



## The Green Transformation of Europe: challenges, opportunities, and the way forward

GREEK & EUROPEAN ECONOMY OBSERVATORY

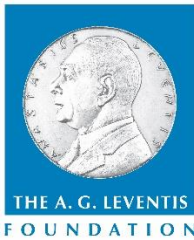
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## Summary

- The summer of 2023 marked record-high temperatures, illustrating the urgent challenge posed by climate change.
- Climate change poses immediate risks including infrastructure damage and health crises, but also presents opportunities for green technology and sustainable economic growth.
- The European Green Deal sets ambitious emissions reduction targets, employing strategies like REPOWER-EU to enhance energy security and reduce dependency on fossil fuels.
- Greece is making strides in renewable energy and climate laws, but challenges remain, particularly in phasing out lignite and fossil fuel reliance.
- Massive investment increases are needed to meet climate commitments, with the EU deploying financial instruments like the European Green Deal Investment Plan and Horizon Europe.
- The EU has adopted a holistic approach with initiatives like European Missions and Net-Zero Cities focusing on collaborative, cross-sector efforts to achieve sustainable development.
- The UN SDSN Global Climate Hub offers scientific, human-centric solutions for a climate-neutral future, emphasizing collaboration and sustainable pathways.
- The EU demonstrates a strong commitment to a holistic, sustainable future, balancing economic growth with environmental responsibility.

## Introduction

Climate change poses a significant challenge to economies worldwide, including Europe. With its exceptionally high temperatures, the summer of 2023 exemplified these challenges. The global average temperature was 16.77°C, which exceeded the historical average by more than 0.6°C, whereas in Europe, the average temperature of 19.63°C was more than 0.8°C higher than usual, making 2023 the fifth warmest summer on the continent (Copernicus, 2023). Addressing the crisis requires fundamental transformations across multiple dimensions, from energy systems and production processes to social behaviours.

While the risks posed by climate change are undisputable and increasingly visible to the public, the crisis also offers opportunities. The right policies can promote technological innovation, boost economic growth that respects the environment and natural resources, and create jobs in new, sustainable sectors. The initiatives of the European Green Deal represent a cohesive and bold approach on the part of the EU, which demonstrates its commitment to not only meeting its climate targets but also to leading the global charge in the transition to a sustainable future. The Green Deal therefore stands as a beacon of Europe's dedication to a green transformation, setting a precedent that combines environmental stewardship, economic resilience, and social responsibility.

This article aims to explore the multifaceted impacts of climate change in Europe, discussing policy initiatives and strategies crucial for mitigating its effects and formulating the conditions for a just and inclusive green transition that leaves no one behind.

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## Climate Change-induced Risks and Opportunities for the EU

### Risks & Hazards

#### **Immediate Risks**

The immediate risks posed by climate change are tangible and diverse. They include the destruction of infrastructure and property due to extreme weather events like floods, droughts, and fires. These phenomena not only damage physical assets, but they also detract from agricultural production. Supply chains are also vulnerable, as natural disasters can destroy transport networks and the availability of resources. Furthermore, the health implications are severe, with an increase in diseases and potential fatalities, especially among vulnerable groups. Climate change has been linked to the emergence of pandemics, such as COVID-19 (Gupta, S., et al, 2021) and is estimated to have caused over 70 000 excess deaths in Europe in 2022 alone<sup>1</sup>.

In addition to these immediate risks, climate change is accompanied by a profound loss of biodiversity, which has irreversible impacts on ecosystems and the ecosystem services that are vital for citizens. The valuation of these ecosystem services is crucial for understanding their importance and for guiding policy decisions<sup>2</sup>.

<sup>1</sup> <https://www.euronews.com/next/2023/11/21/more-than-70000-people-may-have-died-due-to-2022-summer-heatwaves-in-europe>

<sup>2</sup> In this context, the work of the UN SDSN Global Climate Hub, which is led by the author, is particularly noteworthy (see Annex). The hub has significant experience in valuing biodiversity through citizen quantifications of their willingness to pay for ecosystem services, and therefore contributes to a deeper understanding of the intrinsic value of biodiversity and its vital role in human life and well-being. Results on the necessity of integrating ecosystem service valuation into policymaking can be found in an SDSN Senior Working Group on the European Green Deal report entitled: "Financing the Joint Implementation of Agenda 2030 and the European Green Deal" (Sachs J., Koundouri P., et al., 2022).

Climate change presents numerous challenges for Greece, impacting various sectors of its economy. The agricultural sector faces potential declines in productivity due to increased temperatures and drought conditions, potentially leading to reduced yields and food scarcity. Escalating energy costs further exacerbate issues for both businesses and consumers. The tourism sector, a significant contributor to Greece's revenue, is especially vulnerable. Climate change-induced extreme heatwaves during the summer could deter tourists, as the industry relies heavily on clement weather conditions.

### ***Cascading & Contingent Risks***

Cascading risks further complicate the picture. One significant and escalating concern is climate migration, which is emerging as a global humanitarian and policy challenge. It is estimated that over 3 billion people live in highly vulnerable locations and that, as climate change becomes more intensive, worsening living conditions in these areas will force a significant part of the population forced to consider relocating (IPCC, 2023). Such migration is not simply a local or regional issue; it is becoming a continental concern and poses a potential challenge to the entire European Union.

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Additionally, interrupted agricultural supply chains are causing inflationary pressures that raise the cost of living along with the budgetary burden of climate adaptation and restoration in the wake of catastrophic weather events. These interruptions trigger several economic repercussions, because the availability of agricultural products is immediately impacted by climate-induced catastrophes such as droughts, floods, or fires. As a result, several food categories become more expensive, which imposes inflationary pressure and raises households' living expenses. Given that individuals with fewer resources are disproportionately impacted by these price increases, this situation may exacerbate already-existing social inequities.

### **Potential Opportunities for the EU**

Severe adverse effects notwithstanding, it must be acknowledged that the green transition also opens up numerous opportunities. First, the shift to a low-carbon economy creates new industries and jobs and can stimulate economic growth. Coupled with the digital transformation, a shift to green technologies has the potential to foster quality employment and sustainable growth, in the sense that it respects planetary boundaries and takes the wellbeing of future generations into account. In the same way that major technological breakthroughs ushered in the material growth of the Industrial Revolution and the recent ICT revolution, investment in green technologies and environmental innovation could deliver a new era of economic and social development. The successful outcome of this process is conditional on supportive policies fostering the upskilling and reskilling of the workforce, increasing civil awareness, and compensating the groups and regions that are left behind in the green transition.

Enhanced energy security through reduced fossil fuel dependence, improved air quality, and lower healthcare costs are direct benefits. The green transition also encourages innovation and technological progress, especially in renewable energy and sustainable technologies. Investment in green technologies can restore EU competitiveness, with the EU leading by example in climate action.

## EU Climate Targets and Policy Initiatives

*The energy crisis itself is acting as a driver for the green transition, with initiatives like REPOWER-EU.*

The energy crisis itself is acting as a driver for the green transition, with initiatives like REPOWER-EU strengthening renewable energy capacity. The European Commission's response to the Russian-Ukrainian war, REPOWER-EU aims to end the reliance of European countries on Russian fossil fuels before 2030. The plan relies on four pillars, namely: (i) energy efficiency and savings; (ii) energy supply diversification; (iii) clean-energy transition acceleration; and (iv) investment and reform in the energy sector. The initiative aims to generate something positive from an adverse geopolitical development (the Russian invasion of Ukraine in February 2022) by bolstering European energy security and incentivizing renewable energy deployment. REPowerEU has set itself a bold target: increasing the EU's headline 2030 target for renewables from 40% to 45% through support for green technologies such as heat pumps, green hydrogen, and photovoltaic solar panels, and through laying down procedures for capital investment in renewable projects. Still, to succeed, the plan has to ramp up investment in the field (more than 210 billion in the 2022–2027 period) and ensure cross-country collaboration (Tagliapietra, 2022).

### Climate Targets and the EU Green Deal

The European Green Deal launched in December 2019 aims to reduce greenhouse gas emissions by at least 55% by 2030 compared to 1990 levels. This an ambitious target. As a result, the European Green Deal also serves as Europe's long-term growth strategy, combining environmental, social and economic objectives and promoting inclusion and sustainability.

In July 2021, the EU's climate ambitions were increased still further by the introduction of the "fit-for-55" package, which elevated the GHG emissions reduction target to 55%. The "fit-for-55" comprises a comprehensive set of proposals for wide-ranging policy amendments which include increasing the share of renewable energy in the EU's energy mix to at least 40% by 2030; enhancing energy efficiency across various sectors, such as buildings, industry, and transportation; expanding the EU Emissions Trading System (ETS) to cover more sectors; and introducing a Carbon Border Adjustment Mechanism (CBAM) to ensure a level playing field for European industries and to prevent carbon leakage. The aim of these mechanisms (ETS and CBAM) is to incentivize businesses to adopt cleaner technologies and practices, and to ensure fair competition within and beyond the EU.

In March 2023, to complement the EU Fit-for-55 package, the European Commission proposed the "Net-Zero Industry Act (NZIA)", which focuses on accelerating the transition of EU industry to net-zero emissions. NZIA sets out to strengthen European manufacturers' capacity vis-à-vis net-zero technologies like batteries, solar cells, hydrogen, and wind turbines, and to channel investments into clean technologies across the EU and beyond the bloc.

Greece enacted its first comprehensive climate law<sup>3</sup> in May 2022; its targets include reducing total GHG emissions by 55% by 2030 and 80% by 2040, and achieving climate neutrality by 2050. The law also sets ambitious targets for transitioning to renewable energy and adapting to climate change (IEA, 2023a). In addition, Greece has also made notable progress vis-à-vis renewable energy, which covered 20% of its total final energy consumption in 2021 (IEA, 2023b). However, despite the progress noted with regards to reducing the use of fossil fuels, and in particular of lignite in electricity generation, the

<sup>3</sup> National Climate Law 4936/2022 on the transition to climate neutrality and adaptation to climate change, [https://climate-laws.org/document/national-climate-law-4936-2022-on-the-transition-to-climate-neutrality-and-adaptation-to-climate-change\\_2ff3](https://climate-laws.org/document/national-climate-law-4936-2022-on-the-transition-to-climate-neutrality-and-adaptation-to-climate-change_2ff3)

country is still predominantly powered by fossil fuels (IEA 2023a). According to the IEA, despite initial plans to phase out lignite by 2028, Greece needs to accelerate its timeline regarding lignite mines and fossil fuel extraction (IEA 2023b).

### Financing the Green Transition

According to the IPCC AR6 (2023), adaptation and mitigation financing will need to increase many times over to meet global climate targets. The Panel's Sixth Assessment Report underlines that there is adequate capital globally, though the investment gaps remain significant. This implies that there are barriers and capacity deficits across nations, regions, financial institutions and enterprises which hinder the allocation of capital to this end. Recent estimates highlight that annual climate finance must increase by 590% compared to 2010–20 to meet global climate commitments and avoid the most severe catastrophic effects of climate change (CPI, 2021). According to the EIB (2022), the 'high cost of making changes' and 'access to finance' are the most frequently mentioned of a list of potential obstacles to the implementation of climate innovation.

In this context, the EU has established a series of financial mechanisms, schemes, and institutions to promote climate finance and support the green transition enshrined in the EU Green Deal and the EU Climate Law. In December 2020, the Council and the European Parliament signed the 1.211 trillion Euro Multiannual Financial Framework (MFF) for 2021–2027. Given the need for a decisive and integrated response to the COVID-19 pandemic, this was coupled with the Next Generation EU (NextGen EU) instrument, adding 806.9 billion for the seven-year period. The EU continues to develop the institutional framework and actively supports the promotion of green finance for sustainable development through non-financial measures.

Sachs et al. (2022) provide in-depth insights into financing the joint implementation of Agenda 2030 and the European Green Deal, highlighting the importance of strategic financial planning for sustainable development. The European Green Deal Investment Plan aims to contribute to financing the EU green transition, while supporting the regions and communities most exposed to its impact. The plan commingles financial mechanisms, legislation and non-legislative initiatives covering three broad aspects:

#### (i) Funding

Over the 2021–2030 period, the Commission wants to mobilize at least €1 trillion of sustainable investment by devoting resources under the EU budget and leveraging additional public and private financing. The main executive arm for EU green finance is the European Investment Bank (EIB). In 2022, the EIB disbursed 36.5 billion for climate action and environmental sustainability projects, which represented 58% of its total lending. It provides funding opportunities for the public as well as the private sector through direct loans to public entities and large companies and framework loans for Climate Investment Portfolios. InvestEU is a critical instrument for boosting green growth, innovation and job creation in Europe, and is promoted by the EIB. The bank and other cooperating partners provide direct or indirect financial support to SMEs, national and regional authorities, and public–private partnerships; they aim to leverage more than 100 billion € of public and private green investment through an EU budgetary guarantee of 26.2 billion € by 2030.

The LIFE Program is the EU's financial instrument for environmental support, nature conservation, climate action and sustainable energy. It provides direct financing for private and public EU entities, mainly through grants (85% of the program budget), to support environment-specific and environment-integrated projects. Interested parties

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need to design programs which span four key areas, namely: (i) Nature and Biodiversity, (ii) Circular Economy and Quality of Life, (iii) Climate Change Mitigation and Adaptation, and (iv) Clean Energy Transition. The LIFE program will disburse 5.4 billion € in total over the 2021–27 period and provide technical assistance directly managed by the European Commission.

Finally, the Horizon EU program is a potent financing tool which emphasizes the promotion of cutting-edge research and innovation through cross-country and interdisciplinary research projects. The current Horizon Europe has a budget of EUR 95.5 billion for 2021–2027 (including 5.4 billion from NextGenEU), 35% of which is earmarked for projects promoting climate change objectives.

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## **(ii) Regulatory Framework**

The EU plans to use a mix of regulatory initiatives and incentives to ensure that sustainability standards are considered in investment decisions. It will thus put sustainable finance at the heart of the financial system, provide the public and private sector with the guidance it needs, and co-design a supportive state aid framework with member states. The EU Green Taxonomy is at the epicentre of this process, acting as a set of science-based and universally accepted principles that communicate a common definition of environmentally sustainable economic activities<sup>4</sup>. Under the EU Taxonomy, eligible activities include climate mitigation & adaptation, circular economy, sustainable water use, pollution prevention & control, and the protection of biodiversity and ecosystems.

A key issue for the implementation of the actions that underpin the EU Green Deal and the transition to net zero is the use of innovative financial mechanisms. Given the pronounced increase in the use of green bonds for financing sustainable projects (Anyfantaki et al., 2022), the political agreement on a EU Green Bond Standard in 2023 is of pivotal importance. Although still voluntary, the standard mandates that issuers of green bonds must align at least 85% of the activities financed with objectives identified by the EU Taxonomy. In addition, full transparency is required in how the proceeds of green bonds are used, along with external monitoring and supervision by the European Security Markets Authority (ESMA) to validate the procedure and protect investors from greenwashing.

Finally, incentives for redirecting corporate finance towards impactful sustainable activities are provided through the enforcing of the Corporate Sustainability Reporting Directive (CSRD), which came into force in January 2023. The new directive applies more stringent rules concerning the social and environmental information that companies have to report and is mandatory from 2024 for all large companies and listed SMEs (except micro-enterprises) in the EU.

## **(iii) Active Support**

The EU apparatus is also providing technical assistance for the design, implementation, and monitoring of environmental projects, on top of the financial assistance on offer through its multiple schemes. Programs such as InvestEU, Horizon and LIFE all incorporate advisory mechanisms to streamline funding, ensure sustainable outcomes, and create bankable projects (i.e., those that meet the conditions required by the financier to finance a project).

<sup>4</sup> Consultation on the EU taxonomy is ongoing; a timeline can be found [here](#).



Horizontally, research and implementation on climate-related issues is supported by the EIT Climate KIC (Knowledge and Innovation Community), which is the EU's main climate accelerator. The institution provides seed funding and guidance, organizes peer-to-peer demonstrations, and promotes networking to allow ideas to turn into business plans and SMEs to scale up their business and serve climate needs. It leverages public and private funds for green innovation and the dissemination of green technologies.

Regarding climate adaptation, European Environmental Agency (EEA) has developed the Regional Adaptation Support Tool for national and regional authorities. The online tool is a six-step approach to building a solid adaptation project from inception to monitoring and dissemination as a best practice. The initiative bolsters capacity building and is commingled with the financial support for adaptation projects, thus ensuring that problem owners: (i) have access to tailored financing mechanisms and programs, and (ii) can harness the financial resources to meet adaptation targets.

*To address the challenges and opportunities stemming from the green transformation, the European Union has taken a holistic approach which recognizes that effective change requires comprehensive strategies involving a diverse set of stakeholders.*

Given the regional disparities and vulnerabilities within the EU, the role of insurance and Public-Private Partnerships (PPPs) is becoming increasingly vital in climate adaptation strategies. Insurance mechanisms can offer immediate financial support to affected individuals and businesses, which ensures quicker recovery after a natural disaster (ECB, EIOPA, 2023). Moreover, by combining the strengths of both the public and private sectors, PPPs can enhance overall resilience through innovative insurance products which diversify risks and ensure broad coverage. This approach acts as a safety bulwark against the immediate impacts of extreme weather events and encourages proactive investment in resilient infrastructure.

### **The European Union's Holistic Strategies and Climate Initiatives**

To address the challenges and opportunities stemming from the green transformation, the European Union has taken a holistic approach which recognizes that effective change requires comprehensive strategies involving a diverse set of stakeholders. This approach is evident in various initiatives which, though they address different aspects of the climate and environmental crisis, all contribute to the overall objectives of the European Green Deal.

The main pillar demonstrating the paradigm shift in EU strategy towards a smart and holistic policy framework is the "Missions" initiative. Launched in 2021 by the European Commission under the Horizon Europe research and innovation program, European Missions (European Commission, 2023a) are targeted and ambitious projects which seek to address some of the most urgent challenges facing society, including climate change<sup>5</sup>. These missions, which were inspired by M. Mazzucato's work (2021), focus on achieving Sustainable Development Goals (SDGs) through collaboration across various sectors including the private sector, research community, and civil society. Unlike traditional industrial policies, these missions aim to achieve specific objectives through both top-down and bottom-up approaches (Terzi et al, 2023) and are required to produce tangible results by 2030 that accord with the European Green Deal. The five ongoing missions include: adapting 150 regions to climate change, combating cancer, restoring oceans and waters, creating 100 climate-neutral and smart cities, and revitalizing Europe's soils by 2030.

<sup>5</sup> The five Missions are: (i) Adapting to Climate Change, (ii) 100 climate-neutral cities, (iii) Beating cancer, (iv) Restore our oceans and waters by 2030, (v) a Soil deal for Europe 2030.

The "Net-Zero Cities" program is integral to the EU's mission for "100 climate-neutral and smart cities by 2030" and aims to guide cities towards climate neutrality by 2030. It focuses on transforming city operations and decision-making processes and provides tools and resources to help cities develop and implement their climate action plans. It provides a comprehensive six-step journey towards climate neutrality, along with access to an interactive platform detailing EU funding sources, criteria and mechanisms. The initiative is dedicated to supporting cities at different stages of their climate journey through the provision of customized assistance to expedite their transition to climate neutrality.

The Mission Implementation Platform for Adaptation to Climate Change (MIP4Adapt) helps European regions and local authorities to build resilience against climate change. It promotes effective climate adaptation strategies through a platform for knowledge exchange, technical assistance, and coordination. MIP4Adapt, a partnership between the European Commission and the EEA backed by Climate-ADAPT, assists regions across the EU in their climate resilience efforts through the provision of a comprehensive knowledge repository and by showcasing successful adaptation projects.

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In this context of holistic strategies, the findings and recommendations made by Lafortune et al. (2022) in 'Achieving the SDGs: Europe's Compass in a Multipolar World' are particularly relevant: they emphasize the EU's critical role in global sustainable development and the urgent need for progress on the SDGs in the face of multiple global crises. Moreover, Koundouri et al. (2023a) offer interdisciplinary insights on the Sustainable Development Goals, underlining their significance in shaping the EU's strategies for sustainable development.

### Effects of the NRRP on jobs

Most investments and reforms planned in the context of *Greece 2.0* have implications for jobs and social cohesion, direct or indirect, though of course it is impossible to quantify their effects at such an early stage. Nevertheless, an analysis of the reforms and investments listed in *Greece 2.0* offers useful insights.

### Employment, skills, and social cohesion

The *Increasing job creation and participation in the labour market* component contains a variety of actions aimed to support labour market policies, both active (aimed to boost employment) and passive (mainly income support to the unemployed). The digitalization and general administrative upgrade of Greece's public employment service (*OAEΔ*) will improve the services it provides to workers and firms. The reform of unemployment benefits is another important action within this component. Specifically, the NRRP will pilot a reformed unemployment insurance benefit, with an additional earnings-related component (of up to €800 per month) in the early phase of receipt, gradually reduced to the current flat rate (€400 per month for up to 12 months). Moreover, a reformed unemployment assistance benefit will also be piloted, reserved for the long-term unemployed on a means-tested basis, with a similar structure (€325 per month in the first four months, gradually reduced to the current €200 per month for 12 months). Both benefits will be made conditional on participation in training, with a view to strengthening job-search incentives. It remains to be seen whether the reforms will also increase coverage, which currently is abysmally low<sup>6</sup>. Labour law reform also belongs here,

<sup>6</sup> In 2019, the share of unemployed workers receiving the major unemployment insurance benefit was 18.2%. The unemployment assistance benefit for the long-term unemployed was paid to a few thousand recipients.

although recent government initiatives have been criticised for failing adequately to protect platform workers, and for perpetuating the bias for self-employment (the latter running counter to the recommendations of the Pissarides Report)<sup>7</sup>.

The *Education, vocational education, training and skills* component aims to promote reskilling and upskilling (with a special emphasis on digital skills). The reform of vocational education and training is a key element of this. Clearly, given the poor state of Greece's current system of skills formation, it is hard to imagine that the country's performance in terms of both skills and employment can be raised without the successful overhaul of vocational education and training. Policies to promote on-the-job training, provided by firms, as envisaged in the Plan, are also vital. Given that on-the-job training is often 'fungible' (i.e. the skills acquired can be put to use in a different firm than the one providing the training), sharing the costs between firms and the public employment service is appropriate<sup>8</sup>.

Furthermore, the *Improve resilience, accessibility and sustainability of healthcare* component aims to modernize hospitals and reform primary care (an area where the gaps in public provision are significant). In addition to that, the component also envisages targeted actions to enhance access to health services, which, as seen earlier, has deteriorated in recent years, especially for the poor and the elderly. The promotion of 'home health care', including via remote access, for patients with chronic conditions, and the reform of mental health and addiction services, will also be funded with RRF resources.

The *Increase access to effective and inclusive social policies* component lists various actions aimed to strengthen social cohesion, and to raise (female) employment. Improving the quality of affordable childcare, and increasing its availability, is a key objective within this component. Other actions are targeted to vulnerable groups, aiming to provide digital skills to the elderly and the disabled, to improve labour market outcomes for members of the Roma minority, and to house the homeless.

## Green transition

The *Renovate* component is an ambitious attempt to redesign the built environment with a view to improving energy efficiency. The renovation of residential, commercial, and public buildings it will support is set to revitalize the construction sector (traditionally one of the main drivers of the national economy, severely affected by both the economic crisis and the pandemic).

The *Power-up* component aims to upgrade the national energy model. The phasing-out of (highly-polluting) lignite mines, traditionally used to power electricity plants, is part of the plan. While Russia's invasion of Ukraine, and the resulting turmoil in energy markets, has led the government to postpone the planned phasing-out of lignite mines<sup>9</sup>, there is little doubt that jobs will eventually be lost<sup>10</sup>.

The *Recharge & Refuel* component's objective is to promote cleaner, safer, and fairer urban mobility by investing in the installation and operation of electric vehicles' charging

<sup>7</sup> On regulatory changes affecting platform workers, see pp. 213-214 in Theodoropoulou (2022). On the preferential treatment of self-employment, see Matsaganis (2022).

<sup>8</sup> See section 8.3.3 in Boeri & van Ours (2021). The point was also made by the Pissarides Committee.

<sup>9</sup> See Koutantou & Triandafyllou (2022).

<sup>10</sup> A recent survey put the number of jobs in lignite mines and in lignite-powered electricity plants at 4,900 and 1,600 respectively. See p. 21 in Miranda Barbosa et al. (2018). While these figures are negligible nationally (0.16% of all jobs in Greece), they are important locally, as the mines and plants are located in two high-unemployment areas of the country (Ptolemaida and Megalopoli).

stations. The shift away from internal combustion engines is expected to threaten jobs in the maintenance and repair of motor vehicles sector<sup>11</sup>.

### Digital transformation

The *Modernize* component concerns investing in the digitalisation of public administration. A more efficient government bureaucracy entails clear benefits for citizens and businesses alike. As administrative procedures become faster, fairer, and more transparent, firms will face lower transaction costs. This will release resources that can be redeployed in productive activities. The net effect on jobs, though difficult to quantify, is likely to be positive.

Similarly, the *Digitalization of businesses* component (with a special focus on small and medium enterprises) aims to help firms reduce operational costs and reallocate resources to productive activities.

### Private investment and transformation of the economy

The *Improve the efficiency of the judicial system* component is an example of how a reform could have positive spillovers to job creation. Even though the reform *per se* does not concern the labour market directly, long delays and high costs place a burden on the economy, investment, and jobs creation.

Lastly, the *Strengthen the financial sector and capital markets* component aims to facilitate access to credit for businesses. Given that Greek firms have faced higher credit costs and lower credit opportunities, especially since the onset of the country's debt crisis, it is reasonable to expect that improving access to credit will help revive business investment, a prerequisite to creating more jobs.

How realistic is the Greek government's aspiration for *Greece 2.0* "to lead the country's economy, institutions and society into a new era; to spark a paradigm shift towards a more extroverted, competitive and green economic model, matched with a more efficient, less bureaucratic, digitalised state, a more growth-friendly tax system, a dramatically reduced informal economy, and a strong, resilient and inclusive social safety net"<sup>12</sup>?

This is always difficult to assess beforehand, although the incentives to overstate one's case are clear, and Greece's record in spending EU funds wisely (or at all) certainly leaves much to be desired. Nevertheless, the Commission seems to think that the NRRP has potential, especially as regards jobs creation, though it points out that success "will crucially depend on the reform of the lifelong learning system and the extent to which it will help ensure high quality and labour market relevance of offered programmes, accountability of providers and appropriate selection of participants"<sup>13</sup>.

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<sup>11</sup> In 2020, NACE Class 45.2 - Maintenance and repair of motor vehicles supported 30,751 jobs (0.78% of all jobs in Greece).

<sup>12</sup> Cited on p. 19 in *Greece 2.0*.

<sup>13</sup> See p. 44 in SWD (2021a).

## Challenges and Controversies

### Social and Political Backlash

Policymakers in the EU do not simply face the need to budget for the growing costs of climate inaction plus the upfront costs of adaptation and mitigation projects. Another growing concern is the elevated resistance from affected sectors, citizen groups and regions which threatens to derail the course to net zero and undermine flagship EU initiatives such as the Green Deal. Apart from climate change denial, growing frustration with the repercussions of green policies is fuelling populism across the continent and hindering efforts to achieve the green transition<sup>14</sup>.

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A major issue facing policymakers across the EU is that, following the seminal declarations of the previous decade such as the Paris Agreement and the EU GREEN DEAL, the time has now come to implement the policies so legislated, which require an immense share of the funding available. While subsidizing investment in renewable capacity is viewed positively in principle, support wanes when people realize that one person's subsidy is another's taxation (Blanchard et al., 2023). Coupled with the recent energy and cost of living crises, this has resulted in growing discontent with economic policies in support of the green transition. According to a recent poll, only 39% of respondents strongly supported or tended to support a ban on petrol and diesel cars in high-income European economies<sup>15</sup>. An attempt to levy a fuel tax in France spurred riots by the *Gilet Jaunes* movement and led to the retraction of the initiative in 2019, while a proposal for a ban on gas boilers was dropped this year. Moreover, public indignation is exacerbated by the lack of scrutiny on major polluters and the dual message being conveyed by the massive amount of funds that are still being channelled to fossil fuel companies as subsidies<sup>1617</sup>.

However, climate change is changing Europe's economic geography, with some regions facing greater risks than others, which creates disparities regarding vulnerabilities at the regional level. For example, coastal areas are particularly vulnerable to rising sea levels, which pose risks to the infrastructure and livelihoods of communities living near the sea. Perhaps more importantly, the effects of economic policies designed to achieve net zero affect EU regions in a very non-uniform way. Recent empirical evidence reveals that the socio-economic ramifications of EU strategy are extremely non-linear, with less developed, peri-urban and rural regions in Southern and Eastern Europe being most adversely affected by the policies that underpin the green transition (Rodriguez-Pose and Bartolucci, 2023). Insofar as the green transformation is a structural one, it encompasses elements of creative destruction. Decarbonizing the energy industry comes at a short-term cost in terms of employment in coal regions. Koundouri et al. (2023b) emphasize the importance of 'Twin Skills for the Twin Transition', highlighting the critical role of green and digital skills and jobs in facilitating a smooth and inclusive transition to a sustainable and technologically advanced economy. According to the IMF (2022), only 1% of workers will need to reallocate as a result of the green transition, which is considerably fewer than the 2.5% who were uprooted by the transition from manufacturing to services in the late 20<sup>th</sup> century. Nonetheless, the green transition will affect many workers in a handful of regions and warrants massive investment in infrastructure and the upskilling and reskilling of the labour force.

<sup>14</sup> <https://www.ft.com/content/f6667506-d38f-43c2-8e75-b39c72112a41>

<sup>15</sup> <https://www.ft.com/content/437a1058-d0d3-40cf-8eea-6a7b3e626cde?desktop=true&segmentId=d8d3e364-5197-20eb-17cf-2437841d178a#myft:notification:instant-email:content>

<sup>16</sup> <https://www.imf.org/en/Blogs/Articles/2023/08/24/fossil-fuel-subsidies-surged-to-record-7-trillion>

<sup>17</sup> <https://www.theguardian.com/environment/ng-interactive/2022/may/11/fossil-fuel-carbon-bombs-climate-breakdown-oil-gas>

Finally, the transition to net zero by 2050 is being obstructed by vested interests and the power of traditional sectors in the EU economy. The recent outcome of the Dutch elections mirrors the support gained by the populist Farmer Citizen Movement (BBB) in the 2022 uprising against legal action to curtail nitrogen-based emissions. In October 2023, the new version of the Reach legislation, which seeks to reduce harmful chemicals and microplastics, was abandoned following heavy lobbying from the chemical industry on the grounds that the measures would undermine EU competitiveness in the field<sup>18</sup>. Furthermore, the German Constitutional Court's recent decision preventing idle funds from the pandemic relief package to be mobilized to fight climate change indicates that European institutions still have in a 20<sup>th</sup>-century mindset, which could prove catastrophic in the face of 21<sup>st</sup>-century challenges.

### Geopolitics

The fulfilment of the pledges included in the EU GREEN DEAL is also contingent on geopolitical risks and shifts in international relations. The recent war in Ukraine stimulated the EU's energy transition since natural gas from Russia was *de facto* considered a transition fuel as renewable energy capacity was developed. Decreasing the bloc's energy reliance on Russia served to revitalize or prolong the operation of coal plants across the continent, raising issues regarding the short-term impacts on CO<sub>2</sub> emissions<sup>19,20</sup>. Nonetheless, the EU responded swiftly, mainly through REPOWER-EU, and shielded itself by brokering LNG deals while investing in auxiliary infrastructure, ensuring minimum storage capabilities through cooperation, and diversifying its fuel supply<sup>21</sup>. Nonetheless, the policy response indicates that the energy crisis can serve as an opportunity for the EU to speed up its renewables deployment through fiscal incentives and reducing the red tape associated with green investments, and through promoting energy efficiency in buildings, transport and consumption (IEA, 2022).

Given the prominence of renewable energy in the pathway to net zero (42.5% target for energy production by 2030), the EU must not risk a new dependence. The adverse effects of relying on Russia for energy security should act as an alarm for the future, given China's dominance in the renewable energy market. Following a ramping up of investments after 2020, China will control more than 80% of the world's solar manufacturing capacity by 2026<sup>22</sup>. In addition, key materials for renewable energy are located or controlled far from the EU's sphere of influence, with 63% of the world's cobalt extracted in the Democratic Republic of Congo, and 60% of this is refined in China, along with 100% of the materials used for permanent magnets (European Commission, 2023c). The launch of the EU Critical Raw Materials Act as part of the Green Deal Industry Plan seeks to precisely address these issues<sup>23</sup>. It identifies raw materials that are crucial for the European green transition for which there is a high risk of supply disruption, then incentivizes increased participation by EU sources in their extraction and processing. Moreover, it prohibits more than 65% of the bloc's annual consumption of a given critical material coming from a single third country.

Finally, the desired mitigatory effect of EU policy on global GHG emissions depends heavily on the policy responses of third parties. As mentioned above, carbon pricing delivers

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<sup>18</sup> <https://www.ft.com/content/e6569817-108d-4f2d-9350-6e967ad98038?desktop=true&segmentId=7c8f09b9-9b61-4fbb-9430-9208a9e233c8#myft:notification:daily-email:content>

<sup>19</sup> <https://www.reuters.com/business/energy/germany-approves-bringing-coal-fired-power-plants-back-online-this-winter-2023-10-04/>

<sup>20</sup> <https://energypress.gr/news/nea-paratasi-mehri-telos-toy-2025-sti-leitoyrgia-trion-lignitikon-stathmon-tis-dei-gia-logoyas>

<sup>21</sup> <https://www.bruegel.org/dataset/national-energy-policy-responses-energy-crisis?s=09>

<sup>22</sup> <https://www.reuters.com/world/china/china-will-dominate-solar-supply-chain-years-wood-mackenzie-2023-11-07/>

<sup>23</sup> [https://ec.europa.eu/commission/presscorner/detail/en/ip\\_23\\_1661](https://ec.europa.eu/commission/presscorner/detail/en/ip_23_1661)

substantial emissions abatement if it is global; if it is not, however, large enterprises *outsource their emissions* and not just their operations. Although initiatives like the CBAM protect EU interests and bolster the effectiveness of the ETS, only through international cooperation will global targets (such as the 1.5 temperature rise) be met—a principle enshrined *inter alia* in SDG 17. As highlighted by Blanchard et al (2022), the EU can reap significant benefits from leading the political consensus at an international level on the green transition front and remaining at the leading edge of environmental policy in the decades to come.

*... the EU policy response (at both the union and member state level) warrants elaboration in terms of its design, implementation, and monitoring.*

### Policies as Enablers for the Green Transition

Against this backdrop, the EU policy response (at both the union and member state level) warrants elaboration in terms of its design, implementation, and monitoring. Policymakers do not only have to assess the perils of climate change and act decisively; they have to consider how to engage the private sector and civil society, how to unlock the technological and political impasses of past decades, and how to ensure that policy outcomes are not lopsided. To this end, we propose that the basic tenets of EU climate policy be the following:

- i) Economic policies need to be based on undisputed scientific evidence, which should be conveyed to the public with a focus on the socio-economic pathways shaped by specific actions compared with inaction. The costs and benefits of policy commitments should be outlined, focusing on the trade-off between short- and long-term effects, as this will enhance commitment by civil society.
- ii) As initiated by the Mission approach, EU and national plans need to follow a bottom-up approach which tenders to the specific needs and capacities of local stakeholders. Apart from providing tailored support for adaptation and mitigation solutions, this fosters a sense of ownership in local communities.
- iii) Policies have to be holistic and combine elements of supply and demand to harness synergies. For example, fiscal incentives for increasing renewable energy capacity can be commingled with public procurement for such projects.
- iv) The international community needs to exhibit a certain degree of harmonization in terms of climate policies, and avoid making short-term gains in competitiveness by, for example instituting lax environmental standards for industry.
- v) The transition to a low-emission economy must be designed in a fair and equitable manner which ensures that costs and benefits are distributed proportionately. A just transition relies on targeted support for vulnerable groups and investment in life-long learning<sup>24</sup>.
- vi) Industrial policy for the green transition needs to be bold, holistic and aligned with long-term targets. Changes in human behaviour matter, but the key to every major transition has been technological change (Terzi and Fouquet, 2023). Green innovation has the potential to steer the transition and thus minimize the contributions required from consumers and workers, thus softening their resistance.
- vii) EU, national and international institutions have to target big polluters in the energy and industrial sectors. Increased scrutiny is required to gather a fair share of tax revenues from multinationals and to tackle greenwashing by large corporations. The recent UN reform is a promising development on the tax front<sup>25</sup>.

<sup>24</sup> According to Cameron et al. (2020) ensuring a just transition requires the process to be locally driven to ensure the needs and capabilities of affected regions are considered, and targeted policies should be part of long-term EU strategy. These EU initiatives also need to be aligned with national economic policies and subject to regular and transparent assessment.

<sup>25</sup> <https://taxjustice.net/press/un-adopts-plans-for-historic-tax-reform/>

Furthermore, strengthening the monitoring mechanisms for corporate sustainability and enhancing the capabilities of the EU Transparency Register to document brown lobbying activities are initiatives that would show the world the EU takes climate change very seriously.

## Conclusions

As Europe deals with the worsening effects of anthropogenic climate change, it is becoming clearer that continuing with business as usual and implementing methods from the 20th century is not a viable option. At this critical juncture, the EU aspires to be the pioneer in climate action, having set ambitious targets for 2050 and formulated an array of initiatives and instruments for their implementation.

As discussed by Sachs and Koundouri (2021), a green and digital, job-based, and inclusive recovery from the COVID-19 pandemic is crucial for the joint implementation of Agenda 2030 for Sustainable Development and the European Green Deal. The core challenge lies in achieving a decarbonized economy that balances competitiveness with energy security and adheres to sustainable development principles. This necessitates a nuanced understanding of the complex dynamics of climate change, including the provision of support to communities and sectors disproportionately affected by the green transition. The EU's policy framework has evolved to focus on mission-oriented actions, transcending traditional sectoral or enterprise-focused approaches and demanding coordinated efforts across the public and private sectors, academia, and civil society. This comprehensive strategy requires an unprecedented mobilization of financial resources and a commitment to international collaboration.

*The success of these initiatives depends on support from strong regulatory and financial systems.*

In response to the climate crisis, the EU has demonstrated a decisive commitment to a holistic approach, laying the groundwork for long-term resilience and sustainability. Key initiatives like the European Green Deal and the Net-Zero Cities program signify major steps towards transforming Europe's economic landscape through sustainable practices and inclusive policies. The increasing emphasis on Public-Private Partnerships (PPPs) in building resilience and mitigating climate-related risks highlights the need for cross-sector collaboration. Koundouri et al. (2023c) underscore that the EU can achieve its ambitious goals regarding renewable energy and agricultural emissions utilizing up-to-date Integrated Assessment Models (IAMs).

The success of these initiatives depends on support from strong regulatory and financial systems. The Global Climate Hub (GCH) helps coordinate these efforts by providing information and solutions that are based on science and focus on people. Together, these plans and instruments make a just transition possible that benefits all.



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## Appendix: The role of the Global Climate Hub

Against this backdrop, the international scientific community has a material role to play in promoting science-based and human-centric knowledge, developing solutions towards the green transition and co-shaping economic and social policy.

The Global Climate Hub (the Hub) is the response of the UN Sustainable Development Solutions Network to the multifaceted challenges posed by climate change; it proposes a transformative approach to existing economic, production and energy systems, supported by scientific research<sup>26</sup>. In other words, it acts as an initiative for change, leveraging science-based solutions to drive a holistic and equitable transition towards a more resilient and climate-neutral EU and global system.

The Hosting Institutions of the Hub are the Athens University of Economics and Business (AUEB) and the “Athena” Research and Innovation Centre in Information, Communication and Knowledge Technologies (ATHENA RC), both of which are members of the Alliance of Excellence for Research and Innovation on Aephoria (AE4RIA), an initiative for collaboration between research institutions, innovation accelerators, and science-technology-policy interface networks focused on sustainable development<sup>27</sup>.

The Hub consists of nine separate units, each of which contributes a unique perspective and expertise to the development of comprehensive and customized strategies for climate neutrality and resilience. The units are: 1. Climate Data and Digital Platforms, 2. Atmospheric Physics and Climatology, 3. Climate and Energy Modelling, 4. Climate, Land Use, Water-Food-Energy-Biodiversity Nexus Modelling, 5. Climate and Health, 6. Innovation Acceleration for Climate Neutrality and Resilience, 7. Just Transition, 8. Transformative and Participatory approaches, and 9. Education, Training, Upskilling and Reskilling.

What makes this initiative exceptional is its unflagging commitment to basing its recommendations and action plans on the latest scientific knowledge, data, and technologies. By fostering collaboration among experts from diverse fields, the Hub ensures that the solutions it proposes are not only innovative but also feasible and applicable to the unique context of different countries. At the core of the Hub is a interdisciplinary, science-driven approach to developing sustainable pathways for the medium and long run. These pathways are then presented to stakeholders as the scientific basis on which the final pathways to be implemented are to be co-designed using transformative participatory approaches. The final part of the Hub approach is our work on the socio-economic narrative underpinning the transition pathways, the elaboration of financing schemes and mechanisms for the transition, and ensuring a fair distribution of economic and social costs, particularly focusing on protecting society's most vulnerable groups and adhering to the principle of 'leave no one behind'.

The GCH's recent report<sup>28</sup> evaluates Integrated Assessment Models (IAMs) to inform net-zero pathways that are particularly relevant to the EU's energy sector. These include using the BALMOREL model to project decarbonization scenarios aligned with the Fit-for-55 and RePowerEU initiatives. Furthermore, the report explores renewable energy's role in enhancing ecosystem services in Southeast Asia and uses the FABLE Calculator for sustainable land-use and food system pathways in Greece. These efforts by the GCH demonstrate the potential for integrating diverse research into coherent environmental, energy and socioeconomic pathways, underscoring the importance of comprehensive models in guiding financial investments and policy decisions towards achieving net-zero by 2050.

The SDSN Global Climate Hub collaborates closely with national governments and with society with a view to implementing these robust action plans and to securing a sustainable future. The Hub operates within the frameworks of the UN Agenda 2030 and the Paris Climate Agreement, ensuring its alignment with global sustainability goals and climate commitments.

<sup>26</sup> <https://unsdsn.globalclimatehub.org/>

<sup>27</sup> <https://ae4ria.org/>

<sup>28</sup> <https://unsdsn.globalclimatehub.org/un-sdsn-global-climate-hub-report-modelling-net-zero-pathways/>