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The regulatory complexity of the European Green Deal – too much too fast?

Volker Brühl

Abstract:

The European Green Deal (EGD) has the intention to transform the EU into a sustainable, resource efficient and competitive economy, ensuring zero net emissions of greenhouse gases (GHG) by 2050. This article illustrates the complex regulatory architecture of the EGD, which is often overlooked. While each of the initiatives is reasonable, their combined impact – often reinforcing each other – could impede Europe's global competitiveness, especially in a fragile economic environment. There are some fields where a thoughtful discussion about implementation deadlines and reporting requirements could help to resolve trade-offs between environmental objectives and competitiveness.

JEL: A10, K20, L50

1. Introduction

The European Green Deal (EGD) has the intention to transform the EU into a sustainable, resource efficient and competitive economy, ensuring zero net emissions of greenhouse gases (GHG) by 2050 (European Commission, 2019). An important milestone was the adoption of the European Climate Law (EU 2021/1119), which established a binding objective of climate neutrality in the EU by 2050. The law also sets the intermediate target of reducing net greenhouse gas emissions by at least 55% by 2030, compared to 1990 levels. In addition, the green and digital transformation of the European economy intends to address other pressing environmental objectives such as the protection of ecosystems and the reduction of pollution. In order to achieve these objectives, all major economic sectors need to undergo a deep transformation process, including the industrial manufacturing, mobility, housing and agricultural sectors. The ideal future economy is circular, generating very little or no pollution, producing zero net GHG emissions, based on mostly renewable power systems. There is certainly very little (if any) dissent about this vision.

However, the global economy is in the midst of a recession, with declining growth rates, high inflation, increasing unemployment and concerns about public deficits. Moreover, vastly different environmental standards in major global economic regions, looming trade conflicts, multiple geopolitical crises and a concentration of ownership of critical resources are just some of the challenges the EU economy faces. Germany, other EU Member States and the EU itself have initiated large public investment programmes aiming to improve military self-defence capabilities and to initiate economic growth through infrastructure investments. Many voices also call for deregulation and the abolishment of bureaucratic approval processes hindering investment activities. Unsurprisingly, there are growing concerns that the current transformation pressure established by the EGD overwhelms and endangers the global competitiveness of the European economy in light of multiple global crises.

This article provides an overview of the complex reform agenda and the regulatory landscape that emerge from the EGD. There is so far no comprehensive overview of the EGD that captures the big picture while also explaining the breadth and depth of the regulatory framework. The aim is not to question the overall need for such transformation efforts, but to ask whether or not we need more initiatives like the recently proposed "Omnibus I package" (COM 2025/80, 2025/81, 2025/87).

The EU Commission has launched this initiative, which is intended to postpone the implementation schedule ("stop-the-clock") and significantly simplify the current sustainability reporting framework.

Several adjustments of the Corporate Sustainability Reporting Directive (CSRD), the Taxonomy Regulation (TR) and the Corporate Sustainability Due Diligence Directive (CSDDD) are under consideration to reduce the administrative burden for reporting entities. However, the financial disclosure and reporting obligations of financial institutions and corporates are only one side of the coin. The other – even more important – aspect concerns the various transformation requirements that different real sectors of the European economy have to cope with under the EGD in a difficult environment.

To keep the EU attractive for investment activities in manufacturing sectors, innovation and talent, many voices call for a reduction of bureaucracy and administrative burden at the EU level to regain growth dynamics without losing sight of vital climate and other environmental targets. This article illustrates the huge regulatory complexity that has developed in the EU over the last five years. Many of these initiatives stipulate tight deadlines, trigger substantial investment needs for the corporate sector and need to be implemented in parallel.

While each of the initiatives is reasonable, their combined impact – often reinforcing each other – could impede Europe's global competitiveness, especially in a fragile economic environment. In the following we illustrate the complex regulatory architecture of the EGD, which is often overlooked. There are some fields where a thoughtful discussion about implementation deadlines and reporting requirements could help to resolve trade-offs between environmental objectives and competitiveness.

2. The regulatory landscape of the European Green Deal

Having examined the manifold regulatory initiatives, we have clustered the major regulatory acts along the dimensions "climate related", "energy related" and "environmental protection". As there are multiple independencies between the various regulatory fields, we have mentioned some of the legal acts under different categories.

Climate-related regulatory initiatives

Figure 1 illustrates the most important climate-related regulations and strategies following from the EGD and the "Fit for 55" package. It omits the energy sector, which is discussed separately due to its pivotal role for climate change and competitiveness.

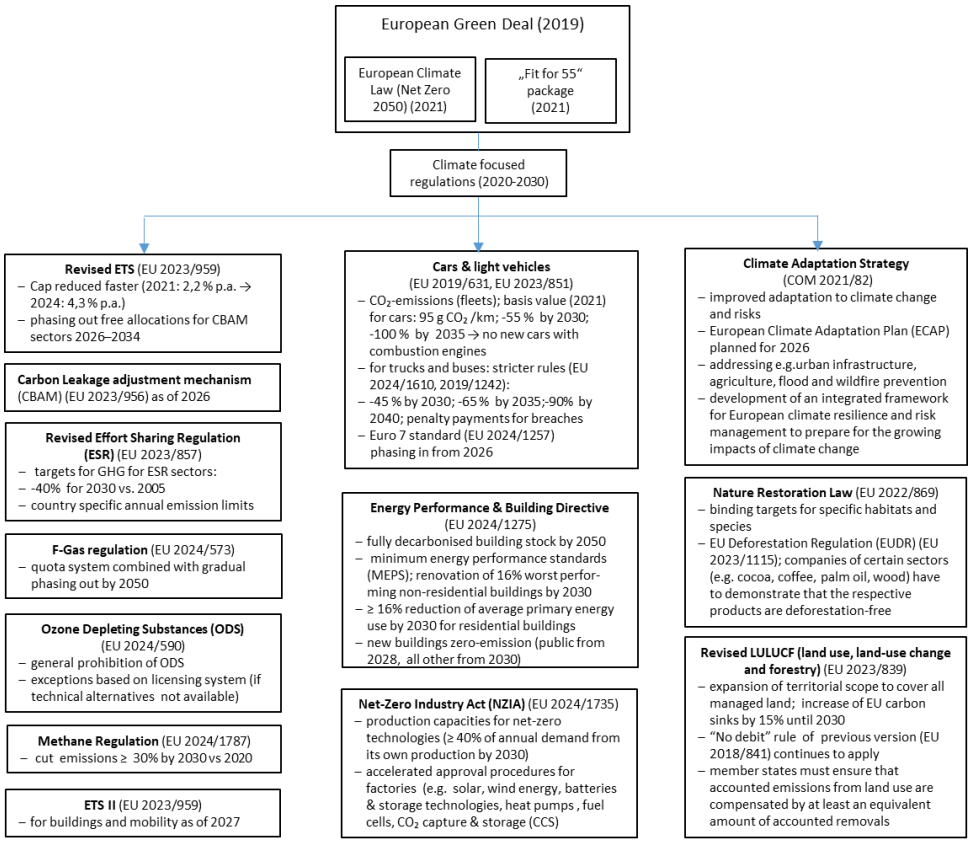
Important elements include the Emission Trading System (ETS), which is a market-based mechanism following a "cap-and-trade" approach, i.e. the EU sets a cap for the overall emissions (measured as tonnes of CO_2 equivalent, tCO_2e), which is reduced annually with a linear reduction factor (LRF). The ETS mainly covers CO_2 emissions, but also other GHGs such as nitrous oxide (N_2O) that are translated into CO_2 equivalents to reflect their Global Warming Potentials (GWP). GHG emissions from electricity and heat generation, energy-intensive industries such as steel, cement, pulp and paper, chemicals, petro chemicals, shipping and aviation fall under the ETS. The revision of the ETS Directive (EU 2023/959) has increased the initial reduction factor of 1.74% per year (until 2020) to 2.2% as of 2021, 4.3% per year over the period 2024-2027 and 4.4% per year from 2028. These measures are intended to bring emissions down by 62% until 2030 compared to 2005 levels.

Companies need to have a European Emission Allowance (EUA) for every tCO_2e they emit within one calendar year. They have to buy these permits, receive a free allocation (depending on the sector and the efficiency of their operations) and are able to trade them. Furthermore, the scope of the ETS will be extended to the building and road transport sector as of 2027 (ETS II). Fuel suppliers will need to purchase emission certificates, which will at least in some cases lead to higher consumer prices for fossil fuels to dampen the demand.

In addition, sectors covered by the Effort Sharing Regulation (ESR) - applicable to sectors outside the ETS - have to reduce their GHG emissions by 40% by 2050 (EU 2023/857). Another important component is the Carbon Border Adjustment Mechanism (CBAM) (EU 2023/956), addressing the potential relocation of CO_2 intensive production to countries outside the EU with less strict environmental standards (carbon leakage). The revised regulation on land use, land use change, and forestry (LULUCF) (EU 2023/839) and the Nature Restoration law (EU 2022/869) should also be mentioned as they will help to protect biodiversity and increase carbon sinks.

The mobility sector has to cope with enhanced fleet emission rules for cars and light vehicles, implying a factual prohibition of new cars with combustions engines as of 2035 (EU 2023/851). In addition, the so-called Euro 7 standard (EU 2024/1257), covering CO_2, NO_x and other pollutant emissions as well as fuel and electric energy consumption, has been adopted and will be phased in from 2026.

Figure 1: Major climate-related regulatory initiatives of the EGD



Source: Author, European Commission

Another major element of the climate protection strategy is the housing sector, which is subject to the Energy Performance of Buildings Directive (EPBD) (EU 2024/1275) and needs to be transposed into national laws in 2026. The EPBD lays down requirements such as minimum energy performance for new and existing buildings. A fully decarbonised building stock is to be achieved by 2050. The directive focuses on increasing the rate of renovation in the EU, particularly for the worst-performing buildings. The new standard shall be zero-emission buildings that are also ready for photovoltaic or solar thermal installations. By 31 December 2025, all EU Member States have to develop a draft National Building Renovation Plan. The EPBD is expected to initiate a "renovation wave" that may stimulate the construction and building materials sector. The Net Zero Industry Act (NZIA) (EU 2024/1735) promotes clean technology sectors such as solar, wind, hydrogen, battery, carbon storage and heat pumps.

Manufacturing capacities are to meet at least 40% of annual demand by 2030. The EPD and the NZIA are examples of sustainability initiatives stimulating growth in certain sectors.

Other regulatory measures have been established to substantially reduce GHG emissions other than CO_2, such as emissions of fluorinated greenhouse gases (F-gases) and ozone-depleting substances (ODS). F-gases include hydrofluorocarbons (HFC, c. 90%), perfluorocarbons (PFC), sulphur hexafluoride (SF_6) and other fluorinated compounds that are used in applications such as refrigeration, air conditioning and heat pumps, but also in aerosols, insulating foams or fire extinguishing technologies. As these substances also contribute significantly to global warming, the F-gas Regulation (EU 2024/573) was adopted to ensure a steeper reduction in usage, with a complete ban by 2050.

Protecting the layer of ozone (O_3) in the stratosphere is important to absorb most of the sun's harmful UV radiation. Therefore, the EU has limited the use of certain ODS to very specific use cases in chemical production and specialised equipment (EU 2024/590). Moreover, methane emissions, mainly generated by livestock farming, the energy sector and in landfills, are to be reduced by 30% by 2030 (EU 2024/1787), which is in line with the Global Methane Pledge (GMP) launched at COP26 in Glasgow in 2021.

Energy-related regulatory initiatives

The production and use of energy account for more than 75% of the EU's GHG emissions. Decarbonising the EU's energy system is therefore a key element of the EGD. Figure 2 provides an overview of the major regulatory building blocks for transforming the energy sector, excluding the ETS, which was mentioned above. As the EU intends to increase the proportion of renewable energy in the energy mix, the third version of the Renewable Energy Directive (REE III) (EU 2023/2413) has set the target of at least 42.5% of energy consumption from renewable resources (compared to 24.6% in 2023). In this context, the EU Offshore Strategy (COM 2023/668) has been adopted alongside a European Wind Power Action Plan (COM 2023/669). Targets are an installed capacity of at least 60 GW of offshore wind and 1 GW of ocean energy by 2030, and 300 GW and 40 GW, respectively, by 2050. This requires accelerated permission procedures and the integration of offshore renewables in the Trans-European Networks for Energy (TEN-E). Moreover, stronger links between different types of energy carriers (electricity, gas, heat, fuels) will be an important ingredient of the future European energy sector. Large investments into transmission and distribution networks for electricity are needed due to the expected higher demand for electricity, the more decentralised energy system and in some cases ageing infrastructure. The revised TEN-E Regulation (EU 2022/869) entered into force in June 2022 to ensure the timely implementation of key infrastructure projects (so called Projects of Common and Mutual Interest (PCIs, PMIs) covering electricity, offshore grids, hydrogen and electrolyser infrastructure in eleven geographical priority corridors. Furthermore, the Commission announced a Grid Action Plan (COM 2023/757) in 2023, anticipating an increase in electricity consumption in the EU of around 60% by 2030. The corresponding investment needs in electricity networks are estimated at around EUR 584bn by 2030 (SWD 2022/230).

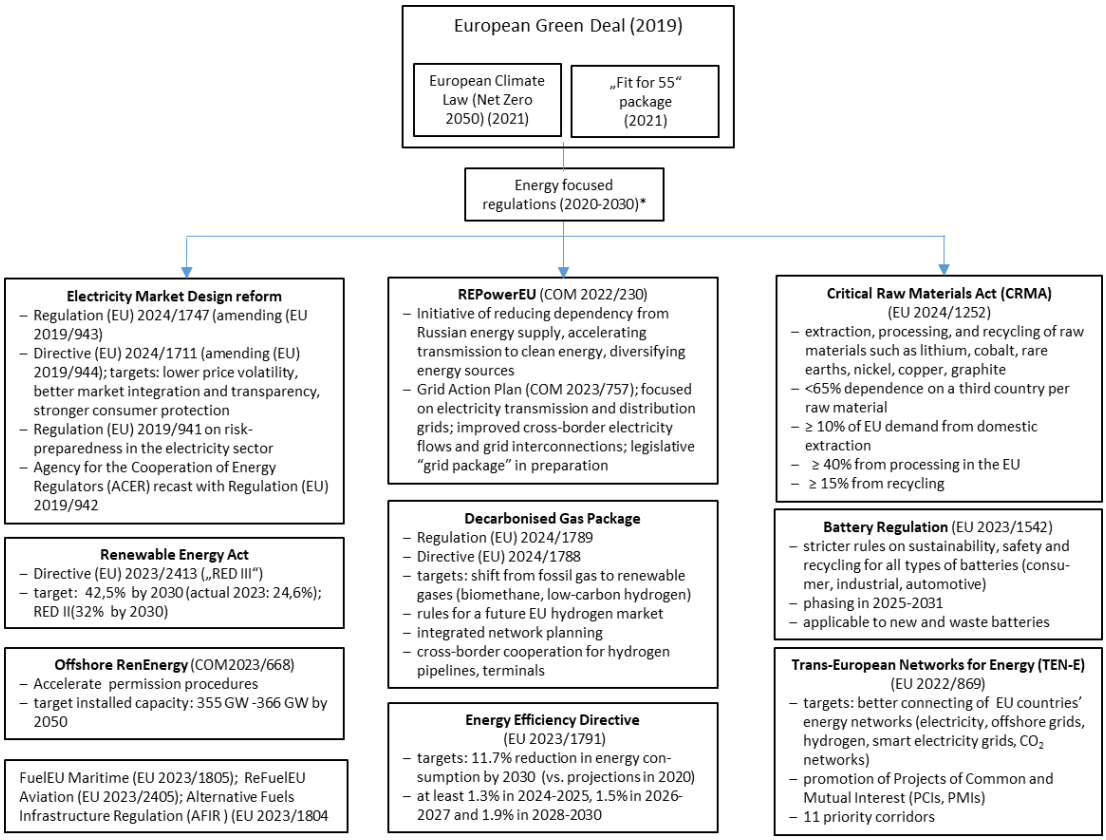
Furthermore, increased usage of low-carbon hydrogen could contribute to decarbonising energy-intensive industrial processes and the transport sector (COM 2020/301). Around 10% of the EU's energy needs could come from green hydrogen by 2050. Further investments to establish a hydrogen backbone network are estimated at around EUR 43-81bn (SWD 2021/455). A decarbonised gas package has been put forward to foster the shift from fossil gas to biomethane and low carbon hydrogen (EU 2024/1789, EU 2024/1788).

These investments can be expected to be reflected, at least in part, in higher prices for end consumers. In addition, ambitious targets regarding energy efficiency and a fully integrated digitalised European energy market have been set. Various regulatory packages have contributed to a more open, interconnected and competitive energy market for both electricity and gas transmission networks. The new electricity market

design rules were adopted in 2024 (Directive (EU) 2024/1711, Regulation (EU) 2024/1747). The revised Energy Efficiency Directive (EU 2023/1791) significantly raises the EU's ambition on energy efficiency gains. It requires annual reduction rates of at least 1.3% in 2024-2025, 1.5% in 2026-2027 and 1.9% in 2028-2030. The resulting investment needs are estimated at around EUR 20bn p.a. (SWD 2021/623).

It should be noted that the Critical Raw Materials Act (EU 2024/1252), the Battery Act (EU 2023/1542) and the Chips Act (EU 2023/1781) are crucial to making the EU more independent from key suppliers outside the EU.

Figure 2: Major energy-related regulatory measures of the EGD



*For ETS see figure 1.

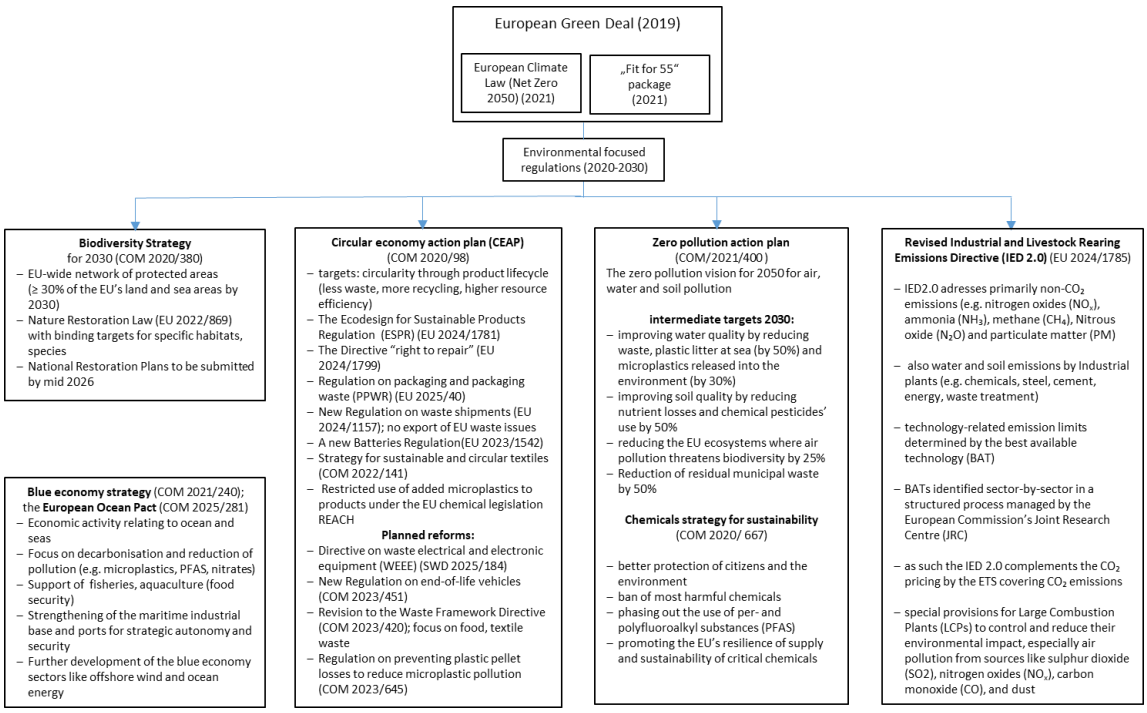
Source: Author, European Commission

Regulatory initiatives for environmental protection

Climate change mitigation and adaptation are important sustainability objectives of the EGD. However, there are many other aspects of environmental protection, such as the protection of ecosystems including biodiversity, water and maritime resources (blue economy), or pollution prevention and control. Therefore, the whole economy needs to become as circular as possible by increasing reuse and recycling and avoiding waste and pollution. Figure 3 provides an overview of major initiatives and regulatory instruments of the EGD concerning non-climate-related environmental topics. However, there are obviously several interdependencies between those and climate-related activities.

The EU's biodiversity strategy for 2030 (COM 2020/380) aims to protect nature and to restore Europe's biodiversity. The Nature Restoration Law (EU 2024/1991), which came into effect in 2024, has set legally binding targets to establish at least 20% of land and 20% of sea as protected areas in the EU. Each EU Member State has to submit a National Restoration Plan to the Commission by mid-2026. The estimated costs and investments to implement the Nature Restoration Law are around EUR 154bn (2050), while the benefits are considered to be much higher. The EU Deforestation Regulation (EUDR) (EU 2023/1115) stipulates that companies in certain sectors (e.g. cocoa, coffee, palm oil, wood) have to demonstrate that the respective products are deforestation free, i.e. do not originate from recently deforested land and have not contributed to forest degradation.

Figure 3: Major environment-related regulatory measures of the EGD



Source: Author, European Commission

All blue economy sectors, including fisheries, aquaculture, coastal tourism, maritime transport, port activities and shipbuilding, will have to reduce their negative environmental and climate impact. The blue economy strategy involves reducing maritime pollution including microplastics, supporting coastal resilience to assist climate adaptation, and sustainable food production (COM 2021/ 240). The oceans cover about 71% of the Earth's surface and play an important role in its heat balance and climate system. They absorb roughly 25% of the annual CO_2 emissions from the atmosphere and store up to 93% of the excess heat trapped by greenhouse gases (Helmholtz, 2023).

In the following, we focus on the Circular Economy Action Plan (CEAP) (COM 2020/98) and the Zero Pollution Action Plan (ZPAP) (COM 2021/400). The CEAP is a central element in transforming the European industrial sector, as it addresses the entire life cycle of products. It aims to reduce packaging waste and to increase reuse and recycling rates of products and materials. Various regulatory acts entered into force recently, including Directive on the repair of goods establishing the "right to repair" (EU 2024/1799), the new Regulation on Packaging and Packaging Waste (PPWR) (EU 2025/40), the Regulation on waste shipments (EU 2024/1157), and the new Batteries Regulation (EU 2023/1542) aim to ensure that products – particularly batteries – placed on the EU market are sustainable and circular throughout their entire life cycle. Furthermore, the addition of microplastics to products (e.g. certain types of cosmetics, detergents, waxes, polishes and fertilisers) has been restricted und der EU chemical legislation REACH (the Regulation

on Registration, Evaluation, Authorisation and Restriction of Chemicals) (EU 2023/2055). Depending on the product, the use of synthetic polymer micro particles is banned after a certain transition period.

Additional initiatives are being assessed or already in the legislative process. They include a revision of the Waste Framework Directive (COM 2023/420), the Directive on Waste Electrical and Electronic Equipment (WEEE) (EU 2012/19) and a possible new Regulation on end-of-life vehicles (COM 2023/451). Furthermore, a new Regulation on plastic pellet losses (COM 2023/645) is planned to be adopted in 2025 to reduce the amount of microplastics released by 30% by 2030.

Another key element of the CEAP is the Ecodesign for Sustainable Products Regulation (ESPR), which entered into force in 2024 (EU 2024/1781). The ESPR covers many physical product categories for end consumers and some intermediate products that should become not only more energy efficient, but also more durable, reliable, reusable, repairable and recyclable. Key product information shall be stored in a Digital Product Passport (DPP). Covered products will include consumer electronics, household appliances, commercial machinery, toys, furniture and textiles. In addition, iron and steel, aluminium, and certain chemicals (e.g. detergents, paints, lubricants) are within the initial scope. However, there are already several regulations in place addressing some ecodesign aspects of chemical products, e.g. the Regulation on chemicals (REACH), the Directive on the Restriction of Hazardous Substances in electrical and electronic equipment (RoHS), the Regulation on Classification, Labelling and Packaging of chemicals (CLP) and energy labelling legislation (e.g. the Energy Labelling Framework Regulation, (EU 2017/1369) or the delegated regulation (EU 2021/340). It is important that the many upcoming delegated acts establishing product-specific technical requirements avoid or eliminate any legislation overlap and keep the entire approach pragmatic.

The Zero Pollution Action Plan (ZPAP) (COM 2021/400) is a vital component of the EGD aiming to reduce the pollution of air, water and soil to levels that are not harmful to human health and natural ecosystems.

The ZPAP sets forth, among other things, the following targets by 2050:

- improving water quality by reducing waste, plastic litter at sea (by 50%) and microplastics released into the environment (by 30%)
- improving soil quality by reducing nutrient losses and the use of chemical pesticides by 50%
- reducing by 25% the EU ecosystems where air pollution threatens biodiversity
- significantly reducing waste generation and cutting residual municipal waste by 50%

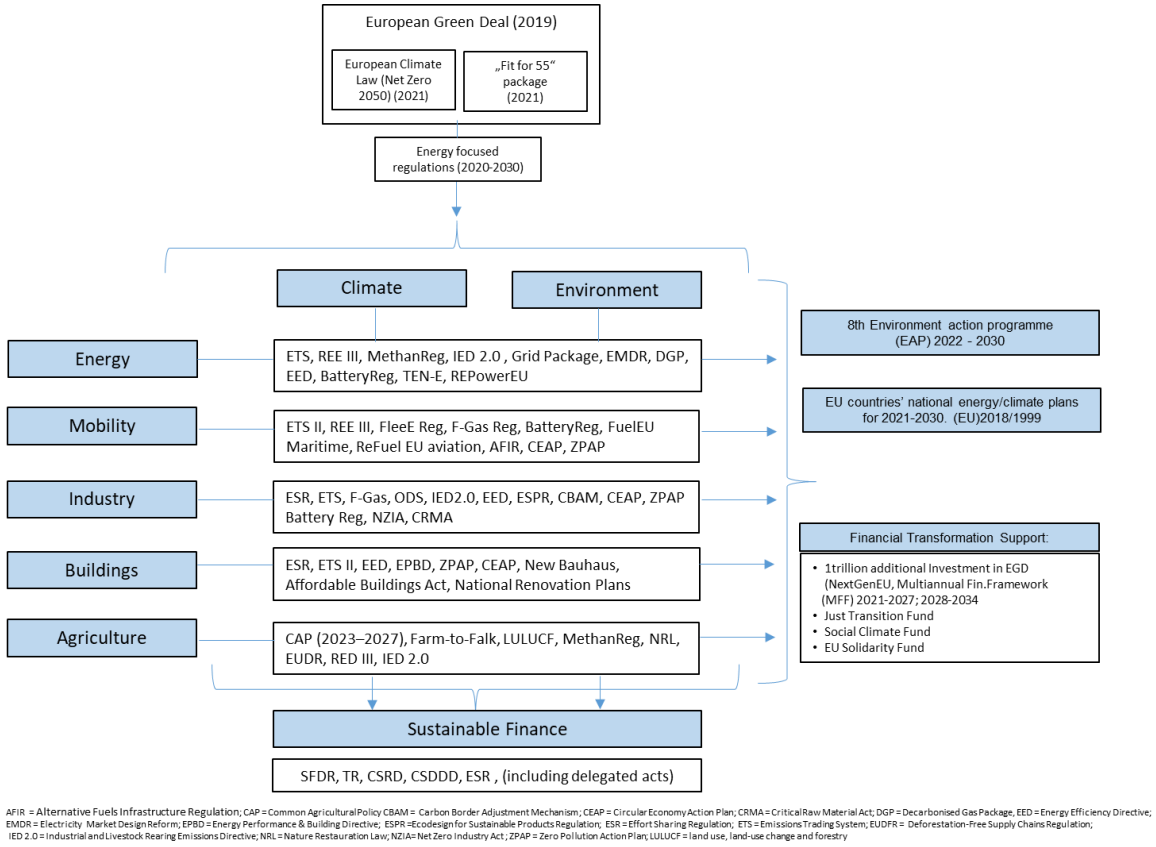
The revised Industrial and Livestock Rearing Emissions Directive (IED 2.0) (EU 2024/1785) is the main instrument to reduce harmful emissions into air, water and land from large industrial installations and intensive livestock farms.

IED 2.0 primarily addresses non-CO_2 emissions including nitrogen oxides (NO_x), ammonia (NH_3), methane (CH_4), nitrous oxide (N_2O) and particulate matter (PM) as well as water and soil emissions by industrial plants (e.g. chemicals, steel, cement, energy, waste treatment). Technology-related emission limits are determined by the best available techniques (BAT), which are generally identified sector-by-sector in a structured process managed by the European Commission's Joint Research Centre (JRC). As such, IED 2.0 complements CO_2 pricing under the ETS. IED 2.0 includes special provisions for Large Combustion Plants (LCPs) to control and reduce their environmental impact, especially air pollution from sources like sulphur dioxide (SO_2), nitrogen oxides (NO_x), carbon monoxide (CO), and dust. As emission-intensive industries often fall under both the ETS and IED 2.0, both instruments put pressure on industrial corporates to improve their environmental footprints.

Combined impact of regulatory initiatives

Figure 4 illustrates that most sectors are affected by multiple climate- and non-climate-related environmental regulatory initiatives simultaneously. The transformation path of the EGD is concretised by the respective European Action Plans (currently the 8th EAP 2022-2030). To meet the EU's energy and climate targets for 2030, Member States have established 10-year integrated National Energy and Climate Plans (NECPs) for the period from 2021 to 2030. These national plans outline targets, policies, and measures especially regarding GHG emissions, energy efficiency and renewable energy (EU 2018/1999). Although impact assessments have been carried out by the European Commission in the preparation of, and during the legislative processes for, many individual directives, regulations and delegated acts, there is so far no impact assessment at sector level covering the cumulative impact of the numerous regulations in terms of investment needs and operational costs.

Figure 4: Cumulative impacts of regulatory initiatives – exemplary illustration



AFIR = Alternative Fuels Infrastructure Regulation; CAP = Common Agricultural Policy CBAM = Carbon Border Adjustment Mechanism; CEAP = Circular Economy Action Plan; CRMA = Critical Raw Material Act; DGP = Decarbonised Gas Package, EED = Energy Efficiency Directive; EMDR = Electricity Market Design Reform; EPBD = Energy Performance & Building Directive; ESPR =Ecodesign for Sustainable Products Regulation; ESR = Effort Sharing Regulation; ETS = Emissions Trading System; EUDFR = Deforestation-Free Supply Chains Regulation; IED 2.0 = Industrial and Livestock Rearing Emissions Directive; NRL = Nature Restauration Law; NZIA= Net Zero Industry Act ; ZPAP = Zero Pollution Action Plan; LULUCF = land use, land-use change and forestry

Source: Author

Conclusions

Although there is broad consensus on the urgent need to address the causes and consequences of climate change and the many forms of environmental damage, including their social implications, concerns are emerging as to whether the current fragile economic environment, marked by multiple uncertainties, requires some form of relief along the transformation path of critical sectors such as energy, energy-intensive industries or the automotive sector. It should be discussed whether the accelerated adoption rates – introduced by the "Fit for 55" package, should be partially reversed or at least extended by 5 years,

e.g. 2035 instead of 2030, without abandoning the final objectives. The selection of industries that could benefit from such alleviations should be based on a thorough analysis of the cumulative investment needs and cost burdens imposed by the EGD, as well as the degree of global competitive pressure on those industries. The same applies to the fleet emission standards for the automotive sector by 2030, where a limited extension would also support the European automotive industry in its challenging environment. To at least partly compensate for a somewhat delayed transformation path in some industries, other initiatives of the EGD could be intensified. This could apply for instance to the LULUCF Regulation and the Nature Restoration Law by setting more ambitious targets on reforestation and carbon sinks. Moreover, the investments deployed to climate change adaption should be increased across all areas. Measures include better protection against floods, dryness and heat waves. With an estimated amount of climate-related damages in the EU of EUR 162bn between 2021 and 2023 and forecasts of increased frequency of extreme weather events, investments in protective measures for public and private infrastructure are essential to enhancing climate resilience. Available estimates of the investments needed to cope with climate change span a broad range and depend, for example, on the underlying global warming scenario and the expected impacts of climate change. Figures range from EUR 15bn to EUR 64bn p.a. (COM 2024/91). A temporarily stronger focus on adaptation could help to mitigate the adverse economic environment while providing some relief along companies' transformation paths.

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