-mechanism_en</u> (accessed 30 December 2024).

The General Block Exemption Regulation (GBER) allows Member States to declare certain categories of aid compatible with the internal market without prior notification to the European Commission. In force since 2014, the GBER has already been revised several times. Notably in 2021 to include, among others, financing and investment operations supported by the InvestEU fund, European Territorial Cooperation (ETC) projects (Interreg), and new block exemptions for the European Innovation Partnership for agricultural productivity and sustainability. The latest revision of March 2023 granted member states more flexibility to design and implement support measures in key sectors for the transition to climate neutrality and net-zero emissions industries. These include (i) environmental protection and energy (support for the deployment of renewable energy, decarbonization projects, green mobility and biodiversity, etc.); (ii) IPCEI projects, (iii) training and reskilling; (iv) aid to regulate energy prices; (v) research, development and innovation, and (vi) aid for risk financing. Initially in force until the end of 2020 and extended to the end of 2023 due to the pandemic, the application of the GBER amendments was extended until the end of 2026 (Soete and Lepièce 2023). Available data until 2022 shows that state aid granted under GPER during the period 2018-2022 amounted to more than €50 bn p.a., with a peak of €66.5 bn in 2021 and €58.6 bn in 2022. Though the 2023 GPER amendments are not yet reflected in the data, the three main objectives of GBER disbursements between 2018–2022 were (i) environmental protection and energy savings (approx. 30 % of total), (i) research, development and innovation (approx. 20 %), and (iii) regional development (approx. 18 %) (European Commission 2024, 89 et seq.).

The second major adaptation of the existing legal state aid acquis was the **Temporary Crisis** Framework (TCF). Adopted in March 2022, the TCF enabled Member States to support the economy in the context of Russia's invasion of Ukraine. The adoption of a new Temporary Crisis and Transition Framework (TCTF) in March 2023 did not only partially prolong the TCF of 2022, but introduced new measures to accelerate investment in sectors that are essential for the transition to a net-zero emissions economy. In particular, the new Framework introduced measures aimed at supporting investments in strategic equipment (e.g. batteries, solar panels, wind turbines, heat pumps, electrolyzers and carbon capture usage and storage) as well as in the production of key components and for the production and recycling of related critical raw materials. Aid under these provisions (i.e. sections 2.5, 2.6., and 2.7. of the TCTF) can be granted until 31 December 2025. Between March 2022 and end of June 2023, the Commission had approved 257 national measures notified by 27 Member States under the TCF/TCTF. The overall budget that Member States notified and that was approved by the Commission during this period was worth a total of €729.72 billion. €140.79 billion of the latter sum was actually disbursed to companies, representing 19.3 % of all the aid approved. Unfortunately, no data on aid granted under sections 2.5, 2.6. and 2.7 of the TCTF is yet available (Stefano, Cannas, and Van de Casteele 2024).

By way of conclusion, the two above exceptional regimes under EU State aid regulations provided flexibility for Member States to pursue expansionary policies in response to the shocks hitting Europe since 2020. While of course depending on their respective fiscal powers, the level of uptake by Member States was significant. For the period of 2020–2023, a sum of approx. €320 bn of state aid was disbursement under the two regimes. With a phase-out of the two regimes until 2026 imminent, at the time of writing it remains however unclear, if and to what extent state aid will be available for IP purposes in the years to come.

4.4. Conclusions

What overall résumé can be drawn from the above discussion? Our analysis of existing industrial policies for the Twin Transformation can be summarized by three main conclusions:

- (1) Many initiatives at the expense of coherence and strategic outlook: What is perhaps most apparent, is the plethora of programs and instruments that have been enacted during the last five years. Given the sequence of exogenous shocks and challenges hitting the EU, it is arguably not surprising that EU policy-makers had reacted to each of these events by enacting specific policy responses. This consisted both in establishing new initiatives and programs, while also adapting existing instruments to the latest policy challenge. This mode of crisis politics also affected the implementation of the European Green Deal, the latter arguably representing a rather coherent set of policies with a clear objective. On the one hand, the EGD profited from the emergency measures, e.g. by the significant RRF funds diverted to promote the energy transformation. On the other hand, the original EGD objectives became gradually superseded by new objectives with a geopolitical motivation, in particular supply chain resilience, strategic autonomy or technological sovereignty.
- (2) A complex institutional structure with demanding processes: While the EGD's approach prioritized sector regulations and the deployment of price instruments, in particular carbon-pricing within the ETS, industrial policy in a more systematic way became prioritized as a consequence of the Pandemic and the Ukraine crisis. Most notably, besides the focus on energy security this triggered new efforts to promote green and digital technologies. The policy approach thus shifted to one favoring incentive mechanisms via grants and loans. In contrast to peer countries such as the US and Japan, given the EU institutional structure, the enacted subsidy programs and instruments are rather complex in nature, with a variegated distribution of competences between the EU and Member States in accordance with the EU acquis. As a consequence, policy coherence suffered and implementation has been uneven, critically depending on the institutional capacities of national bodies. This is particularly pertinent in cases, where access to funds has been conditional upon the presentation of national plans by Member States before project funding could start (e.g. in the case of the RRF and the JTP). Access to project financing is typically based on application and monitoring processes with strict formal conditionalities requiring significant upfront resources from applicants. Program and project administration within the competent bodies, including coordination between bodies at national and EU level, are generally time-consuming and result in considerable lead-times between project application and kick-off. Given the dominant co-financing model in many programs, program uptake also depends on the financial powers of Member States, thus increasing heterogenous implementation across the EU.
- (3) A fragmented and intransparent funding structure: With the exception of NextGenerationEU as a temporary emergency funding mechanism, EU level funding remained circumscribed. It essentially consisted in reshuffling regular budgetary resources and ETS funds for the purposes of the Twin Transformation, which then went into diverse existing & new funds supplemented by NGEU money. Large disbursements of public resources happened at the level of Member States, particularly in those with significant fiscal power (e.g. Germany and France), while thanks to the NGEU the lack of own funds in most member states was temporarily remedied. Incentives for private investors via EU guarantees and co-funding under the de-risking approach as well as green finance reforms did raise money, but in overall quantitative terms, private investment for the Twin Transformation remained below expectation.

Thus, while funding remains an important issue, especially for the coming years, our preliminary analysis points in particular to governance and capacity issues as major shortcomings of the prevailing approach. It is to these that we will turn in the next section.

Funding initiative / program	Time frame	Budget (€billion)	Source of funding and funding instruments	Objectives
NextGeneration EU (NGEU)	2021-2026	750	Grants and loans financed through common debt (EU bonds)	Support the EU's COVID-19 recovery; green transi- tion; economic resilience
Recovery and Resilience Fund (RRF)	2021-2026	724	The RRF is the operational arm of the NGEU	Digitalization, green transition, energy infrastructure
REPowerEU	2022-2026	300	Mainly RRF	Reduce Europe's energy dependence on Russia
Horizon Europe	2021-2027	93.5	Grants mainly (EU budget)	Research and Innovation
The European Regional Development Fund	2021-2028	226	Grants (EU budget)	Ameliorate regional imbalances
The Cohesion Fund	2021-2029	48	Grants (EU budget)	Ameliorate regional imbalances
European Structural and Investment Funds (ESIF)	2014-2020	535	Various	Execute European economic, innovation, agricultural and cohesion policy
Strategic Technologies for Europe Plat- form (STEP)	2021-	15	Reshuffling of existing funds	Support technological upgrading (incl. digitalization, decarbonization and biotech)
European Fund for Strategic Invest- ments (EFSI)	2015-2020	33,5	Guarantees, Loans, Equity, Venture Debt (EU budget, EIB, EIF)	Revive European investments to boost growth and competitiveness
InvestEU	2021-2027	26	Similar to EFSI	Similar to EFSI
Net-Zero Industry Act (NZIA)	2023-2030	16-18	No additional EU funds, proposed member state spending	Strengthen the European manufacturing capacity of net-zero technologies
Social Climate Fund	2026-2032	86.7	25 % of ETS-2 revenues (max. €65 bn) plus 25 % national co-financing	Support households and firms impacted by climate policies
Innovation Fund	2020-2030	40	Monetization of 530 million ETS al- lowances, assuming a carbon price of €75/tCO2	Finance "innovative low-carbon technologies"
The EU Chips Act	2023-2030	NA	Mostly private and MS funding; re- shuffling of EU resources (e.g. Hori- zon, RRF)	Support Europe's semiconductor manufacturing
Important Projects of Common Euro- pean Interest (IPCEI)	2018-	NA	Member States, private co-funding	Strengthen open strategic autonomy, by enabling breakthrough innovation and infrastructure projects
Just Transition Mechanism	2021-2027	55	EU grants and loans	Ameliorate regional impact of decarbonization

Table 4.1.: Non-exhaustive overview of EU funding programs relevant for the Twin Transformation

Source: own adaptation, based on Skyrman (2024, 12)

5. KEY DEFICITS OF AND CHALLENGES FOR EU INDUSTRIAL POLICY

Based upon the assessment in the previous section as well as by taking into account new challenges, a number of key deficits of the current EU approach to industrial policy for the Twin Transformation will be discussed in this chapter. Amongst these are, in particular (i) the lack of a coherent definition and strategic outlook of industrial policy, (ii) the legitimacy problems of the current approach, (iii) governance deficits, and (iv) the counterproductive macro-financial framework.

5.1. The lack of a coherent definition and of strategic outlook

Industrial policy may be conducted for different purposes. As mentioned in Chapter 1, the traditional objective of IP was to promote late industrial development in low-income countries. Following the example of the technologically most advanced country of the time, basically all current industrialized countries (with the notable exception of Great Britain) went through such a phase of late industrial development by applying a roughly similar arsenal of industrial policies. The most recent case for highly successful late industrial development has of course been China, which in the relatively short period of 40 years developed from a mostly agrarian society into the industrial powerhouse of the global economy. Late industrial development is however not a relevant IP motivation in the case of the European Union anymore. This does however not mean that industrial policies have not been a pervasive feature of the economic policies of high-income countries as well. They have though come under different labels. As various scholars have shown (see e.g. Block and Keller 2009; Mazzucato 2015), the US government has for instance systematically promoted research and development particularly in high-tech sectors (including the military-industrial complex) through state-sponsored programs such as DARPA and others throughout the last decades. The underlying motivations may vary and depend on the respective political-economic context. They may include national security concerns, the promotion of (public) health, or the security of supply with essential goods and services to increase crisis resilience. Evidently, the motivation underlying IP is of critical importance not only in terms of generating public support domestically. In a world that after three decades of hyper-globalization has become highly interrelated, it has also important foreign policy implications. Industrial policy for rearmament coupled with protectionism might provoke retaliatory action from other countries and in extremis trigger an arms race, thereby generating a security dilemma.¹⁷ On the other hand, an industrial policy to promote the green transformation coupled with green technology transfer and largely open trade in green products and services might lead other countries to cooperate and thus promote a green transformation at the global level. Industrial policy motivations are thus crucial and should be carefully specified.

Looking back at the last five years, the debate on the motivations and objectives of IP in the European Union went through basically three phases. As a consequence of the commitments assumed by the EU under the Paris Climate Accord in 2015, and triggered by the emergence of large-scale climate activism in European civil society during 2018 and 2019, the first phase featured the quest for a green transition. The objective underlying the European Green Deal presented by the new Commission President Ursula von der Leyen as her lighthouse project in December 2019, was to decarbonize the European economy and make it climate-neutral until 2050. To that end, the first von der Leyen Commission introduced a large package of programs and regulations to put the European economy on the path to sustainable development (see section 4.2 for an overview). Though the EU had been engaged in environmental

¹⁷ A security dilemma describes a situation in which the actions of a country to increase its security (e.g. through rearmament) create a situation that ultimately undermines its security. The reason for this is that as other countries do not know whether rearmament serves defensive or offensive objectives, they will react by retaliatory action. This in turn can further escalate tensions and ultimately lead to (armed) conflict (see Herz (1950) for the original formulation of the concept).

policy for decades, the EGD elevated the policy field to a strategic level, and represented the most comprehensive and ambitious policy initiative to date. Arguably, the prime motivation was to deliver on international commitments given the EU's self-image as a global leader on climate issues, while also reacting to increasingly widespread and profound concerns amongst large segments of the EU population, in particular the younger generation.

A second and partially overlapping phase came with the Covid-19 pandemic in March 2020. Against the backdrop of disruptions in global supply-chains and the quest for the development of an effective vaccine, a second motivation for industrial policy emerged, whose aim was to increase the security of supply for essential goods and services. The pandemic was the starting point for an increasing awareness in policy-making circles that the European economy was dependent on other countries in guite substantial ways, when it came, for instance, to medical equipment and pharmaceutical substances, which were mostly produced in China, India or other non-European countries (Raza et al. 2021). What is more, in such situations the governments of producer countries of essential goods (including the EU) tend to - at least temporarily - prioritize domestic consumption and thus restrict exports to other countries, as happened e.g. in the case of Covid-19 vaccines and other needed medical equipment during the pandemic (Bollyky and Bown 2020). In response, EU policy-makers started to reflect on the EU's "Open Strategic Autonomy" and the need to increase the resilience of global supply chains led by European firms. As a consequence, the EU and Member States enacted a number of policies to diversify supply chains, promoted near- and onshoring of essential production (e.g. in the pharmaceutical sector and semiconductors) and the build-up of stockpiles of essential pharmaceutical substances and medical goods. The basic motivation of these policy initiatives was to increase the EU's crisis preparedness, by guaranteeing a certain level of security of supply for essential goods given turbulences in the global economy in the immediate aftermath of a shock. Arguably, the EU crisis response was thus by and large defensive in nature, though the reluctance of the EU to share novel vaccine technology - aka its "vaccine nationalism" was severely criticized by the countries of the Global South at the time (Kampmark and Kurečić 2022).

Against the background of the growing geopolitical confrontation between the US and China, a third phase came with the outbreak of the war against Ukraine in February 2022. While the pandemic had already pointed political attention to specific vulnerabilities, the perception that the EU was in fact suffering from a much broader set of dependencies, including critical raw materials, green and digital technologies, as well as energy, that could be "weaponized" against it (Farrell and Newman 2019), now became widespread. As these dependencies were typically concentrated on countries, the EU had increasingly tense relations with -e.g. critical raw materials, green technologies and pharmaceutical substances from China, natural gas and oil from Russia – the motivation for promoting industrial policies became increasingly "securitized" (Buzan, Wæver, and Wilde 1998). That is, the principal rationale for conducting different kinds of industrial policies became increasingly motivated by national security concerns. The issue of technological sovereignty in tandem with (more) local manufacturing, i.e. the ability to control the capacities and capabilities needed to produce strategic products, moved onto the centerstage of EU industrial policy-making. In response, different policy instruments were applied. These included geographical diversification of supply, where domestic production was impossible and insufficient, respectively (e.g. buying LNG gas from the US and UAE instead of Russian pipeline gas), a strategic reorientation of trade policy to serve security purposes (e.g. via export restrictions, FDI screening, trade sanctions), as well as the promotion of reand onshoring of strategically important advanced technologies (e.g. via the European CHIPS act, the IPCEIs on batteries).

Most recently, external dependencies particularly in high-tech sectors have led to a renaissance of the debate about the EU's competitiveness. Based on the perception that the EU economic model suffers not only from a number of dependencies, but in particular from insufficient innovation dynamics, a number of recent strategy documents, e.g. the Letta Report (Letta 2024), the Strategic Agenda 2024–2029 (European Council 2024), and most recently the Draghi Report (Draghi 2024), diagnose a competitiveness gap of the European economy vis-à-vis its global peers. Consequently, a large number of both horizontal and sectoral measures to close this gap has been proposed, and the European Commission is working on a new competitiveness agenda with policy proposals forthcoming throughout 2025.

The strategic orientation has thus shifted from environmental and crisis resilience objectives to promoting EU competitiveness, with a focus on increasing productivity and innovation via a mix of de-regulation and regulatory simplification, the creation of a single market for energy, finance and telecommunications, public and private investment in high-tech, as well as more assertive foreign economic policies. Twenty-four years after the notorious 2000 Lisbon Agenda, which had introduced a number of neoliberal reforms based on labor market flexibilization, deregulation and liberalization, competitiveness – though in a somewhat modified form – is thus again re-enthroned as the overarching objective of EU economic policy. As a consequence, the conventional view of the hierarchy of economic goals has been re-established: the first priority is growth based on productivity and innovation, everything else, including decarbonization and social welfare, is relegated to second place.

Though the Draghi Report states that competitiveness should not be understood as a zerosum game pitting the EU against other countries, it nevertheless explicitly refers to the EU's growth and productivity gap vis-à-vis the US and China as the problem to be tackled by its proposed agenda. The report also cites statistics in support, for instance the EU's falling share of world GDP, falling EU shares in global trade, or the small number of EU companies amongst the world's top 50 tech companies and their falling share of global tech revenues (Draghi 2024, 7 et seq.). As Paul Krugman already observed thirty years ago (Krugman 1994), to elevate the concept of competitiveness from the company level to the macroeconomy is however dangerous. If one follows the Draghi Report and defines productivity as the essential measure of a country's competitiveness, Krugman's main argument was that in large advanced economies productivity basically depends on domestic factors, as the relative weight of the international sector in the national economy remains circumscribed. One might argue that after three decades of neoliberal globalization this argument does not hold any longer, as the EU has been increasingly integrated into the world economy. However, this has happened to a limited extent only. The share of total trade (extra-EU exports + imports of goods) to EU GDP grew from approx. 23 % in 2002 to roughly 29 % in 2023, i.e. an increase of roughly one quarter.¹⁸ One might thus assume that international factors, such as e.g. exchange rate movements, unfair competitive practices of trade partners, etc. might have played a stronger role in determining EU economic performance. However, a look at the EU trade balance (goods and services) reveals, that since the mid-1990s the trade balance has always shown a surplus with a significant growth tendency since 2009 (except for 2022 due to the Ukraine shock). In 2023, net export of goods and services stood at 3,70 % of EU GDP, i.e. a significant surplus (see also Figure 3.1). Whatever negative impacts the world economy might have had on the EU economy, the EU seemed to have managed well with respect to its external position.¹⁹

The EU's slower growth dynamics relative to the US and China thus should be primarily explained by domestic factors. The Draghi Report cites relevant factors such as relatively low R&D dynamics, low investment levels (both public and private), and the lack of risk-taking private investment capital. It however fails to fully account for the dysfunctional macroeconomic framework of the EU, which via fiscal austerity and restrictive monetary policies has had a strong contractionary effect on effective demand during most of the last 25 years. The latter is

¹⁸ Own calculation, based on AMECO data tables DMGE, DXGE and UVGD, see <u>HERE</u>.

¹⁹ Own calculations, based on AMECO data tables UBGS and UVGD, see <u>HERE</u>.

arguably the most pronounced difference to both the US and China, which over the same time period have followed much more expansionary fiscal and monetary policies.

However, in so far as the Draghi Report focusses on domestic measures to increase productivity dynamics, and labels this a competitiveness agenda, it might be considered an otherwise harmless misnomer. To the extent however that the policy agenda puts the emphasis on reacting to perceived external threats to EU competitiveness, it might quickly turn into a "dangerous obsession", leading to skewed policies that might threaten the international economic system and ultimately be self-defeating (Krugman 1994).

The latter happens precisely through the securitization of economic relations propagated by the Draghi Report as well as the new EC's Strategic Agenda. This is particularly problematic, since it tends to introduce a zero-sum logic into EU policy-making. Either the EU gains access to critical raw-materials "in the new scramble for Africa" or its peer competitors; Either the EU controls advanced photo-lithography technology by introducing export restrictions for EU producers like ASML, or China will acquire these technologies, misuse them to enhance its military capabilities and "weaponize" them against the EU. Either the EU produces batteries and electric vehicles (EVs), or Chinese competition will displace EU competitors from the global market. As Krugman (1994) lucidly observed, "The rhetoric of competitiveness turns out to provide a good way [...] to justify hard choices", as it appeals to national unity and sacrifice in the face of external threats. If others put their national interest first, the EU needs to follow suit. Needless to say, that the second Trump administration with its America-first rhetoric and tit-for-tat trade policy has exacerbated this stance amongst EU-policymakers.

What such a motivation overlooks, is that increased international economic competition will have broader repercussions upon international politics more generally. The political climate between countries and thus the willingness to engage in cooperation to arrive at mutually beneficial solutions for pressing global problems must necessarily suffer. Little surprise that multilateralism and global governance is considered to be in deep crisis by many observers. Under such conditions, mutual distrust reigns and virtually every industrial policy is perceived by other countries as an unwarranted act of protectionism that must be answered by retaliatory action. The shift to such a security-oriented competitiveness agenda that pits the EU against other countries should thus be considered an ambivalent and potentially self-damaging development. Precisely because of the increase of geopolitical rivalries, and the subsequent risk of self-damaging tit-for-tat trade retaliation and economic warfare between countries, the motivation for IP should be strictly defensive in nature and oriented towards achieving legitimate social objectives such as climate neutrality or enhancing societal resilience in crisis situations, by e.g. expanding domestic production capacities for essential goods and services such as essential medicines. In other words, industrial policy needs thus be embedded into a vision of "Defensive Regionalism" (Buzan 1984), instead of offensive mercantilism. While the latter employs economic statecraft to secure access to raw materials, energy, technology or export markets, with a mixture of economic and political coercion, while at the same time protecting its domestic market from foreign competition, the former approach is oriented towards promoting domestic welfare. It is based, in particular, on (i) a principled definition of what constitutes a legitimate argument for (protective) industrial policies, (ii) builds on a careful case-by-case analysis instead of reliance on a generic principle (of e.g. free trade, or expanding state power), and (iii) is open to addressing the concerns of trade partners through a process of cooperation with the aim of finding mutually beneficial solutions.

Given the EU's relatively higher external dependencies with respect to e.g. energy, technology and critical raw materials (see section 3.2), and its lack of hard power in international relations, the "assertive" foreign economic policy agenda propagated by the Draghi Report and recent Commission documents should be avoided. The EU has an obvious right to economic selfdefense, if coerced by others. In an increasingly multi-polar world, the focus of the EU's external policy approach, particularly given the new Commission's priority on economic security, should otherwise focus on promoting cooperative international economic relations. This runs however counter to the new competitiveness agenda, with the latter aiming to increase the EU's competitive leverage on world markets, that is, markets that are increasingly protected by tariff walls. Instead, a strategy based on Defensive Regionalism would be more inwardlooking, with economic dynamism being generated as a consequence of an public sector-led investment strategy for productive transformation.

5.2. The legitimacy problems of the current approach

Whatever the specific motivation, for IP programs to be accepted by societal stakeholders, they have to be considered legitimate. While economists typically focus on the technical aspects of economic policy, and thus tend to neglect legitimacy issues, such an approach is fundamentally flawed in the case of policies for the Twin Transformation. The Twin Transformation will produce deep changes to our modes of production and consumption, indeed our way of life. Along the way, some segments of society will profit, while others and potentially large parts of the population will find themselves negatively affected, at least during the transitory period up to 2050. Given the fundamental uncertainty of the process and the associated social concerns, sustained political support critically depends upon a positive, if not optimistic vision of the future. Citizens will have to be convinced that (i) the Twin Transformation is not only necessary but indeed desirable; (ii) that they are stakeholders in this process and have a chance to co-shape it; and (iii) that their aspirations and concerns are taken onboard, so that the distribution of benefits and costs during the transformation is fair and balanced.

These three requirements of a legitimate political approach to managing the Twin Transformation can be substantiated by three concepts of political theory, namely, hegemony, input legitimacy and output legitimacy. Hegemony is here interpreted in the Gramscian sense and refers to the requirement for a vision of change (or grand narrative) underlying the political management of the Twin Transformation to convince people and garner active support from civil society (see Figure 5.1 for graphical illustration). It should inspire hope and optimism for a better future. Apart from this ideational element, support is more likely if it is combined with two further elements: (i) people are given a stake in the process, such that they have a chance to voice their interests and concerns (input legitimacy); (ii) the instruments and policies employed deliver on the promises of the transformation process, and social costs arising along the way are managed in an effective and balanced manner (output legitimacy). Input and output legitimacy are complementary. Though the balance between them may shift during the process, both should be employed to secure legitimacy.²⁰

While climate science has provided a convincing case for the necessity of the green transformation, the same has not happened with respect to the desirability of the process.²¹ Though one might argue that given the existential threat of the climate crisis to human survival, its desirability should be self-evident, this is not entirely convincing. Surveys, for instance, typically confirm that a large majority of citizens is aware of the threats posed by climate change and supports policies to tackle it. However, in-depth questions reveal that different segments (or milieus) of the population have diverging views as to the specific policies to be employed, and what is more, are unwilling to change their cherished yet unsustainable personal lifestyles in more profound ways (Schleer, Wisniewski, and Reusswig 2024). In other words, while in general people understand the threat posed by climate change, their desire to change their

²⁰ In this, we do not follow the conventional view in European studies that given the multi-level governance structure of the EU including its democratic deficit (Scharpf 2002), output legitimacy is of higher importance. Given the fundamental character of the Twin Transformation, its legitimacy needs a broad approach involving both dimensions. What is more, to sustain the process of transformation over the required timespan of at least two to three decades in the face of ups and downs, i.e. resistance from vested interests, adverse outcomes from electoral cycles etc., it needs to be firmly supported by a broad social base, that has an active stake in the process.

²¹ See the most recent 6th IPCC Assessment Report at: <u>https://www.ipcc.ch/report/sixth-assessment-report-cycle/</u> (accessed 30 November 2024).

current lifestyle in exchange for some diffuse future benefit is limited. To this one has to add that other social drivers such as vested interests in the fossil economy also hinder decarbonization policies. Studies indicate that under the current constellation of social forces, it remains implausible that the EU will be able to reach its climate targets in time (Engels et al. 2024).



Figure 5.1.: Inclusive State – society relations

The pace as well as effectiveness of decarbonization policies, including green industrial policies, is thus severely curtailed by a lack of (active) support by important segments of society. Indeed, the recent electoral success of the populist far-right parties across Europe upon the basis of, *inter alia*, a climate-sceptic message suggests that popular support for the green transformation is indeed receding.

To its credit, the European Commission has understood that the green transformation needs to be complemented by a social pillar. In proclaiming that "not one is left behind", Ursula von der Leyen introduced the Just Transition Mechanism (JTM) as an element of the European Green Deal in 2019, which became operational in 2021 in the context of the Fit-For-55 package. Under the JTM, EU regions negatively affected by the phase-out of fossil fuel industries receive financial support for economic diversification and reconversion of affected territories (see section 4.3 for more info). The Just Transition Fund has however been mainly dedicated to helping coal regions manage the social and employment effects of their coal phase-out. This is important, but reaches only a small fraction of the people affected by decarbonization (Akgüç, Arabadjiewa, and Galgóczi 2022). What is more, preliminary assessments of the state of implementation of the Territorial Just Transition Plans point to very slow implementation due to missing regional state capacities and a lack of coordination between public and private stakeholders (Cirillo et al. 2024).

Many other affected sectors such as the automobile or chemical industries do not dispose of dedicated EU funds. Similarly, the manifold distributional effects of the green transformation (e.g. on workers, rural/urban areas etc.) are not systematically addressed by the EGD. The EU has thus adopted a narrow and ad-hoc approach vis-à-vis the social impacts of the green transformation. Instead, what is needed is a comprehensive social agenda, that systematically

Source: Raza, Staritz, and Grumiller (2016: 14)

addresses the variegated social impacts of the Twin Transformation. Recent work in transformation studies has, for instance, highlighted the critical role of the Foundational Economy for providing the physical (e.g. water, energy, transport) and social infrastructure (e.g. education, health, care), upon which civil and economic life depends (Bärnthaler, Novy, and Plank 2021). Understood as citizen rights, the provision of these basic public services will be of particular importance for sustaining social reproduction and societal stability during the transition period. Their expanded development during the transition would not only meet the social needs of aging societies for care services, but could become an important source of new employment, given that a significant number of jobs will be lost in both carbon-intensive sectors and economic activities taken over by digital technologies.

With respect to the digital transformation, the latter will foreseeably impact both production and consumption quite profoundly, thus generating winners and losers along the way. The digital transformation however requires a different answer as to its necessity and desirability. While the socio-ecological transformation is a politically-induced (and thus exogenous) process in order to put capitalist society onto a different, i.e. ecologically sustainable, trajectory, the digital transformation is a process endogenous to capitalist society. Thus, in the latter case, the objective is not to induce the process but to manage it in socially beneficial directions. Though it is premature to make a conclusive judgement of the economic benefits and costs of the digital transformation, some studies expect sizable job losses, particularly in routine tasks (Acemoglu and Restrepo 2019; Frey and Osborne 2017), while others emphasize negative skills-related effects on the income of workers (see e.g. Baldwin 2019). Thus, to the extent that digitalization displaces labor or necessitates new skills, the government has, for instance, a role to play to support skills acquisition and training, as prominently emphasized by the Draghi Report (Draghi 2024).

As technology is not neutral but can be used for both socially useful and detrimental purposes, the critical engagement with technological change as e.g. voiced by the Frankfurt School (Horkheimer and Adorno 1944; Marcuse 1991), however points to the need for a more systematic political regulation of the digital revolution. More recent work, in particular on the rapid expansion of digital technologies, especially in the form of social media, surveillance technology, biometric tracking, or artificial intelligence, has raised concerns about privacy, freedom, and loss of political control. Also, the power of digital platforms and of big tech companies not only in the economic realm, but in expanding its influence on politics is cause for concern (Rikap et al. 2024; see e.g. Zuboff 2020). It is thus difficult to argue that the digital transformation as such is desirable. Instead, the political management of the digital transformation is necessary and indeed desirable to guarantee individual freedoms and civil rights, as well as to promote the employment of digital technologies to socially beneficial ends. While acknowledging that the approach of the EU to regulating digital technologies has traditionally been motivated by the desire to protect individual freedoms and rights, in the recent debate on promoting the digital revolution, other motivations related to national security and competitiveness have become more prominent. It has been argued, in particular, that against the background of increasing geopolitical rivalries, the EU cannot afford to lack behind its peer competitors in advanced technologies including artificial intelligence, cloud computing or semiconductors. Thus, support programs for these industries have been designed (e.g. the EU Chips Act, the Microelectronics IPCEIs), which have handed out significant amounts of money to often large multinational companies without apparently imposing any social conditionalities and regulations.

The debate on the necessity as well as desirability of the digital transformation thus remains contradictory. On the one hand, EU policy-makers increasingly justify significant financial support for the digital transformation on grounds of national security and the EU's competitiveness. Upon this basis, the Draghi Report goes so far as to suggest that the EU actively supports the formation of European based big tech companies. In contrast, the social and political impacts

of the digital transformation are increasingly relegated to second place. This risks to create a situation, in which corporate interests, including US-based big tech companies, increasingly dictate the political agenda of the EU digital transformation. Instead, the case for the desirability of the digital transformation should be based on a distinct European approach to the digital sphere, that is motivated by promoting the EU's digital sovereignty. This approach should (i) strengthen the political regulation of digital technologies on the basis of a strong commitment to civil liberties and fundamental rights; (ii) promote forms of public digital infrastructures, including public sub-stacks and universal platforms, such as search engines and foundation Al models, which are organized as a commons governed by new public institutions with state and civil society representation; (iii) provide financial support to tech companies only upon the basis of strong transparency & information-sharing as well as social conditions; (iii) not shy away from a more stringent competition policy, including if necessary the dismantlement of companies with a dominant market position (see Rikap et al. 2024).

By way of conclusion, for industrial policies promoting the Twin Transformation to succeed, they must be based on a new inclusive European social contract (Ricz 2020). This contract must involve three elements: (i) a new narrative outlining the contours of a future European society based on a sustainable production and consumption model, (ii) social equity by way of an enlarged welfare model, that is comprehensive as well as effective in providing a social safety net for the entire population, as well as (iii) a political model including enhanced democratic participation of affected stakeholders to co-shape the Twin Transformation.

5.3. The governance deficits of the current IP approach

In section 2.3, three basic institutional requirements for successful industrial policy have been identified: (i) strong coordination, (ii) embedded autonomy, and (iii) effective state capacities. Section 4 has shown that existing industrial policies suffer from complex institutional arrangements, as well as slow and uneven implementation. Remedying these and similar governance deficits will be pivotal in the coming years. The following discussion highlights major issues to be addressed.

The coordination problem of EU Industrial Policy

Given the *sui-generis* political-institutional setup of European politics, it is straightforward that coordination presents a major challenge to any EU industrial policy program. By necessity, coordination must be multi-level including the EU, national, and regional levels, it must be multi-actor, including political bodies, the corporate sector, trade unions, science, and civil society, and depending on the scope of the program, it must include multiple economic sectors and industries (see Figure 5.2 for an illustration). To this one has to add that the distribution of legal competences on economic policies in the EU is extremely variegated. Some policy areas, including monetary and trade policy are unionized, while others such as taxation, labor market, education and social policies still (mostly) reside at the national level. In a third category of policy areas, competences between the EU and MS are shared, including environmental, transport, energy and territorial cohesion policies, amongst others. Depending on the distribution of competence, specific decision-making procedures apply respectively. To some extent, this complex institutional setup is replicated at the Member State level, particularly in countries with federal structures, e.g. in Austria, Belgium or Germany.

Coordination under these circumstances is extremely challenging, and puts the EU at a disadvantage compared to more centralized political systems such as the US and China. Under the prevailing EU framework, industrial policy-making is very time-intensive and thus comparatively slow. This owes to a number of factors, including the legal obligation to follow due process, differing state capacities to efficiently manage the process, as well as outside intervention, both from the global level and from other actors. There are many entry points for vested interests to slow-down or block specific policy initiatives. The institutional setup clearly favors (alliances of) actors with abundant resources and the capacity for orchestrated interventions at different entry points.

For its efficacy, such an institutional setup depends in particular on political leadership and the mobilization of popular support. While the European Green Deal profited from the committed political leadership of the first von der Leven Commission, which in turn was the result of strong social mobilizations in 2017-2018, in retrospect one has to conclude that the socio-political bloc supporting the project was not unified and broad enough. With respect to unity, the support coming both from Member State governments and from business associations was ambivalent. Though broadly supportive of IP, Member States with larger fiscal space argued against large scale transfers to the EU level and favored a more decentralized approach. While open to receiving financial support (aka carrots), political support from the corporate sector became quickly circumscribed, when the policy approach prioritized regulatory measures (aka sticks). With respect to inclusiveness, the Commission (as well as most Member States) put the emphasis of garnering the support of the business sector, but kept other stakeholders (potentially) favorable to the EGD at a distance. This includes in particular the trade union sector, but applies similarly to civil society writ large. The prevailing approach to the inclusiveness of the process thus referred to the traditional understanding of embedded autonomy, which considers the close involvement of the corporate sector as pivotal for success. Given the profound changes required by the Twin Transformation, the process is however accompanied by potentially huge adjustment costs, which present a threat to the short-term profitability as well as the long-term viability of not only individual companies, but entire economic sectors.



Figure 5.2.: Dimensions of EU Industrial Policy Coordination

Source: author's elaboration

Due to the prevailing financialized corporate governance structure in the EU, the ambivalent posture of the corporate sector should thus not come as a surprise. Putting the focus of embedding primarily on the business sector bears the risk of losing out on autonomy, as political authorities lack allies to resist excessive business demands. And indeed, corporate lobbying

with respect to the many policy initiatives related to the green transformation has been pervasive. In a series of investigations, Transparency International showed that roughly two thirds of all related meetings in the Commission and European Parliament were held with corporate lobbyists. Only 27 % of meetings were held with non-commercial organizations (Engelbrecht-Bogdanov 2024). These results are corroborated by other studies (see e.g. Corporate Europe Observatory 2020). Though this bias might hardly be surprising for people familiar with politics in Brussels, this form of embedding the process risks the green transformation to become slowed down, as well as watered-down with respect to more ambitious proposals, at which point potentially favorable, but marginalized stakeholders become alienated and critical of the project.

While a broad coalition of forces might be difficult to manage, a selective policy of inclusion risks to derail the process prematurely, either because of internal reasons (e.g. capture by business interests) or external reasons (e.g. political resistance of excluded stakeholders). Regardless of the difficult trade-offs associated with broad institutional setups, given the comprehensive and profound nature of the challenges of the green and digital transformation as well as its decades-long implementation period, embedded autonomy requires a broad coalition of social forces, that is able to withstand episodes of opposition from within, as well as shocks from the outside. In addition to the corporate sector, the inclusion of other segments of civil society, in particular trade unions, social movements, as well as science, the media and cultural organizations is thus necessary. Only via such an alliance can the political stamina necessary for implementing such a project be mobilized, and can the state both at the European and national level play its role of leading the process and of mediating the multiple interests involved without compromising the fundamental objectives of the project.

Apart from the inclusive approach to governance, as indicated above, another major challenge in the European context is the rather decentral institutional setup given the multi-level structure as enshrined in the EU Treaties. This clearly contradicts the requirement for a more centralized institutional setup particularly during the early stages of industrialization projects, as emphasized by comparative studies of the Developmental State (see e.g. Ohno 2013; Raza, Staritz, and Grumiller 2016). As the road to Treaty reform appears to be blocked at least for the short to medium term, ways to strengthen IP governance will have to rely on alternative mechanisms. Amongst these, (i) informal coordination mechanisms, and (ii) pockets of efficiency might merit detailed consideration. Informal coordination mechanisms (ICMs) could come in diverse formats and relate to political as well as technical coordination. As a surrogate mechanism for the lack of centralization of formal IP-related competences at the EU level, its most important role would however consist in mobilizing political support, in facilitating difficult processes of negotiation, and in communicating the project to the general public across the EU. For these purposes, Twin Transformation councils could be set-up both at the EU and potentially also the MS level, with participation from EU institutions, governments, parliaments, as well as the heads of business associations, trade unions, the NGO community, as well as highprofile scientists and scholars. Such councils should convene in regular intervals, assess progress, identify and remediate problems, make strategy adjustments and identify high-priority issues for implementation in the upcoming period 2025–2029. They should be supported by a competent secretariat, with resources and capacities to support the work of the respective council, prepare regular reports, organize events and workshops, to provide scientific and conceptual inputs to the debate, as well as to take care of public affairs and communication.

Pockets of efficiency (PoEs) are defined as spaces or entities within the state apparatus with conducive conditions for industrial policy-making (Whitfield et al. 2017). Conducive conditions might include political will, the existence of private sector support and the requisite bureaucratic capabilities for a particular industrial policy project. PoEs are typically, though not exclusively, to be found at the sector, national or regional level, and could for instance be centered around a particular ministry, a sectoral promotion agency, or an innovation agency. Given political

support, PoEs could be promoted in the context of an industrial policy strategy with a focus on issues that enjoy relatively widespread support, or alternatively, where political contestation is expected to remain moderate. Pilot/flagship projects and missions à la Mazzucato are related approaches. The important point of PoEs however refers to their institutional setup, characterized by a strong commitment to embedded autonomy and a managerial bureaucracy competent for effective implementation, that operates at arm's length from their political masters. In the context of EU IP, initiatives such as the five Missions under the Horizon Europe program, or the IPCEIs might have been attempts in this direction, though in organizational terms they were implemented by regular Commission services and national agencies, and thus lacked the typical institutional features of PoEs (Kattel 2024; Tõnurist 2023).

Figure 5.3.: Elements of a comprehensive vs. selective IP approach



Source: Raza, Staritz, and Grumiller (2016: 16)

To sum up, a central governance problem of EU industrial policy-making refers to narrow and biased coordination undermining societal support, while effective implementation is hampered by the complex EU multi-level institutional setup. With more centralized coordination blocked by the distribution of competences as enshrined in the EU Treaties, improvements must rely on the promotion of informal coordination mechanisms as well as on building-up pockets of efficiency. Both types of mechanisms might eventually contribute to garner broader support for IP, through mechanisms of inclusion as well as through showcasing the success of specific policies. Upon this basis, a selective IP strategy might over time be expanded and developed into a more comprehensive IP strategy (see Figure 5.3 for an illustration).

State capacities, dynamic capabilities and innovation governance

When speaking about embedded autonomy, an important component relates to the capacities and capabilities of the state entities (ministries, agencies) in charge of implementing industrial policy. State capacity consists of different and overlapping dimensions (see Figure 5.4). They include framework capacities such as legislation, the judicial system and manifold other entities with executive and administrative functions. A second dimension refers to various planning and coordinating capacities. A third dimension consists of dynamic capabilities, that is, the ability of state entities for continuous organizational learning. The capacities and capabilities interact with each other and are largely complementary. Together they are responsible for performing multiple state functions and for guaranteeing the stability of a political society, as well as for adapting to and shaping new developments.

The neo-Weberian consensus view of the scholarly literature argues that such state bodies need to be based on a meritocratic culture that promotes technical and managerial expertise (Kattel, Drechsler, and Karo 2022). In addition, upon the basis of a political mandate and clearly stated objectives, they should enjoy a level of autonomy in their daily operations. If necessary, through the establishment of ad-hoc separate organizational entities, outside of the line ministerial bureaucracy and their constraints. These caveats notwithstanding, a major drawback of bureaucratic structures, particularly in liberal democracies, has to do with their obligation to operate on the basis of due process, honoring the obligations of the prevailing legal order and the rights extended to third parties.





Source: Kattel (2024, 15)

This foments a culture oriented towards stability, which in turn introduces inertia, complexification and resistance to change. Industrial policy or related agencies thus resemble a paradoxical venture. They are tasked to promote change, but are based on principles oriented towards stability. There are different ways to overcome this ambivalence. As far as the framework conditions, in which these agencies operate, are concerned, historically the problem was often solved by active state interventionism in combination with coercion or political repression. Thus, legal or procedural impediments as well as political opposition could be overcome by such a transactional approach. With good reason, the liberal democratic state's capacity to employ such discretionary powers has been curtailed (except for state of emergency powers subject to certain constitutional disciplines). A second option more in line with the exigencies of due process is to change laws that impede certain interventions or unduly slow them down. The recent discussion about shortening long permission procedures for renewable energy installations or of strategic mining projects for critical raw materials are a case in point.

As far as the organizational capacities of the responsible state bodies themselves are concerned, again different instruments have been employed. Firstly, IP bodies have been outsourced from the line ministerial bureaucracy, and set up as formally independent entities. Thus, they enjoy a higher level of operational autonomy, in particular with respect to human resource acquisition and career development. Outsourcing however entails also certain problems. Particularly the design of the relationship between principal (i.e. the government) and agent (i.e. the outsourced agency) becomes a critical governance issue. The government has an interest in making sure that the agent fulfills its mandate efficiently, but there is no guarantee that the agent does not prioritize other and potentially contravening objectives. Another potential problem relates to the fact that given its mandate, the agent is not or only partially delivering upon its mission, for either endogenous or exogenous reasons. Thus, scholars have found that often innovation agencies are not agile enough, i.e. they do not deliver on their mandate to promote innovation, or do so with a heavy bias on incremental innovation instead of radical innovation (Kattel 2024). This might be explained by the incentive structure built into the principal-agent relation. If the principal commits the agency to maximize the return on public investment in the short run, the agency has an incentive to focus on supporting projects that promise incremental innovation. Promoting radical innovation, on the other hand, necessitates longer time horizons and the willingness to accept failures and sunk costs. In liberal democratic systems, short electoral cycles and public criticism in the event of failure make it difficult for principals to afford the required patience. As a result, innovation agencies are often overtly risk-averse. The latter also explains the tendency of agencies to build-up an extended bureaucratic apparatus with respect to project administration and to introduce complex application processes, which entail a considerable (upfront) cost for applicants. The heavy administrative requirements during the full project cycle can only partially be explained by legitimate reasons including the prevention of bribery or corruption. The other part of the explanation has to do with the agency's desire to immunize itself against criticism from its principal or other stakeholders (e.g. the business community).

In a similar vein, development finance institutions such as the European Investment Bank (or the World Bank) have been criticized for preferably funding low-risk, "safe" projects rather than taking on higher-risk, transformative investments, particularly in the context of advancing sustainability and climate goals (see e.g. Counter Balance 2024). Apart from the above-mentioned internal factors, a specific external reason for this behavior has to do with the structure of financial markets, and in particular the role of credit rating agencies. For maintaining the best rating ("Triple-A"), and thus to secure favorable rates of re-financing on e.g. bond markets, public investment banks have an incentive to avoid the accumulation of non-performing loans, even if they are backed by – implicit or explicit – government guarantees to cover losses.

Another problem in fulfilling its mission has to do with a lack of capabilities within the organization or agency itself. Not least as a consequence of numerous New Public Management

reforms during the last three decades, many functions traditionally performed by government bodies have been outsourced to the private sector, thus contributing to the emergence of a large consulting industry (Mazzucato and Collington 2023). Thus, expert knowledge on specific economic sectors, industries or markets is lacking in the public sector, but must be procured from private consulting companies. In an increasing number of areas, the companies hold a de-facto monopoly on specific forms of knowledge, that is foundational for performing certain government functions (e.g. IT services). Given the marked dependency of governments, consultancies often extract rents from the public sector by charging excessive prices. The resulting profits allow consultancies to recruit young talented staff by offering attractive career opportunities, which in turn makes working in the public sector less appealing. To secure the necessary "embeddedness", it is however of paramount importance for public entities entrusted with performing industrial policy activities to dispose of the necessary knowledge in-house. The required knowledge is not only formal knowledge, for instance, technical or economic expertise, but also tacit knowledge, which is practical in nature and thus only to be acquired by actually performing specific functions, or by working in a certain industry at least for some time. The existence of competent in-house expert staff is a necessary requirement also for buildingup dynamic capabilities, that is, the ability of the organization to learn by making sense of changes in the external environment and adapt their respective policies (Kattel 2022). Evidently, there is also a trade-off between dynamic capabilities and the administrative workload. Time and resources devoted to master burdensome administrative requirements erode the agency's capability base in the longer term, and thus their agility in responding to new challenges.

Promoting the agility of innovation agencies has indeed been identified as an eminent challenge in the context of the Twin Transformation. While innovation agencies were promoting experimentation at the local level via multiple initiatives (e.g. innovation labs, pilots), at the European and national level innovation policy has been oriented towards stability, e.g. via a focus on long-term programming and rather rigid administrative implementation (Kattel 2024). Against this background, the recent scholarly debate on the challenges of the Twin Transformation has indeed put the emphasis on promoting the public sector to become more agile (Kattel, Drechsler, and Karo 2022). As the cross-sectoral nature of contemporary societal challenges requires enhanced coordination and cooperation between different public entities, under such circumstances a transformative policy approach requires a broad portfolio of activities working towards a common goal. A single agency cannot feasibly manage such portfolios. The design of the organizational landscape has therefore become particularly critical. There needs to be a conscious effort to design and govern the ecosystem of multiple innovation agencies as a pool of distributed and collaborative ecosystems of capabilities. Such coordination could be done by a high-level governing body or similar structure. Both the European Commission and Member States should thus focus on the 'meta-governance' of innovation agency landscapes and consciously design and build organizations with diverse vet complementary capabilities. This requires taking ownership of the innovation agency ecosystem and building new governance structures. Further, it would also require focusing on longer-term goals, moving away from objectification and short-term goals, and evaluating policies on the level of portfolios or programs rather than on the level of individual projects. This would allow for more risk-taking while also helping to cultivate a higher tolerance for failure (Kattel 2024).

Enhancing the directionality of IP through (social) conditionalities

Industrial policy interventions come in different forms, but can be roughly categorized into (i) financial transfers (grants, preferential loans, guarantees, public equity), (ii) taxes and tariffs, and (iii) regulation (disciplines, prohibitions). The predominant neoliberal policy framework during the last four decades, as e.g. codified in EU competition and state aid rules, by and large displayed a restrictive stance towards public transfers to the private sector. Subsidies needed special justification, and were only allowed for a number of exemptions, including research &

innovation, regional development and specific social purposes. The main economic arguments levelled against subsidization emphasized competitive distortions, rent-seeking behavior, and moral hazard (e.g. in the case of state-financed company bail-outs).

At latest with the arrival of the Corona Pandemic in 2020 and the effects of the war in Ukraine since 2022, this state of affairs has markedly changed. Both the EU and most member states have initiated large-scale funding programs including hefty hand-outs to private companies (see section 4.3 for an overview). Motivated by the challenges of the Twin Transformation as well as geopolitical security concerns, large industrial policy programs have been initiated in many industrialized countries, including the US, the EU, China, Japan, amongst others. The programs typically target certain strategic sectors, e.g. semiconductors, green technologies, or telecommunications.

The principal rationale for mobilizing significant public financial resources for the Twin Transformation has to do with influencing the directionality of private investment, against a situation of existential threats emanating either from climate change, or from geopolitical risks. For instance, to build-up domestic productive capacity in strategic products like semiconductors, or for switching to energy production based on renewables. Predominantly, this is not done through command and control measures, but indirectly by offering the corporate sector financial incentives under the condition that the public funds are used - and possibly matched by private funds - to achieve a defined objective. Thus, ideally, a desired process of change, such as the decarbonization of the economy, can be catalyzed, if not accelerated. Underlying this approach is an implicit social contract that given the scale of the needed transformation, the necessary adjustment requires a collective effort encompassing all members of the political society, with each making its contribution according to his/her abilities. Adjustment burdens exceeding individual possibilities are shared throughout the community, in particular by offering public financial support. Receiving public money thus obliges the recipient to honor his/her part of the implicit social contract. This includes to use the money for the defined purpose, in conformity with the respective legal framework conditions, and to share any benefits eventually accruing from the investment, be it with the direct stakeholders of the company (i.e. owners, workforce), or with the general public at large (e.g. via tax contributions, free licensing of new technical knowledge, etc.).

With the government in a liberal democracy acting as the collective agent of society, it is its obligation to implement the agreement. This is typically done through a funding agreement, which stipulates the conditions under which the beneficiary is entitled to receive the financial transfer. Such conditions may come in multiple forms, including through performance standards, i.e. targets to be achieved by the beneficiary relating to production, investment or employment; In addition, process conditions might be employed, that oblige the beneficiary to accept or introduce changes to its corporate governance system, for instance public (co-)ownership, introduction of collective bargaining, or special transparency or reporting mechanisms (see Table 5.1. for overview).

Table 5.1.: Industrial policy conditionalities

Performance Standards	Corporate Control		
Production, investment, employment, and export quotas	Public or domestic ownership		
Environmental and safety standards	Promotion of intra-firm or intra-sectoral cooperation		
Training and skill programmes	Acceptance of collective-bargaining rules		
Technological or local content requirements	Accepting joint ventures		
Geographical Location	Inclusion of independent directors		
	Disclosure of pollution information		
	Regulation of intellectual property rights		

Source: author's elaboration, based on Bulfone, Ergen, and Maggor (2024)

A specific sub-category refers to social conditionalities. These include both measures targeting the affected labor force, e.g. via employment and labor standards, skills acquisition, the establishment of works councils or collective bargaining, and extend to measures that benefit society at large, e.g. the sharing of new technology, the sharing of (excess-)profits, or domestic content requirements (see Table 5.2 for an overview).

Table 5.2.: Indicative	taxonomy	of social	conditionalities

Performance Standards	Corporate Control		
Location guarantees	Establishment of Work Councils		
Employment quotas	Consultation/Co-decision rights for Work Councils		
Skill upgrading programmes	Information and monitoring rights for Work Councils		
Sharing of new technology (e.g. compulsory licensing requirements)	Mandatory seats for trade unions/Work Councils on boards		
Domestic content and sourcing requirements	Labour standards (minimum wages, collective bargain- ing)		
	Health and safety standards		
	Prohibition of stock buy-backs and of dividends		
	Sharing of profits (e.g. upside profit sharing)		

Source: author's elaboration

While there is widespread agreement that the green – and to some extent also – the digital transformation pose extraordinary challenges that require this collective effort including the transfer of significant amounts of public money to the private sector, the danger of corporate welfarism is clearly looming in the background (Bulfone, Ergen, and Kalaitzake 2023). In other words, the corporate beneficiaries might see the availability of public money as a windfall opportunity for increasing profits via rent-seeking or for moral hazard behavior, e.g. by pocketing public money for ailing business activities. In addition, as currently not only the EU, but many other countries have set up massive financial support programs, particularly large transnational corporation might try to play off governments against each other in order to extract the highest possible subsidy.

The scholarly literature on corporate welfarism emphasizes that the privatization of many stateled activities (e.g. public services) during the neoliberal period has resulted in a marked shift of structural power in favor of the corporate sector (Busemeyer and Thelen 2020; Culpepper 2010). As mentioned above, in many respects the state has lost its capacity to directly take care of certain activities, and in fact depends on the private sector to perform such tasks. This literature thus warns against the prevailing view (see e.g. lversen and Soskice 2019), that the return of industrial policy should be interpreted as a sign of renewed state power. Instead, the prevalence (or not) of strong conditionalities attached to financial handouts to private firms should be the indicator, upon the basis of which to assess the power balance between the state and private capital.

Preliminary comparative assessments of conditionality policies of the EU and other countries, in particular the US, highlight the following aspects that merit particular attention:

- (i) the US has been more pro-active in including (social) conditionalities than the EU, using a wide array of different instruments (Blue Green Alliance 2023; Estevez 2023);
- (ii) coalition-building, in particular with trade unions and civil society, and a broadly shared motivation (in the US primarily the geopolitical threat of China to US supremacy) have been critical for successful implementation and monitoring in the US case (Bulfone, Ergen, and Maggor 2024);
- (iii) government monitoring and enforcement during implementation is difficult due to capacity constraints and lacking access to information, but is facilitated by including monitoring provisions that grant corporate stakeholders, e.g. works councils and trade unions, access to information (Blue Green Alliance 2023);
- (iv) the legal room to define and include conditionalities into funding agreements is relatively wide, even under EU competition and state aid law. It is ultimately constrained by fundamental constitutional rights (e.g. protection of private property) only (Damjanovic 2024; Zenke, Heymann, and Arnold 2024).

To the extent that information is publicly available, the EU and Member States have used conditionalities only selectively, and not with a focus on social conditionalities. Examples include, amongst others (Bulfone, Ergen, and Maggor 2024):

- (i) conditionalities to prevent fraud within the framework of the Recovery and Resilience Facility (RRF);
- (ii) in the Microelectronics IPCEI, a "claw-back" profit-sharing mechanism was introduced, under which companies may be required to redistribute extra profits obtained as a result of EU funding. In the case of a supply chain crisis, the Commission can require semiconductor companies that have received financial support under the EU Chips Act to share information about their production capacities and, if necessary, to prioritize domestic orders for critical products. If companies do not comply with these requirements, the Commission can impose fines or other sanctions;
- (iii) within the framework of the European Defense Fund, access to funding is restricted to companies established in at least two EU member states, or associated members part of the European Economic Area. Intellectual property rights (IPRs) resulting from funded projects should not be controlled by any third countries or third-country entities. Otherwise, the Commission can claw back the initial funding.

Various reasons are proposed in the literature, as to why the conditionality regime in the EU appears relatively weak (Bulfone, Ergen, and Maggor 2024; Cooiman 2023; Ducastel, Rivière, and Ferlazzo 2024). Amongst them are (i) the lack of financial power of the EU and its dependency on Member States to extend funds, (ii) administrative capacity constraints both at EU, but particularly at the level of Member States, and (iii) a comparatively weak security dispositive, including opposing views on the "China-threat". With respect to the low profile of social conditionalities, the already relatively high level of labor and social standards in the EU as well

as the exclusion of trade unions from industrial policy-making in the EU serve as the main explanations. In contrast to the US, where trade unions have played an important role in codesigning social conditionalities, and thus have put considerable pressure upon the Biden administration, the calls of European trade unions to introduce stronger social conditionalities have been mostly ignored by the Commission as well as Member State governments (ETUC 2024).

By way of conclusion, conditionalities, including in particular social conditionalities, are the central mechanism for guaranteeing the desired directionality of investment, i.e. for making sure that financial transfers to the private sector are effective in pursuing specific objectives of the Twin Transformation. Weak or no conditionality invites indeed the kind of adverse behavior emphasized in the mainstream economics literature, such as rent-seeking, moral hazard or anti-competitive behavior. Given the relatively weak bargaining position of many EU institutions as well as governments vis-à-vis the private sector, and in particular large transnational corporations, it is precisely through (social) conditionalities that the public purpose of financial transfers can be safeguarded. A more inclusive approach to industrial policy, that mobilizes the support of trade unions and civil society at large for such an approach, would provide more autonomy to policy-makers, and thus facilitate the implementation of conditionalities greatly.

5.4. The counter-productive macrofinancial framework

A particularly severe constraint for the systematic application of industrial policy by EU institutions is the lack of an appropriate financial capacity. With 1 % of EU GDP, the EU budget is too small to sufficiently fund the investment needs of the Twin Transformation. Large-scale common EU borrowing under NGEU was introduced after Covid-19 as a one-time measure. but has so far not been transposed into a permanent practice. The ECB holds the power to create money at will, but is restricted by its mandate to directly finance governments, although the ECB de-facto extended its mandate already in 2015, when it embarked on direct asset purchases. Following its strategic review in 2020, the ECB started decarbonizing its corporate bond portfolio in 2022, but restricted this to re-investments. This process however was defacto stopped in June 2023, with no major re-investments in bonds having taken place since then. The EU's financial firepower thus pales in comparison to the budgetary resources and monetary power of the US government. Most of the financial resources devoted to industrial policy purposes thus comes from Member States' budgets, or specific funding mechanisms like the EU Emissions Trading System (ETS). The fiscal space across Member States is however unevenly distributed. Between March 2022 and June 2023, for instance, of the €140,79 billion of state aid approved by the Commission under the Temporary Crisis and Transition Framework, 52 % of this amount was spent by Germany. Together with Italy and Spain, the Top-3 spenders account for 88 % of total state aid, while the other 24 EU countries account for the remaining 12 % (Stefano, Cannas, and Van de Casteele 2024).²² Without strong central coordination and redistribution, respectively, the variegated national fiscal powers in supporting industrial policy will thus sooner or later lead to increasing structural heterogeneity in the EU economy, with peripheral countries and regions falling further behind in terms of structural change and dynamics.

As if this was not problematic enough, the reform of the Stability and Growth pact concluded in April 2024 did not significantly enhance the fiscal room of Member States. The benchmark Maastricht targets (max. 3 % annual deficit, max. 60 % public debt ration) were retained. Though the flexibilities for fiscal adjustments were somewhat increased, in particular by introducing the option for a longer adjustment path (7 years) under the excessive deficit procedure, the reformed SGP does not contain a golden rule that would exclude public investments from

²² It is important to note that the high shares of Italy and Spain are not explained by their domestic fiscal power, but mostly by funding allocations under the RRF.

adjustment plans, nor are there exceptions foreseen for expenses related to the Twin Transformation (EuroMemo Group 2025). As a consequence of enhanced public spending in the period 2020–2023 in response to the Pandemic and the economic effects of the war in Ukraine, the reinstatement of the new Fiscal Governance Framework in 2024 has decisively tightened the fiscal outlook for the years to come. Already in June 2024, excessive deficit procedures were announced for eight Member States, with announcements for other Member States imminent in 2025. The next years will thus likely see a return to fiscal austerity at the Member State level, with heavy political pressure on governments to reduce spending (and given political resistance, to a lesser degree on raising taxes). At the EU level itself, repayment of the one-time common borrowing under the Next General EU package (including the RRF), will kick-in in 2028 and last until 2058. According to estimates, in the period to 2030, annual repayment of the debt (interests plus principal) could reach €25 billion, a sum to be covered by the EU budget (Claeys, McCaffrey, and Welslau 2023). Although this annual amount is expected to decline afterwards, it would further circumscribe the financial leverage of the EU budget, unless substantial own resources and/or higher contributions from Members were to be raised.

Given the fiscal constraints, and arguably also because of the pressure of the financial sector, the Commission adopted a de-risking approach to funding investment in the context of the Twin Transformation. Through measures such as grant elements, public guarantees, or preferential loans, this basically meant that public money has been primarily used to incentivize private capital (Gabor 2023; Gabor and Braun 2023). The expectation was that via de-risking a multiple of the public money invested could be raised from the private financial sector. When looking at the numbers, it is now obvious that this approach has not been able to close the investment gap for the Twin Transformation, notwithstanding the fact that a harmonized measurement methodology does not exist.

Let's first focus on the green transformation: the Commission estimated in 2020 that annual EU investment required for reducing CO2 emissions by 55 % until 2030 was estimated at €350 billion, or 2 % of EU GDP (Von der Leyen & Hoyer 2021, Pisani-Ferry et al. 2023: 13). This 2 % represents the lower bound of estimates. With each year passing with investment below the required 2 %, the investment gap grows for subsequent years. In comparison, annual public EU resources dedicated to climate action, including from the EU budget, RRF, and various EU funds, amount to only €131,6 billion according to Kedward & Ryan-Collins (2022: 281). Actual funding under the prevailing approach thus falls short by some 50 %. Another study comes to similar conclusions. Though it suggests annual investment in 2022, the investment gap also stands at 50 % of the amount needed. What is more, with the phaseout of the RRF in 2026, the level of funding will decrease to slightly less than €20 billion per year. The phase-out will thus leave a gap that can be estimated at €180 billion between 2024 and 2030 (Pisany-Fery, Tagliapietra, and Zachmann 2023).

For the decade from 2030 to 2040, at which point the EU must reach its target of 90 % CO2 emissions reductions, the Commission estimates that investment needs will increase to \leq 1.5 trillion per year (Makaroff, Kalcher, and Kouam 2024: 38). The gap, meanwhile, for the EU to reach net-zero by 2050 is estimated to average \leq 360 billion per year, 2.3 percent of the current EU-27 GDP, according to one think tank (Institut Rousseau 2024). Others claim that the Commission has underestimated the investment requirements and put the number to 6 % of GDP annually until 2050 for making Europe climate neutral (for an overview, see Heimberger and Lichtenberger 2023). How much of the spending will need to come from the public sector is discussed controversially, and will also depend on the respective sector. Nevertheless, given

the modest growth prospects for the coming years, private investment activity will remain subdued. Thus, it is probably safe to assume that at least 50 % of the needed amounts will have to be procured by public funds.

With respect to the additional investment needs for the digital transformation, a lower bound estimate by the Commission cites the figure of ≤ 125 billion (European Commission 2023b). Upon a broad-based definition of investment for increasing the EU's competitiveness, which includes both the green and digital transformation, the Draghi-Report suggests an annual investment gap of between $\leq 750 - \leq 800$ billion, or some 4.5 % of EU GDP (Draghi 2024). Again, the distribution of these amounts between the public and private sector is not spelled out in detail. What is obvious, however, and confirmed by the Draghi Report, is that actual investment is way below of what is needed.

By way of conclusion, in light of the projections presented above, the investment gap for the Twin Transformation might be estimated at between 2 % and 4.5 % of EU GDP per annum (in 2023 prices), of which at least 50 % should be supplied by the public sector. Given both the dire fiscal situation presented above and the clouded economic outlook for the coming years, it is totally unclear how these amounts are to be raised.


6. A PROGRESSIVE INDUSTRIAL POLICY AGENDA FOR THE TWIN TRANSFORMATION

A central conclusion from our analysis in this report is that implementing the Twin Transformation is first and foremost a political process. Thus, while in many areas, e.g. solar PV, wind turbines, batteries, heat pumps, electric vehicles, mature technological solutions already exist, the major threats to the green and digital transformation have to do with economic, social and political risks. While some of these risks, e.g. those emanating from increased geopolitical conflict or from global pandemics, are beyond the EU's direct sphere of influence, others such as political and social resistance or lack of resources can be overcome by determined political action within the EU. Indeed, recent modelling exercises have shown, for instance, that managing the distributional issues from carbon pricing will be pivotal to maintain social support for the Twin Transformation in the medium term future until 2040 (Heussaff et al. 2024).

It is our conviction that given the profoundness of the required changes and its long-term nature, a successful Twin Transformation process will depend on promoting its legitimacy and maintaining it over the next 25 years. Evidently, this is easier said than done. Against the current background of multiple crises, which exacerbate societal anxieties, the challenge of the coming five years consists precisely in reinserting confidence both to citizens, workers and the business sector that the strategic agenda initiated with the European Green Deal needs not only to be maintained, but accelerated. This will place heavy demands on EU institutions and national governments. Both will have to balance the exigencies of the long-term strategic Twin Transformation agenda with those of managing more frequent short-term crisis situations. To perform this, governments will need enlarged capacities and capabilities. Nonetheless, even the most capable government will not be able to do all of that alone. The cooperation of social actors supporting the strategic trajectory of the Twin Transformation will be pivotal.

As legitimacy forms the basis of the social bond between governments and the members of society, a reinvigoration of in particular the green transformation agenda will depend on mobilizing new sources of both input and output legitimacy. Input legitimacy will depend on providing a compelling vision for a transformation society based on solidarity. Upon this basis, six pillars focus on the substantive areas of the policy agenda., These areas encompass (1) enhancing spaces for public participation, and (2) ensuring a fair distribution of benefits and costs. Output legitimacy will require (3) a strategic transformation agenda accelerating the transformation in key areas, (4) a governance framework with strong capacities and capabilities to implement reform policies, (5) a set of funding mechanisms and instruments proportionate to the required investments, and (6) an EU global cooperation agenda that mobilizes international support for the Twin Transformation. While none of this is new, and is to some extent reflected in the current framework of the Twin Transformation, amble room for improvement does exist. In the following, against the background of the policy agenda of the Commission as presented in the new Competitiveness Compass (European Commission 2025a), we will briefly outline each of these elements in turn.

The basis: Providing a vision of solidarity for a transformation society

In times of crisis, security becomes the overarching demand of both citizens and the business sector. To the sequence of shocks befalling Europe during the last five years, European policy-makers have responded by increasingly securitizing every policy domain. While understandably defense has become a priority, the other priority has been economic security under the slogans of resilience, strategic autonomy and technological sovereignty. Indeed, in tandem with competitiveness, the strategic guidelines of the new Commission have put economic security center-stage (von der Leyen 2024). Unfortunately, the ongoing political realignment under the new Commission has de-emphasized the social dimension and essentially restricts it

to a skills agenda. This is complemented by a political agenda that focusses on defense and security threats related to cybercrime, terrorism, border control and migration.

Apparently, with this agenda the onslaught of the populist far-right across Europe shall be contained. It remains however dubious, if this will be sufficient to reinforce established democratic political forces. Given the multi-pronged crises and threats confronting the EU and the insecurity this has created amongst EU citizens, a holistic concept of human security highlighting in particular the socio-economic and environmental dimension will be essential (Altvater 2003). The multiple challenges emanating from climate change, pandemics or war comprise in particular threats to health, food, housing, precarity and unemployment. Human security is thus closely connected to what are essentially public services, i.e. the foundational economic elements of modern civilization. Against the background of deteriorating public services across virtually all EU Member States in the face of increasing demand, a new public services agenda would be an essential element of a reinvigorated Twin Transformation agenda. Such an agenda should be based on the recognition, that it is the satisfaction of these basic human needs that stabilizes society and thus forms the foundation for the capitalist market economy. For all its merits, current Commission proposals including to invest in skills, to lower energy prices, or to invest into the resilience of medical and drug supplies, address the foundational economy only in a partial and selective way. Amidst a higher frequency of natural hazards and extreme weather events, in conjunction with the likelihood of pandemics as well as of geopolitical crises, safeguarding social reproduction will arguably present one of the biggest challenges of the transformation period until 2050. Given the heterogeneity of public services across the EU and the deteriorating quality of provision, a renewed agenda to tighten the social safety net and to put a strong emphasis on the foundational economy would be a strong signal that the challenges of the Twin Transformation are tackled upon the basis of a strong sense of community and solidarity. Thus, confidence amongst EU citizens towards their political leaders could be re-established.

Pillar 1: Enhancing spaces of participation

Under the title "Putting citizens at the heart of our democracy", the political guidelines of the new Commission proclaim the intention to strengthen deliberative democracy beyond elections and institutionalized politics (von der Leyen 2024, 24). To this end, cooperation with civil society organizations shall be strengthened, and European Citizen's Panels shall put forward recommendations on specific issues. The document however does not provide any further information, e.g. with respect to which topics shall be deliberated by these panels, or how many of them are foreseen during the next five years.

While the guidelines thus pay lip service to the need for more deliberative democracy, the specific agenda remains vague. Given the popular mistrust towards institutionalized politics, and the European Union in particular, expanding on deliberative democracy by promoting alternative and experimental forms of participatory democracy represents a chance to reinvigorate trust in liberal democracy. As a matter of fact, the ability of established liberal democratic institutions, in particular parties, governments and parliaments, to articulate the interests of citizens and transform them into concrete political action, has suffered during the last decades. Instead, they are increasingly captured by powerful vested interests, scandalized by populist politics, and/or blocked by political infighting (Crouch 2020; Lessenich 2024). To re-inject legitimacy into democratic governance by giving voice to citizens as well as civil society more generally, and provide them with spaces to co-design political agendas alongside established democratic institutions, thus presents an opportunity also in the context of the Twin Transformation.

In Section 4.4, the establishment of a **Twin Transformation Council** was proposed, composed of members from EU institutions, national governments, and civil society including the corporate sector, trade unions, NGOs and academia. Such a council (i) should strengthen horizontal and vertical coordination, (ii) assess progress, identify and remediate problems, (iii) make strategy adjustments and identify high-priority issues for implementation. The Council would represent a significant enlargement of representation by including civil society organizations active in Brussels. It would however not directly involve ordinary EU citizens, nor would it be representative of all Member States.

Thus, two complementing structures could be envisioned. Firstly, national Twin Transformation Councils. These would also be composed of members from the national and regional governments, parliaments, civil society, business and academia. Their tasks would be similar to the EU-level Council, but transposed to the national scale. Secondly, citizens could become involved via Citizen's Assemblies/Panels, both as transnational panels at the EU level, and as national (or regional) assemblies in Member States. Building on the experiences of previous panels at EU level (e.g. on food waste, virtual worlds and energy efficiency) as well as at national level (e.g. the Citizen's Climate Assemblies in Austria, UK) or regional level (e.g. in the context of the Just Transition Plans), such assemblies could be tasked with elaborating proposals on specific issues relevant for the Twin Transformation at the respective level. By way of setting up a funding facility (e.g. within the framework of the JTM), the necessary financial resources could be provided for such a program. Given previous experiences, two issues however merit particular attention: (i) the lack of policy-uptake; and (ii) the lack of public awareness (Jones et al. 2022). With the final result of an assembly being a set of policy recommendations, a lack of policy-uptake and thus of policy impact represent potential sources of frustration for participants. A more formalized process that would oblige official institutions (e.g. the EC, the EU parliament, national governments, national parliaments) to respond to the recommendations, e.g. by holding a public debate, offer written explanations, why specific recommendations could not be accepted, provide regular implementation reports, etc., would be important in this respect. A series of public dissemination events and media communication is important to raise public awareness (Bozzini and Pascual Dapena 2025).

Given its tradition of cooperative industrial relations, democracy in the EU also extends to the economic domain. This is explicitly recognized by the European Pillar of Social Rights. Pillar 8 highlights the need to promote social dialogue and the involvement of workers in social, economic and employment policies, and encourages collective bargaining. Facing the historic challenges of the Twin Transformation, the knowledge and experience of the social partners is indispensable for establishing transformation strategies that are just both in process and in outcome. A closer cooperation with social partners and in particular trade unions is thus important. Such cooperation could strive to, inter alia, (i) develop a legal framework at European level that guarantees the essential role of collective bargaining to anticipate and manage change and to maximize the transformative potential, while ensuring just transition and quality jobs; (ii) take initiatives to facilitate labor market transitions, not least by ensuring the right to training without cost to workers and during working time, fend off the detrimental distributional effects of climate policies for vulnerable groups and make low-carbon and innovative technologies affordable and accessible to all; (iii) ensure full respect for the right to collective bargaining based on the prerogatives of trade unions as the bargaining agents for workers, as recognized by the Directive on Adequate Minimum Wages in the EU; (iv) take specific initiatives to support collective bargaining and social dialogue in Member States that do not yet have a strong framework (Galgóczi 2024).

Pillar 2: Ensuring a fair distribution of benefits and costs

Structural transformation processes as profound as the Twin Transformation will inevitably result in producing a significant number of winners and losers. This includes both natural persons and companies, but also extends to regions, some of which will become important hubs for new sectors, while others will suffer from the closing down of old industries. To its credit, the Commission has recognized the latter problem and reacted to it with the Just Transition

Mechanism, through which support programs for regions negatively affected by the green transition have been set up (see section 5.2.). Mostly due to capacity constraints, program implementation has however been slow in many regions. The planned phase-out of the program by the end of 2026 thus not only poses a risk to the sustainable impact of the programs, but will arguably deepen the already widespread skepticism of rural populations with respect to the Twin Transformation. Given the long-term nature of the structural change processes affecting regions, stronger support mechanisms on a permanent basis are thus required. This could either be achieved by **putting the JTM on a permanent basis**, or by using the structural and cohesion funds for this purpose. In any case, a follow-up program must **address the capacity problems many regions have faced** in implementing regional just transition plans. Member States should also use the Social Climate Fund (which starts operations in 2026) to complement the measures under their RJTPs, and thus coordinate their Social Climate Plans (to be finalized until June 2025) with their regional adjustment plans.

The **Social Climate Fund** should also be used for national level programs to support affected workers through (i) early retirement plans, (ii) re-training and skills acquisition, and (iii) through public employment programs, particularly in public services and the care economy. While it is expected that via the SCF (including national co-financing) up to \in 85 bn will be mobilized in the period 2026-2032, and thus the program will likely be larger than the JTM, again the **issue of state capacities and capabilities** will have to be addressed, particularly in the more peripheral EU economies with weak public administrations. For, any effective use of funds will critically depend on both the capacities for strategic planning in determining developmental pathways for their regional and national economies. A **more strategic approach to regional and national planning** will be critical for the successful steering of the Twin Transformation (Rodríguez-Pose and Bartalucci 2023).

A third critical elements to assure fairness has to do with **managing the benefits and costs at the level of companies**. Significant public funds are employed to support companies in transforming their business models. So far, the EU has focused on making sure that certain formal conditionalities mostly related to state aid and competition regulations are met by companies. The economic rationale for conditionalities is however mainly motivated by the desire to make sure companies reach certain performance targets with respect to e.g. production, innovation or skills acquisition. Also, given that any change promoted by public support will invariably affect the company's workforce, **co-participation of workers' representatives** (works councils, trade unions) is paramount not only for cushioning any adverse social effects, but also for retaining the support, and indeed, for mustering the motivation necessary throughout the workforce to join forces to successfully implement the required changes. **Public support for companies** must thus be **complemented by strong performance as well as social conditionalities.** This includes expanded participation and consultation rights for trade unions and works councils, which analogous to US practice should form an integral element of public funding contracts.

Pillar 3: Doubling-down on the transformation agenda

As outlined in section 5.1., the strategic outlook of Twin Transformation policies in the EU has undergone several changes since 2019. While strongly focused on the green transformation initially, with the pandemic and the war in Ukraine, security of supply with critical goods, supply chain resilience and strategic autonomy have become more important. With the Draghi Report, most recently this economic security agenda has been coupled with a new competitiveness agenda. As outlined in the new EU Competitiveness Compass, the Commission will now start a process of implementing this new agenda. The document defines three "transformational imperatives": (i) closing the innovation gap; (ii) a joint roadmap for decarbonization and com-

petitiveness, and (iii) reducing dependencies and increasing security. With respect to implementation, the Commission emphasize regulatory simplification and better coordination as basic requirements, as well as (i) exploiting benefits of scale offered by the Single Market by removing barriers, (ii) financing through an investment and savings Union and a refocused EU budget, and (iii) promoting skills for competitiveness and quality jobs while ensuring social fairness, as horizontal enablers.

While virtually all of these elements have already been contained in previous EU documents, what is new is the change in priorities. The Compass consolidates the shift from pursuing a broader socio-ecological agenda to one that puts competitiveness front and center-stage. Accordingly, specific regulations introduced under the broader EGD agenda of the last years, including in the fields of corporate sustainability reporting, corporate sustainability due diligence and the EU taxonomy, are under the threat of being watered-down by a forthcoming Simplification Omnibus proposal. A new company category of small mid-caps, comprising some 30.000 firms, will profit from regulatory simplification, i.e. be exempted from most obligations under the above-mentioned regulations (and others). With respect to closing the EU's innovation gap, the Commission is similarly focusing on regulatory simplification as the panacea. It will, notably, propose a "28th legal regime" for innovative firms, which is intended to simplify applicable rules and reduce the cost of failure, including aspects of insolvency, labor law, and tax law. While it remains guite likely, that instead of simplification, such a new regime might lead to regulatory uncertainty for companies - e.g. with respect to for which purposes the respective national regime is applicable versus the new 28th regime - a straightforward effect of this new regime will be increased regulatory competition between Member States.

With respect to decarbonization, the Compass announces a Clean Industrial Deal initiative with the aim (i) to make energy more affordable, though without envisioning major reforms to the EU energy markets, (ii) to strengthen the business case for clean production, through new measures to encourage demand for low-carbon products, such as benchmarking/labelling, preference in public procurement or financial incentives. In terms of resources mobilized for implementing the new Competitiveness Compass agenda, apart from repurposing resources from the regular EU budget and simplifying the multiplicity of EU funding instruments, in terms of fresh money the Compass refers to a new EIB TechEU investment programme and a new framework for transition-related state aid. A new Competitiveness Fund is announced under the next MFF, though no details on the latter are provided.

By way of summary, the new competitiveness agenda is completely aligned with the demands of the EU corporate sector. Arguably competitive pressures from global markets have been on the rise, and the implementation of the Twin Transformation agenda weighs on companies' capacities. The new EC approach however throws the baby out with the bath water, as it almost exclusively relies on de-regulation and liberalization, including for tackling the EU's innovation gap. The green agenda is relegated to second place, and only considered when compatible with the overarching goal of competitiveness. Under these circumstances, it is highly questionable, whether it will be able to deliver on the EU's decarbonization and other goals until 2030, as outlined in the EGD (see Figure 1.1). What is more, the Commission's approach will not be able to remedy the EU's innovation gap, the latter being not caused primarily by too much regulation, but by structural factors related to the EU's innovation system (see discussion of Pillar 4).

By way of contrast, doubling-down on the Twin Transformation agenda from a progressive point of view would in particular require a focus on the following elements during the next five years:

- (i) a **stronger focus on reducing energy and material consumption** by (i) promoting energy efficiency measures (including through enhanced support for R&D), and by (ii) accelerating the roll-out of the circular economy and the recycling of critical materials;
- (ii) a massively scaled-up EU investment program for renewable energy, with a focus on solar, wind, geothermal, and green hydrogen. Given the insufficient interest of private capital for investing into renewables, a public funding preference should be given to not-forprofit companies, e.g. public companies or energy cooperatives at local, regional, or national levels:
- (iii) an EU mobility strategy that prioritizes massive investments in railway infrastructure, supports electrified public transport at all territorial levels, and reduces private vehicle use via the promotion of car sharing and similar measures. Via public procurement and public support programs, the transformation of the car industry should be directed towards a mobility system that increases public transport and reduces private car use. By accepting the reduction of European car manufacturing capacity as inevitable, public resources should be focused on retraining programs for workers, and for supporting investment programs into train production, electric trucks and small passenger e-vehicles, thus providing directionality for the transformation of the automobile sector;
- (iv) an EU strategic industries strategy that defines which productive activities deserve special treatment under (i) security of supply considerations including disaster preparedness (upon the basis of a human security lens), and for (ii) accelerating the Twin Transformation. Upon the basis of first, but incomplete, efforts during the last years, a systematic list of strategic industries should be elaborated and the public requirements put upon these industries in exchange for support should be specified, including the safeguarding of domestic "strategic production capabilities" in key industries;
- (v) an EU digital sovereignty strategy that (ii) safeguards democratic control of the digital sphere via stringent regulation, and (ii) promotes forms of public digital infrastructures, including public substacks and universal platforms, such as search engines and foundation AI models, all organized as a commons governed by new public institutions with state and civil society representation;
- (vi) a transformation agenda for the European food industry: with the farm-to-fork strategy only half-finished and de-facto blocked by farmers' protests in 2023/24, the transformation of the European food system needs a restart. This will require two priorities: (1) given the strong asymmetries of power between farmers, the food industry and retailers, unfair competitive practices, including on pricing and other contractual terms, should be subjected to stronger regulation and monitoring by supervising and competition authorities; (2) The promotion of organic farming including through producer subsidies should be stepped up, while subsidies to large-scale farming need to be progressively scaled-down.

Pillar 4: Promoting a governance framework based upon strong capacities & capabilities as well as agile stability

Our discussion of industrial policy and innovation governance has highlighted the importance of promoting state capacities and capabilities. The new Commission however intends to take an alternative route to closing the EU's innovation gap. In the Competitiveness Compass, it outlines an agenda focusing on start-ups and an improved market-led innovation cycles. Via a series of new sector-specific strategies, the Commission wants to address bottlenecks to market entry and scale-up, including relations between universities and business, cross-border mobility of talent and skilled workers, access to risk finance, barriers within the Single market, infrastructure constraints, as well insufficiently targeted innovation support. Specific acts on e.g. Al, quantum computing, digital networks, clouds, biotech, advanced materials, space technologies, shall facilitate innovation entrepreneurship, primarily via regulatory facilitation. With respect to innovation diffusion throughout the whole economy, an Apply AI Strategy will aim to boost new industrial uses of AI in sectors, including manufacturing, automotive, energy, robotics, pharmaceutical and aeronautics, as well as to improve public services, for example in healthcare. Better EU-wide coordination and support of these AI vertical use cases shall be ensured via a 'CERN for AI'. With respect to changes to the institutional structure at EU level, the European Research Council and the European Innovation Council shall be aligned along the same strategic interests and cooperate more closely. Currently in charge of promoting high-quality basic research, this might de-facto undermine the ERCs independence. The EIC, currently in charge of promoting breakthrough innovation, shall be succeeded by an ARPA-like agency tasked to promote disruptive innovation. Whether this presents an opportunity will mainly depend on the mission, capacities and operational independence of the new agency. Apparently, the Compass does not follow-up on the mission concept as developed for the Horizon Europe cycle 2021–2027. If true, this would reduce the space for orienting innovation programs to socially desirable ends.

Although the proposals at this stage are rather general and often lack specificity, the overall trajectory points to a conventional conceptual understanding of innovation focused on the commercialization of technology. This is in marked contrast to the research literature on innovation for the Twin Transformation. Particularly with respect to the green transformation, the literature on transformative innovation policy has emphasized the need for a broader and transdisciplinary understanding of innovation policies in the context of the required deep transformation of our current production and consumption models, including key features for policy such as anticipation, experimentation, participation and directionality (Schot and Steinmueller 2018). As our discussion in section 5.3 has shown, there is a need to foster agile stability in competent agencies. and to allow for more experimentation and risk-taking while also helping to cultivate a higher tolerance for failure. For this purpose, innovation agencies need to enhance their dynamic capabilities, i.e. their ability to learn and adapt to changing circumstances. This can be fostered by introducing institutional learning processes, but also via promoting diversity more generally, in particular with respect to the recruiting of staff, or with respect to the staffing of program and project evaluation committees. A more diverse set of stakeholder representation in governance bodies (e.g. boards, advisory committees) will also contribute to bringing in new visions and ideas. This is true both for the EU and the member state-level. Also, a stronger coordination of the innovation agency ecosystem across the EU is needed to exploit complementarities and promote inter-institutional learning. Though the EU cannot directly influence the mandates and modes of operation of innovation agencies across the EU, via its cooperation with national agencies in the course of implementing EU-funded programs. the Commission could leverage its role by in particular (i) promote a discussion with Member States on the role of innovation agencies for the Twin Transformation with a view to revise mandates to allow for more diverse forms of innovation policy while accepting a higher risk of failure: (ii) by reducing administrative requirements for both national implementing agencies and applicants, thus freeing up resources to promote learning and thematic interchange, and (iii) by scaling-up learning platforms for national agencies to promote interinstitutional exchange and peer learning.

Besides the governance structure for promoting innovation, state capacities to implement industrial policy programs will have to be strengthened more broadly, in particular at the national and local levels. The straightforward way to achieve this is via systematically **integrating and expanding**, **respectively**, a funding component to promote the institutional capacities and capabilities of implementing agencies with the overall program design. Given that in many Member States, the absorptive capacities of existing institutional structures to implement programs are limited, they create a bottleneck for swift and effective implementation, that needs to be addressed.

Pillar 5: Closing the investment gap

Based on our analysis in section 5.4., the investment gap for the Twin Transformation might be estimated at between 2 % and 4.5 % of EU GDP, of which at least 50 % should be supplied by the public sector. That would be equal to an amount between €360 bn – €800 bn per annum.

The new Commission wants to tackle this challenge by doubling-down on its de-risking approach. While lamenting the lack of risk appetite amongst private investors, it wants to incentivize private capital markets to channel the relatively high level of European household savings into productive investment and innovation. With its proposal for a European Savings and Investment Union, the Commission thus follows suit on the recommendations of the Letta and Draghi reports, respectively, on establishing a full EU capital markets union. In this, the Commission includes problematic elements such as the securitization of loan portfolios, the latter having been a major reason for the GFC in 2007/08.

If it is the case, as the Commission contends, that private capital markets and European banks have so far not been able to perform its very function of providing the finances necessary for investment into the Twin Transformation, the obvious question is why sovereign borrowers shouldn't go to capital markets and tap into the pool of savings themselves via public borrowing. Clearly, funding costs for sovereign borrowers would be lower than for private debtors. The obvious answer to this has to do with the fiscal constraints imposed by the reformed SGP upon Member States and the political blockade to put common EU funding on a permanent basis. Given both the dire fiscal situation in many EU Member States and the clouded economic outlook for the coming years, it is however totally unclear how the required amounts to close the investment gap for the Twin Transformation are to be raised on private capital markets. Investors and their appetite for risk will only come back, once the economic outlook has improved substantially. Thus, in the current circumstances, there exists a strong economic case for frontloading public investment to raise economic prospects and thus to stimulate the animal spirits of private investors. Also, for the sake of preventing a further widening of internal economic imbalances and structural heterogeneities, it is of paramount importance that most public funding should come from the central European level.

Putting the temporal EU joint borrowing facility on a permanent basis would also be justified from a legal perspective, given that the Twin Transformation is an EU public good requiring a one-off fiscal effort (Poiares Maduro et al. 2021); Thus, instead of establishing a new Competitiveness Fund, as announced by the Commission, with the very limited resources available under the regular EU budget, a **Twin Transformation Fund** should be funded with money raised by the EU on capital markets. As an absolute minimum, the Fund should be capitalized to the tune of 1 % of EU GDP over a ten-year time period (see also Heimberger and Lichtenberger 2023).

As this represents the lower-bound estimate of the total EU public investment gap for the Twin Transformation, two complementary mechanisms should be contemplated. Firstly, the **EU's own resources could be raised**: this could include to direct more ETS revenues to the EU level (Pisany-Fery, Tagliapietra, and Zachmann 2023), but could also mean to allow the EU to raise its own taxes, including via e.g. a financial transaction tax or a net wealth tax (Schratzenstaller and Krenek 2019).

Secondly, the **mandate of the ECB could be amended to allow for monetary financing of the Twin Transformation**: notwithstanding the prohibition of monetary financing under the EU Treaty (Article 123 TFEU), the scope of this prohibition was de-facto broken already in 2015, when the ECB embarked on direct asset purchases. With the ECB strategy review of 2020, outright purchases have been made part of the 'normal' toolbox. In addition, the ECB could use a much wider array of policy instruments to promote the Twin Transformation, including through collateral frameworks, asset purchases (e.g. of green bonds), refinancing operations,

and regulatory tools such as capital requirements, credit controls and mandatory disclosures (Dafermos et al. 2023; Skyrman 2024).

Of course, any combination of these options is possible, and would indeed be desirable. The next years, and in particular, the incipient negotiations for the next EU financial framework 2028–2034 will give a clear indication, whether the investment gap for the Twin Transformation will be closed or not.

Pillar 6: Cooperating with partners on a global Twin Transformation

As outlined in section 3.2.3, the EU is suffering from pronounced external dependencies with respect to energy, raw materials, clean tech products, as well as intermediate inputs (e.g. active pharmaceutical ingredients). The response of the EC consisted in a variety of measures, including to diversify supply chains so as to increase resilience. With respect to energy, the Commission has for instance supported the development of green hydrogen production in African countries. With respect to clean tech products (e.g. Solar PVs, batteries), the EU and Member States have promoted domestic production (e.g. via subsidies for onshoring of third-country companies). As far as raw materials are concerned, under the Critical Raw Materials Act, the EU has negotiated a series of Raw Material Partnerships (13 as of end 2024) with producer countries.²³ These are basically Memorandums of Understanding (MoU), outlining future cooperation areas and establishing an institutional process including a roadmap with concrete projects, annual high-level meetings and a permanent Working Group. The MoUs routinely include a reference committing the parties to EU ESG standards and sustainable mining practices. The EU's Global Gateway Initiative is referred to as a financing mechanism.

Building on the on-going implementation of the Critical Raw Materials Act, the Competitiveness Compass outlines both additional domestic and external policies. With respect to the former, the promotion of domestic production, stockpiling and diversification shall be pursued. The Commission will create a platform for the joint purchase of critical raw materials to identify the needs of EU industries, aggregate demand, and coordinate joint purchases. Also, the Commission announced to promote new Clean Trade and Investment Partnerships bringing together targeted trade and investment rules, financing and regulatory cooperation, into a single whole-of-government partnership. It is however unclear how these new partnerships will complement the existing raw materials diplomacy including the Raw Material Partnerships, the EU has pursued under the Critical Raw Materials Strategy since 2021.

While it will be necessary for the EU to secure additional external supplies of renewable energy, critical raw materials and other necessary products for the Twin Transformation, any bilateral cooperation needs to be based on (ii) **strict adherence to and comprehensive application of the highest ESG standards** for mining and production activities, (ii) **EU support for technology transfer and the build-up of a processing industry and value chain in producer countries**, including through skills development for the domestic workforce and scientific & technological cooperation programs with the EU; and (iii) **fair-benefit sharing** with respect to mining/exploration contracts and pricing mechanisms. While the EU corporate sector has traditionally emphasized the need to access abundant supplies of energy and raw materials at affordable prices, which with the current focus on competitiveness has only become more pronounced, an EU strategy of offering partner countries technological and financial support in building up their green and digital sectors is in the enlightened self-interest of the EU. This is equally valid for relations with the EU neighborhood and the Global South. To this end, **funding under the Global Gateway will have to be expanded**.

²³ For a full list of existing Raw Material Partnerships, see https://single-market-economy.ec.europa.eu/sectors/raw-materials/areas-specific-interest/raw-materials-diplomacy_en (accessed 31 December 2024).

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