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Industry and the green transition

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As this work reflects equal contributions from all members, we propose that a global grade be awarded, ensuring the same evaluation is shared across the group.

In recent years, the convergence of several major crises, including the pandemic, geopolitical tensions, and energy shocks, has left lasting effects on the economy of the European Union, increasing inequality and weakening social cohesion. While the critical phases of these crises may have passed, their consequences continue to resonate. Meanwhile, the climate crisis remains an ongoing and escalating threat. Widely recognized as a “threat multiplier,”. ([United nations-Climate change](#))

In this context, the transition to carbon neutrality has become a shared global objective, in line with the Paris Agreement’s objective to limit global warming to well below 2°C. ([United nations-Climate action](#)). The European Union has recognized climate change not only as an environmental necessity but also as a driver of profound economic and societal transformation. As such, it has positioned itself as a global leader in the green transition, aiming to align industrial growth with long-term sustainability and climate resilience. The President of the European Commission described the launch of the European Green Deal as “Europe’s man on the moon moment,” highlighting its significance as a bold, historic step toward climate neutrality.” ([Counterbalance-EGD](#)).

A key development in this agenda is the Net-Zero Industry Act, introduced in 2023 as the latest pillar of the EU’s Green Deal industrial plan. The NZIA seeks to scale up the manufacturing of clean technologies in the EU and ensure the Union is equipped for the clean energy transition. The Act’s core ambition is to make at least 40% of the EU’s net-zero technology deployment needs by 2030 meetable through domestic production, while boosting strategic autonomy, energy, security, and job creation. As a response to recent global disruptions, the NZIA aims to reinforce supply chain resilience and strengthen European industrial sovereignty. However, as a newly proposed regulation, the NZIA is still in the early stages of implementation, and there is currently insufficient data available to evaluate its long-term impact. ([European commission-NZIC](#))

This essay will tackle how EU industrial and climate policies since the launch of the European Green Deal, have contributed to the green transition. We will examine both the measures that have already been implemented and those planned for the future, viewing the process of industrial decarbonization through the lens of job impacts and the principle of a just transition, culminating in the Net-Zero Industry Act. By examining the policy evolution, impact on emissions and labor markets, and emerging forecasts, as well as examining the indicator linked to each policy, this paper aims to assess the effectiveness and fairness of the EU’s approach to linking climate goals with industrial transformation. The analysis begins with the context of a green transition, followed by a timeline of key policies leading up to it. It then discusses the core

challenges the EU aims to address, reviews relevant indicators, evaluates the role of just transition mechanisms, and considers the NZIA's potential based on existing information and trends.

To understand the path that led to the Net Zero Industry Act, it's essential to start with the European Green Deal, introduced in 2019, which laid the foundation for this transition. ([European Commission-NZIC](#))

Within this broader context, Industry is an important sector of the economy of the EU, which helps generate value added and jobs. However, at the same time, the industrial sector activities also result in pressures on the environment, such as emissions to the air. The transformation of these carbon-intensive sectors, such as steel, coal, and chemicals, poses complex challenges. Policymakers must balance industrial competitiveness and economic growth with urgent climate goals. The stakes are high, as decisions taken at the policy level can affect millions of lives across Europe and beyond. This brings us to the importance of a just transition. ([European commission-JTM](#))

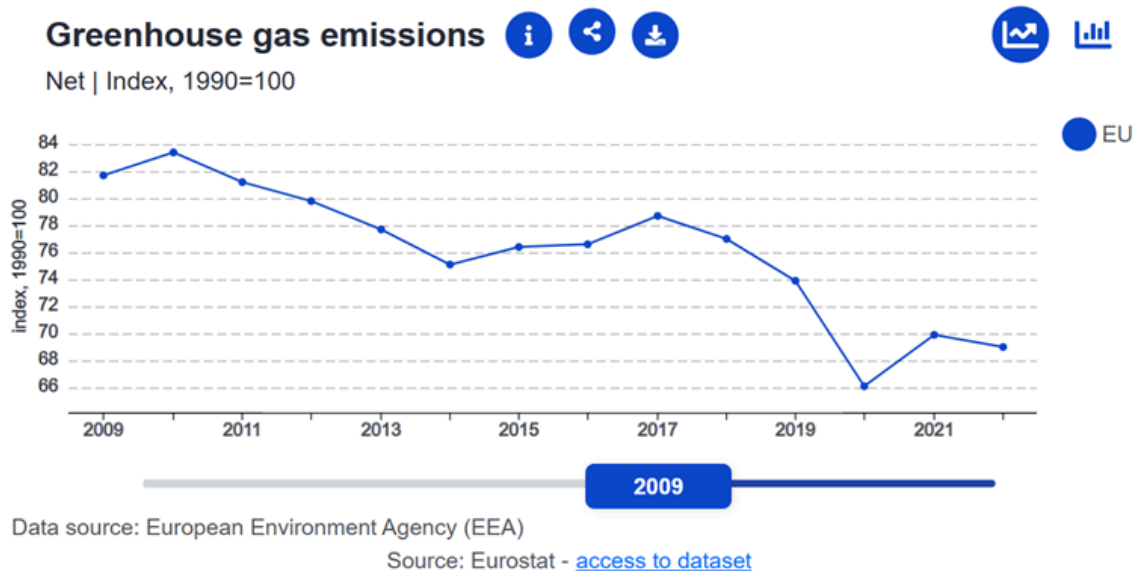
The NZIA must therefore be understood not only as a forward-looking industrial policy but also as a result of years of evolving EU climate and labor policy. It is a test of the Union's ability to integrate industrial competitiveness, environmental urgency, and social justice into a coherent framework for climate neutrality by 2050. With this vision, the Green Deal represents a roadmap for future policies and actions, impacting all policy areas and all sectors of the economy, and making this transition just and inclusive for all. Under this overall strategy, initiatives and policies have been implemented, focusing on the details and applying them in reality.

In the economic and industrial sector, the Commission presented in March 2020 the new Industrial Strategy to support EU industry, emphasizing the twin transition of digital and zero-emission economy, fostering the EU's strategic autonomy but without damaging its competitiveness. The Strategy proposed several measures to strengthen the EU's Single Market. These include the enforcement of the Services Directive to ensure Member States responsibilities in eliminating new potential barriers; it also involves twin green and digital transitions for companies with measures that invest in upskilling and reskilling, co-creating transition pathways, collaborating with industry, and public authorities

In 2021, an update was introduced to the original strategy in response to lessons learned during the COVID-19 pandemic, highlighting critical issues such as strategic dependencies. Detailed in the ([European Commission-Strategic dependencies and](#)

[capacities](#)) by the European Commission, a significant portion of these dependencies involves raw and processed materials as well as chemicals, which are directly related to the digital transition, green mobility, and renewable energy production. The EU has a high level of foreign dependency, and in the renewable ecosystem, several dependencies may have an impact on the decarbonisation and continued proper functioning of the EU electricity system.

In the same year, in June 2021, the European Green Deal was put into force through the adoption of the European Climate Law. Due to its regulatory nature, achieving the net-zero greenhouse gas emissions (GHG) goal by 2050 of the Deal became a legally binding target. As an intermediate goal, a new target due for 2030 has been set: to reduce net greenhouse gas emissions by at least 55% compared to levels in 1990, prioritizing emission reduction.



As shown by the Eurostat database, a decrease was recorded from 2021 levels compared to the 2022 value. We will see later how further development takes place in the next few years.

This process of making these targets binding continued in the same year, as the fit for 55 package was approved. The Fit for 55 is a package of laws aiming at reforming EU climate and energy policies to reduce the EU greenhouse gas emissions by at least 55% by 2030 against 1990 levels, and, against 2005 levels and in some sectors, to reduce 62% of emission (previous goal was set at 43%) Additionally, the annual reduction rate of the emissions cap has been raised from 2.2% to 4.3% which in return will lessen the number of allowances in the market and increase their prices.

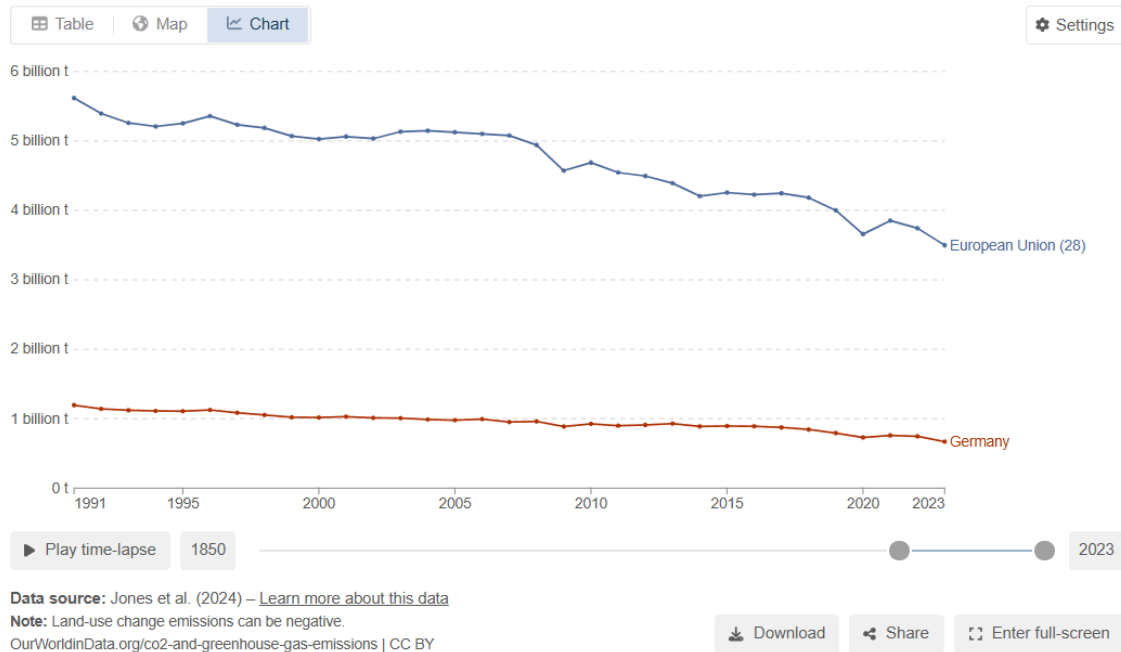
One of the main instruments to address emissions reductions is the EU Emissions Trading System (EU ETS) it is a carbon market based on a system of cap-and-trade of emission allowances for the energy-intensive industries (e.g., steel works, oil refineries) and the power generation sector. A cap is the limit set on the total amount of GHG that can be emitted by installations and operators. Annually, the cap is reduced, resulting in a decrease in the gas emitted. Cap is expressed in emission allowances, which allows one to emit 1 tonne of CO₂ equivalent. When a company reduces its emissions, it can sell the allowances or keep them to use in the future. Therefore, along with the carbon price, it incentivizes companies to cut their emissions to reduce their costs and receive profits from the sale.

Another important instrument introduced by the Fit for 55 package is the Carbon Border Adjustment Mechanism. Its goal is to counter carbon leakage, which is a phenomenon in which high GHG emission industries move their production outside the EU, where there is less stringent environmental legislation, to avoid the EU's regulation. The aforementioned ETS allowance system rules out extra-EU production, making it convenient for companies to shift abroad. To this day, the system is still in its transitional phase, its definitive regime will take place from 2026. In contrast, steps are taken to switch and increase the usage and production of renewable energy. The old 2030 target was at least 32% renewable energy of the mix; it has now been raised to 42.5% + 2.5% top-up. In the industry sector, +1.6% annually in renewable energy usage is set.

Although we do not have more data due to their recent implementation, and therefore can not evaluate the long-term impacts, according to the EDGAR – The Emissions Database for Global Atmospheric Research (2024) report, EU emissions fell by 7.5% in 2023. 2024 report global GHG emissions in 2023 rose by 1.9% higher than 2022 values. Nevertheless, the EU experienced a significant decrease of -7.5% compared to 2022. This trend was recorded in all EU countries except Croatia and Cyprus, and the largest emitters remain Germany, and then France, Italy, Poland, and Spain. According to the article [\(EU Parliament-GHG Emissions\)](#) by the European Parliament, in 2023 Germany produced 682 million tonnes of CO₂ equivalent, while the EU produced 3.222 million tonnes. The largest drop was observed in the power industry sector, with a gap of 20.1%, followed by industrial combustion and processes, which amounts to an 8.1% decrease. Compared to 1990 levels, the 2023 value amounts to a 33.9% reduction, which is in line with the Industrial Strategy goal of at least a 55% reduction.

Greenhouse gas emissions

Greenhouse gas emissions include carbon dioxide, methane and nitrous oxide from all sources, including land-use change. They are measured in tonnes of carbon dioxide equivalents over a 100-year timescale.

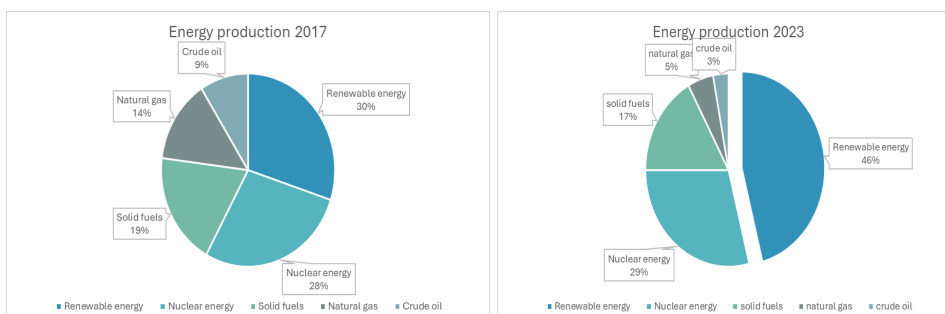


The World in our data database reports the same downward trend until 2023.

Launched 2022 May, REPowerEU is the European Union strategic response to Russia's invasion of Ukraine and the market disruptions it caused on the gas supply. This crisis brought to light UE's overreliance on Russian fossil fuels and this became an opportunity for the European Union to accelerate the transition to clean energy.

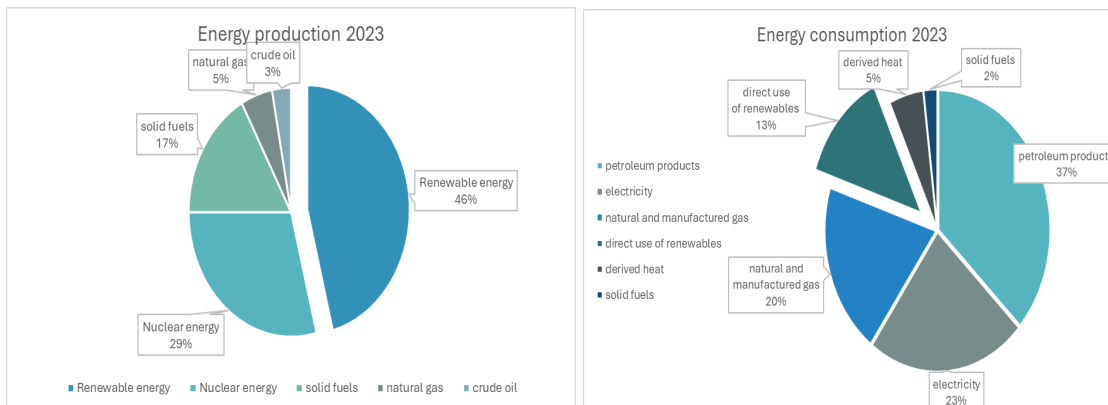
The plan includes different measures, one of which is the diversification of energy supplies: The 2021 share of Russian gas imports, amounting to 45% of power generation, fell to 15% by 2023. For renewables, there is a massive scaling-up, speeding up the production and usage, accelerating the clean energy transition. Diversifying the EU's energy mix is in line with the Fit for 55 package, which sets the target of 42.5% of energy consumption in renewables.

According to the Eurostat report *Shedding Light on Energy in the EU – 2019 Edition*, The production of energy in 2017 was structured as follows:

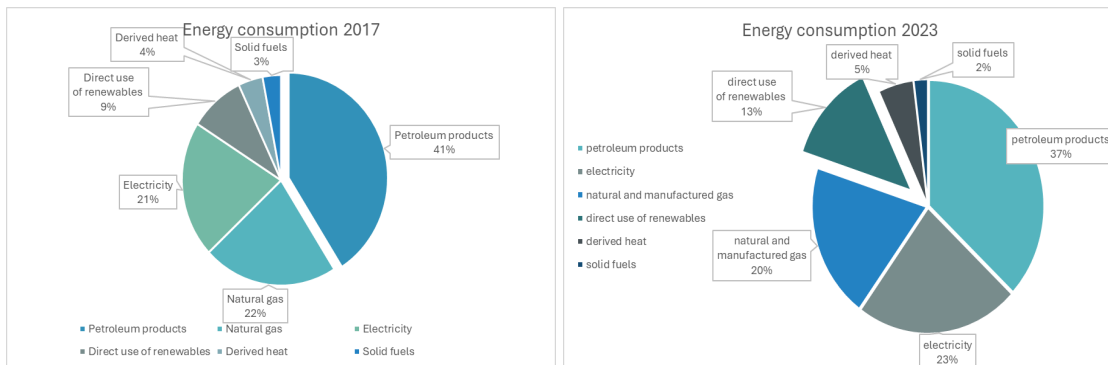


Analyzing the data, from 2017 to 2023, the share of renewable energy rose from 29% to 46%.

As of 2023, according to Shedding Light on Energy in Europe – 2024 Edition (Eurostat, 2024), the EU's energy production is composed as follows:



Meanwhile, the energy consumption as of 2017 and as of 2023 is structured as follows:



The real consumption of renewable energy (25%) was higher than the direct use (13%) because other renewable sources, such as hydropower, wind power, and solar photovoltaic, are included in electricity use.

In 2023, the Commission presented the Green Deal Industrial Plan to enhance the competitiveness of Europe's net-zero industry and support the rapid transition to climate neutrality by fostering a more supportive environment for net-zero technologies and products. Based on 4 pillars - simplified regulation framework, faster access to funding, enhancement of green skills, global cooperation and trade - it is in this context that the Net-Zero Industry Act is proposed and later comes into force.

The Net-Zero Industry Act (NZIA) is an initiative originating from the Green Deal Industrial Plan and its goal is to boost the EU's manufacturing capacity for clean technologies.

The goal is for the manufacturing capacity for net-zero technologies to achieve at least 40% of annual deployment needs by 2030, and by the same year, to create a Union market for CO2 storage. By doing so, it stimulates investments into clean technologies, creating better conditions and markets, as well as boosting the competitiveness of the EU industry and creating jobs. The measures to do so are various. One of them is, for example, through permitting of net-zero projects or implementing sustainability criteria in procurement procedures.

Regarding enhancing skills, the Net-Zero Industry Academies is established, which will train and provide education on net-zero technologies. The Act also covers public intervention forms, for example, through support schemes that incentivize households and businesses to purchase net-zero tech e.g., rooftop photovoltaic installations at homes. Net-Zero Europe Platform – a platform made of the EU countries' representatives and the European Commission, who together oversee, coordinate, and discuss the implementation of NZIA.

It is inevitable that such massive changes and initiatives will affect the population. The paper Green transition and its potential territorial discontents (Cambridge Journal of Regions, Economy and Society, 2024) delves into the relations between regional inequalities and the implementation of the green transition, moreover it discusses the potential consequences of growing discontent in the most vulnerable regions and what that might mean for the green transition. The green transition implies large-scale interventions that undeniably will affect lots of sectors. Nevertheless, its effects will vary in different regions.

Firstly, the transition will affect regions where the brown energy production concentrates, which describes energies that are produced from polluting sources as a contrast to green energy from renewable and non-polluting sources. Having been a dominant source of energy, especially coal. Its role will diminish rapidly due to the adoption of the European Green Deal, which attempts to reduce greenhouse gas emissions. As stated in the research by Nijs et al. (2018), coal regions in the EU face both opportunities and significant challenges in the green transition. ([Research gate](#)). As of 2018, coal activities provide jobs to about 237,000 people, which 185,000 are employed in coal mining while 52,000 are employed in coal-fired power plants. The country with the highest number of jobs in the sector is Poland, with 112,600 jobs. Indirect jobs, which for example are in the power generation, equipment supply, and services, amount to another 215.000.

The goal of phasing out coal is in contrast with the current dependence of certain European regions on coal production. Job losses related to coal and green transition are expected to greatly impact already lagging regions like Upper Silesia in Poland, which would imply 41,000 people losing their jobs, South West Oltenia in Romania, and Severozapad (Northwest) in the Czech Republic. Moreover, the study shows that some coal-dependent regions are already struggling from externalities and some have a GDP per capita below compared to their peers, for example, West Macedonia in Greece already displays high unemployment rates.

One of the tools used by countries to try to reduce GHG is the carbon tax. The application of carbon taxes can have unequal consequences on individuals and places. Another tool used by the European Union is the European Union Emissions Trading System (EU ETS). A carbon policy tightening the carbon pricing regime causes an immediate strong increase in energy prices and a persistent decrease in GHG emissions. This shows the tool's success in lowering emissions. Both the carbon tax and the EU ETS cap affect consumer prices, which rise considerably, and economic activity falls, which translates into lower output and higher unemployment. The fall in activity is not as persistent as the fall in emissions, improving it in the longer term. Contemporarily, carbon pricing incentives for green innovation increase low-carbon patenting. An important effect on the population is seen in low-income households: while higher-income families only fall marginally, low-income families reduce their expenditure significantly. A spike in their energy bills implies fewer resources to spend on other expenditures. Moreover, as they tend to work in sectors more exposed to carbon pricing, they will experience a larger fall in income.

While the European Green Deal, through the Just Transition Fund, addresses direct impacts of the green transition, it often overlooks indirect ones, such as the reallocation of resources and labor toward regions with stronger green industries. This shift can deepen disparities, as lagging regions lose skilled workers and face further economic decline. Beyond the economic effects, this dynamic fuels social and political discontent, especially in vulnerable areas where citizens feel excluded from policy-making and disadvantaged by investment strategies that prioritize already prosperous regions.

An example is found in Fosen, in Norway, and what is commonly referred the Fosen conflict: starting from 2016 a wind power development was build, despite the opposition of the local community, especially the indigenous Sámi herders, who claimed that the constructions interfered with their right to enjoy their culture and for reindeer glazing. An intense legal battle started, and an appeal reached the Supreme

Court, which favoured the Sami community, stating that the wind farms threatened the reindeer husbandry's existence and that they violated the cultural rights of the herders. Nevertheless, intense protests in 2023 took place, with famous activist Greta Thunberg. At the end, agreements were made: the Sami herders received compensation, state-guaranteed alternative winter grazing pastures for the reindeer, and more importantly, they were granted veto rights over future licences in the area. The state government introduced a tax on wind power energy to ensure communities affected by the wind power projects receive some of the benefits and to support the reindeer industry.

Regarding the effects on the population, in 2022, Special Eurobarometer SP527 was published. In this survey, citizens were asked to give their opinions on the green transition. Important data is related to the fairness perceptions of the transition. They are confident that the 2050 sustainable energy transition will be affordable for everyone, including low-income households. Only 46% of the overall EU respondents positively answered, against the 48% who didn't have confidence in a fair transition. ([EU-Eurobarometer SP527](#)). Low-income households bear the costs, The survey highlights that people having more difficulties in paying bills are more likely to show distrust in the transition process, as expressed by 59% of respondents.

Terrain/Fieldwork : 30/05 - 28/06/2022

QA1.4. To what extent do you agree or disagree with the following statements?
You are confident that by 2050 sustainable energy, products and services will be affordable for everyone, including poorer people

Base: All Respondents

Response	EU27	Most of the time	From time to time	Almost never/ Never
Total	26395	2104	6959	17085
Tout à fait d'accord	3630	219	1031	2321
Totally agree	14%	10%	15%	14%
Plutôt d'accord	8537	495	2422	5547
Tend to agree	32%	24%	35%	32%
Plutôt pas d'accord	8181	675	2024	5436
Tend to disagree	31%	32%	29%	32%
Pas du tout d'accord	4551	558	1057	2893
Totally disagree	17%	27%	15%	17%
Ne sait pas	1497	157	424	887
Don't know	6%	7%	6%	5%
Total 'D'accord'	12167	714	3453	7869
Total 'Agree'	46%	34%	50%	46%
Total 'Pas d'accord'	12731	1234	3081	8329
Total 'Disagree'	48%	59%	44%	49%

This shows the importance of the impact of the transition on the population, more importantly, how crucial it is to involve and engage with the local community to ensure a just transition.

The concept of a just transition, initially introduced by labor unions in the 1980s to protect workers from job losses due to environmental regulations, has expanded to ensure a fair shift to a low-carbon economy. It includes four key aspects: distributional justice, restorative justice, procedural justice, and recognitional justice. Together, these

principles aim to achieve climate goals while fostering fairness and sustainability. ([Sciences Po-The Just transition in the EU](#))

As the EU accelerates its climate targets, the social and economic implications of decarbonization, particularly in carbon-intensive regions, have become increasingly pressing. The transition to a low-carbon economy inevitably involves structural shifts in employment, especially in industries such as coal, steel, and chemicals. This is a key element of the European climate agenda, to support the regions and sectors most affected by the reduction of dependence on fossil fuels.

The Just Transition Mechanism was launched in January 2021 as part of the European Green Deal. The mechanism operates under three main pillars: A new just transition fund, the InvestEU “Just Transition” scheme, and new public sector loan facilities supported by the European Investment Bank. The fund was created to ensure that no region or community is left behind. As stated in REGULATION (EU) 2021/1056, which made the JTF binding for member states: “Such a situation not only creates the risk of a variable speed transition in the Union as regards climate action, but also of growing disparities between regions.” Collectively, these mechanisms back projects that create alternative employment opportunities and promote regional resilience. ([EU-Regulations](#))

To understand the scope and effectiveness of the Just Transition Fund, it is essential to examine the financial commitments behind it. Including its multi-billion euro budget allocated for the 2021–2027 period, reflecting the EU’s dedication to supporting vulnerable regions. The Just Transition Fund is allocated a total of €17.5 billion for the 2021–2027 period, with €7.5 billion from the EU’s long-term budget and €10 billion from the temporary NextGenerationEU (NGEU) recovery instrument ([European Parliament-The Just transition fund](#)). A significant portion of the NGEU funding is sourced from the Recovery and Resilience Facility, which the European Commission finances through borrowing on the capital markets by issuing eurobonds ([European commission-Resilience and recovery](#)). These bonds, backed by the EU’s AAA credit rating (Fitch Ratings,[EU-Fitch ratings](#)), offer an attractive investment opportunity and allow the EU to distribute financial support to member states, ensuring an inclusive and balanced green transition.

Building on the Just Transition Fund, InvestEU mobilizes public and private capital to de-risk green industrial investments and support climate-aligned projects. As the second pillar of the Just Transition Mechanism, it provides guarantees through its Sustainable Infrastructure and Strategic Investment Windows, helping finance

sustainable infrastructure and low-carbon technologies that may otherwise lack funding. To leverage €372 billion by 2027, InvestEU exemplifies how the EU uses financial tools to accelerate industrial decarbonization. [\(EU-InvestEU-Fund\)](#)

The third pillar of the Just Transition Mechanism is the Public Sector Loan Facility (PSLF), which provides targeted financial support to public authorities undertaking projects that enable a socially equitable shift to a climate-neutral economy. Designed to address public sector investment gaps and correct market failures, the PSLF combines EU grants with loans from the European Investment Bank (EIB) to support projects in areas like energy efficiency, sustainable mobility, and affordable housing. By 30 July 2024, the PSLF evaluation committee had selected proposals representing an estimated €148 million in grants and €863 million in EIB loans, with four grant agreements already signed and projects underway. [\(EU Commission-Implementation of the public sector loan-JTF\)](#) Together with the JTF's direct budgetary support and InvestEU's risk-sharing guarantees, the PSLF reinforces the financial architecture of the EU's just transition strategy by unlocking public investment where private capital may fall short.

To access support, countries must develop territorial just transition plans outlining key challenges and strategies up to 2030. The JTM benefits three main groups: vulnerable citizens by offering reskilling, new job opportunities, better energy-efficient housing, and access to clean, affordable energy. Companies and carbon-intensive sectors through support for low-carbon technologies, financial aid, innovation, and the creation of new businesses and jobs. Regions and member states via investments in renewable energy, sustainable transport, digital connectivity, energy infrastructure, and technical assistance to drive green, climate-resilient growth. [\(Sciences Po-The Just transition in the EU\)](#)

Since the launch of the EGD, the EU's approach to just transition has progressed but remains uneven. In 2019, only a few countries, like Spain, Germany, and Greece, had concrete transition policies, focused on coal regions. Countries relied on investment-focused measures such as economic diversification and worker reskilling, with limited attention to broader social issues like energy poverty or income support. By 2023, all EU countries had incorporated just transition into their updated climate plans, a milestone. Significant differences remain in deeply and broadly integrated countries that integrate just transition principles, with ongoing gaps in policy scope, governance, and stakeholder involvement. Emerging research continues to track these developments, highlighting both progress and areas needing improvement.

Several country-level examples illustrate the JTM's role in action. Relocation assistance and income compensation schemes have been introduced to provide short-term security. For example, in Spain, the coal regions of Asturias, Castilla y León, and Aragon faced significant closures after 2018, but the country stood out by adopting a planned and socially inclusive approach. In 2019, the Spanish government, together with mining unions and companies, signed an agreement that laid the groundwork for site closures accompanied by compensation, early retirement packages, and reindustrialization plans. Supported by the JTF, Spain designated just transition zones where projects such as solar farms on former mining sites and vocational training centers for energy transition jobs are now underway. These efforts have not only mitigated job losses but also attracted new businesses, while strong local engagement and involvement of authorities have helped build community support.[\(Spanish Government-The Just transition strategy\)](#)

In Poland's Silesia region, long reliant on coal, EU funding has enabled technical retraining and SME development to help diversify the economy. In Bulgaria, the Stara Zagora region, similar steps are being taken to reduce coal dependency by developing green business clusters in biomass, energy efficiency, and waste management. High schools and vocational institutions are ramping up technical training to prepare youth for future clean economy jobs. [\(EU Commission-Silesia case study\)](#)

Meanwhile, in Sweden, the Hybrit project presents a different but complementary path to a just transition, using technological innovation to decarbonize heavy industry. Hybrit aims to produce steel using hydrogen instead of coal, preserving industrial jobs in the northern regions of Sweden and Finland. Though less focused on immediate social conversion, it aligns with just transition goals for a clean and competitive industrial model in Europe. The project's success has inspired similar initiatives in Germany and the Netherlands, creating a broader ripple effect. These country-level examples collectively highlight the multifaceted nature of a just transition, demonstrating that with adequate funding, local engagement, and coordinated planning, the green shift can be both socially responsible and economically transformative.[\(EU Commission-Innovation fund\)](#)

While the Just Transition framework aims to manage the social and economic impacts of the green shift, understanding its future trajectory requires looking ahead, examining forecasts and expectations based on past trends and emerging policies like the Net-Zero Industry Act.

The Net Zero Industry Act has presented a positive outcome of its strategy however, experts have highlighted several uncertainties and raised serious questions that

may delay its uptake. To begin, it is important to unpack what the NZIA envisions for the EU. Its core objective is to strengthen Europe's capacity to produce clean, green technologies while reducing reliance on foreign sources for critical raw materials. The NZIA sets ambitious targets, including producing 40% of key clean technologies such as solar panels and wind turbines within the EU, developing 50 million tonnes of CO₂ storage capacity by 2030, reducing industrial emissions by 35%, and creating up to 3.5 million new green jobs. ([Net-Zero Industry Act - European Commission](#))

The new green jobs are linked to sectors such as clean energy, recycling, sustainable agriculture, electric transport, and manufacturing. These opportunities are expected to arise primarily in fields like solar energy, hydrogen production, and carbon capture technologies. However, concerns persist that these projections may not fully materialize. Job friction could arise due to the challenges of job reallocation, particularly since the EU faces a shortage of skilled workers. Educational institutions and training centers have struggled to keep pace with the green transition, as it is a relatively recent shift in the job market.

Transitioning from pollutant-intensive jobs to green ones requires significant change, and this gap is expected to slow the pace of the just transition. Citizens may struggle to adapt to the new skill demands or face challenges in securing employment without access to proper training programs. Some analysts have also suggested that job seekers may migrate in search of opportunities, and have recommended the creation of an EU-wide skills passport to help workers integrate more easily into industries and across member states.

According to predictions in the Fit for 55 framework, the phase-out of "brown" jobs, which represent only 0.1% of total EU employment, is expected to occur as part of the transition to a greener economy. However, not all jobs will transition due to certain input restrictions. The NZIA is expected to significantly impact white jobs, which make up the majority of employment in the EU. These jobs, which are already neutral in terms of environmental impact, will likely evolve as greener practices and sustainable activities are integrated into industries. While many of these jobs are not directly harmful to the environment, changes at the task level will occur as production processes become more sustainable. Additionally, some white jobs may experience growth as a result of the green transition. For example, the demand for bus drivers could rise due to increased reliance on green transportation. ([EU Commission-The Possible Implications of the Green Transition for the Labour Market](#))

Delays in permitting procedures for green technologies present a significant challenge. Each EU member state operates under different bureaucratic frameworks, often marked by outdated regulations, understaffed agencies, and inconsistent

permitting standards. This creates major obstacles for the timely implementation of the NZIA. To address this, the NZIA proposes fast-tracking approvals for green energy projects within 12 to 18 months. Countries like Poland and Italy have experienced prolonged delays in renewable energy projects, which could hinder the EU's ability to meet its 2030 climate targets. ([World Economic Forum](#))

Funding is the backbone of the NZIA, supported by a three-tiered system. However, researchers have raised concerns about potential mismanagement, inefficient allocation, and limited accessibility. According to the European Court of Auditors, the Recovery and Resilience Facility (RRF) lacks sufficient transparency and a robust performance framework. Disbursements are often not linked to actual project costs, making it difficult to assess whether the funding is generating meaningful results. For instance, by early 2024, 42% of RRF funds had been disbursed, while only 28% of targets had been achieved. A particularly pressing issue is administrative capacity: under-resourced regions, which stand to benefit most, may face significant delays in accessing and implementing these funds. Many EU countries are also facing financial constraints, particularly amid inflation and rising energy prices. Additionally, private companies may choose to invest in countries like the United States, where generous subsidies under the Inflation Reduction Act create more attractive conditions for green industry development. ([Financial Times-Global green subsidy race draws investors attention](#))

Furthermore, the Net-Zero Industry Act may exacerbate existing disparities among EU member states. Wealthier countries such as Germany, France, and the Netherlands are better positioned to capitalize on the transition due to stronger financial resources, advanced industrial bases, and well-developed education systems. In contrast, less affluent nations in Eastern and Southern Europe like Greece or Bulgaria may struggle to keep pace. As a result, green job creation is likely to be concentrated in more developed regions, while others risk being left behind. This could lead to increased emissions in areas where clean technologies remain unaffordable. For example, France has made significant progress in scaling up battery manufacturing, whereas countries like Romania face difficulties attracting similar investments due to inadequate infrastructure and shortages of skilled labor. Although the EU has attempted to bridge such gaps with mechanisms like the Just Transition Fund, outcomes have been uneven. Without stronger coordination and targeted support, the NZIA risks deepening regional inequalities. ([EU Commission-NZIC](#))

Lastly, the green transition has faced public resistance in several regions, driven by concerns over its social and economic impacts. Fears about rising energy costs, job losses in the fossil fuel industry, and disruptions to local communities contribute to growing skepticism. For example, in the Netherlands, farmers staged large-scale protests against environmental regulations they perceived as unfair. Such opposition highlights the risk that some communities may view the Net-Zero Industry Act as a threat rather than an opportunity. Without addressing these concerns, public pressure and political backlash could undermine the Act's implementation and delay its progress.

While the NZIA sets out ambitious objectives, experts argue that achieving these targets will require deeper structural reforms beyond the Act's current framework. One key recommendation is the creation of a banking and capital markets union to streamline financing and reduce fragmentation across the EU. Additionally, analysts emphasize the need for a more integrated European electricity market to lower structural energy costs and enhance industrial competitiveness.

An increasingly supported proposal is the establishment of a central clean energy delivery agency. This body would oversee and coordinate green funding across member states, ensuring efficient allocation, minimizing duplication, and improving policy coherence. Greater coordination between EU-level, national, and regional green industrial policies is essential to prevent inefficiencies and maximize policy impact.

The Jacques Delors Centre at the Hertie School criticizes the NZIA for lacking strategic focus. According to its assessment, the Act attempts to promote too many clean technologies simultaneously, without prioritizing sectors based on levels of foreign competition, existing EU strengths, or risk of import disruptions. This unfocused approach risks diluting limited resources and missing opportunities where Europe could lead.

Another significant concern is the absence of dedicated EU-level funding for the NZIA. In its current form, the Act relies heavily on national state aid, potentially creating an uneven playing field, distorting competition within the single market, and undermining joint efforts on large-scale projects. Similarly, the European Environmental Bureau cautions that treating all net-zero technologies equally without assessing their cost-effectiveness or technological readiness could lead to inefficient use of public funds and weaken the Act's overall impact.

In conclusion, the EU's green transition relies heavily on financial mechanisms like grants, funds, and green bonds to support clean technology and industrial decarbonization. The Net-Zero Industry Act encourages member states to allocate part

of their emissions trading revenues toward clean manufacturing. However, despite these efforts, major financial and technological barriers remain. High costs of low-carbon materials, challenges in grid adaptation for renewables (as seen in Greece), and a complex, restrictive funding application process limit progress. Small and medium-sized enterprises, despite being major contributors to emissions, often lack access to funding, risking unequal progress across sectors and regions.

We don't have any particular data to address the efficiency of the JTF mechanism, since it was only by the end of 2023 that the Commission had adopted all of the JTF programmes submitted by the member states, and now all efforts are going to be focused on the implementation. However, early findings from the Just Transition Indicator paper highlight potential impacts. On the positive side, the transition could lead to healthier working conditions due to improved emissions and air quality standards, as well as long-term economic benefits through the preservation of natural resources, biodiversity, and ecosystem services. Acting now also helps avoid the far greater socio-economic costs of inaction on climate change.

However, several significant challenges remain. Social and regional inequalities may persist, as green jobs are unlikely to emerge evenly across all regions, skill levels, or social groups. New green sectors might offer poorer labor conditions, including lower pay, less job security, and weaker worker protections. A major concern is sectoral job losses, as the destabilization, shrinkage, or even exnovation of "brown" industries could lead to lasting unemployment, undermining workers' livelihoods and quality of life. Additionally, regional value creation is at risk. Regions heavily reliant on carbon-intensive industries may face shrinking tax revenues, cuts in public spending, and deteriorating infrastructure, all of which can exacerbate territorial and social inequalities.

Nonetheless, regional disparities, the difficulties of enhancing workforce skills, and bureaucratic delays are preventing the complete achievement of these goals. The danger of an expanding divide between affluent and at-risk areas continues to be evident. Additionally, global rivalry for eco-friendly investments demands that the EU strengthen its technological independence while ensuring social inclusivity.

Beyond just making the economy more environmentally friendly, this shift necessitates a reconsideration of the European industrial framework, founded on fairness, durability, and sustainable advancement.

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