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Anticipating and managing the impact of change

The transition to a climate-neutral economy: Exploring the socioeconomic impacts



The transition to a climate-neutral economy: Exploring the socioeconomic impacts



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Executive summary

Introduction

The EU's transition to a climate-neutral economy requires a clean industrial revolution. This report explores the potential implications of such fundamental socioeconomic change for European regions and populations, following a foresight approach. The research findings are presented with policy pointers on achieving a just transition that leaves no one behind.

Policy context

With the EU's adoption of the European Climate Law (June 2021), it committed to achieving climate neutrality by 2050, with a target of reducing greenhouse gas emissions by at least 55% (compared with 1990 levels) by 2030. To achieve this, a fundamental transformation of energy, transport and production systems will be necessary. This will affect economies, societies, territories and people. Simultaneously, a recalibration of industrial relations and wider socioeconomic policies will be required to deliver fair results for people in the EU and ensure public support for the transition. The Russian war on Ukraine and the resulting energy crisis have stimulated governments to accelerate the move away from reliance on imported fossil fuels. The EU, for instance, sought to end its dependency on Russian fossil fuels with its 2022 REPowerEU plan, which involves energy savings, the diversification of energy supplies and the accelerated roll-out of renewable energy. However, it has also delayed ending domestic production of high-carbon energy sources.

The European Commission's Just Transition Mechanism was introduced in recognition of the socioeconomic change required by the European Green Deal. It aims to promote EU cohesion and maintain social fairness and inclusiveness, key objectives of the European Pillar of Social Rights. The Just Transition mechanism, together with the 'Fit for 55' package – including, crucially, the Social Climate Fund – provides support for those regions, industries, workers and households that face the greatest transition hurdles. This report explores whether additional policy measures may be required to ensure fair outcomes for regions and populations and thus secure EU cohesion.

Key findings

- The just transition is expected to create net employment gains, new business sectors and a healthier environment. However, labour demand and supply may not be matched within regions; therefore, it is important that investment in education, (re)skilling and bespoke support for job transition are provided. In addition, social challenges and inequalities, including job polarisation (a rise of high- and low-wage occupations) and inadequate social welfare, should be addressed.
- To avoid worsening existing inequalities, measures to mitigate the effects of climate change should be constantly monitored, including disproportionate effects on certain regions. In addition, entirely new welfare models could be considered to ensure fairness and equality.
- The current EU policy approach to the just transition could be adapted to include a shift toward sufficiency – meaning more limited consumption – at a societal level and more localised economy models, such as circular economy approaches. A fair distribution of resources would be a precondition to such changes.
- Innovation measures that aim to achieve sustainability objectives are essential for the industrial restructuring required for the just transition. Civil society and social partner engagement are crucial, especially in regions with weak innovation systems.
- A new, more localised economy adopting circular economy principles can draw on regional assets (natural, human and capital) to reduce environmental degradation and pollution. There must be adequate scope for social innovation, and economic diversification will be needed to create opportunities for socioeconomic groups in different circumstances.
- Improving infrastructure is key to delivering just transition outcomes for different socioeconomic groups while creating jobs. Civil society and social partner engagement are vital to realising the societal benefits from infrastructure renewal, including improved public health and well-being, for example through energy-efficient housing and urban green spaces.

- Effective multilevel governance at EU, national and regional levels requires investment in capacity development and the consistent use of an integrated EU-wide evidence base, down to regional and local levels. This is key for the kind of long-term systemic change needed to reconfigure wider production and consumption systems. Ensuring broad civil society and social partner engagement will be crucial in navigating potential conflicts, as will reconfiguring institutionalised power relationships between the state, the corporate sector, trade unions and citizens. The specifics of regional socioeconomic systems and patterns of disadvantage of different socioeconomic groups need to be considered.
- There is a need to secure support and livelihoods for all socioeconomic groups, including during periods of reskilling and job transition. Policymakers must be alert to emerging patterns of job polarisation and the reinforcement of existing patterns.
- Economic opportunities resulting from the transition must be accessible to all by strengthening collective worker representation at all levels, including for new settings and forms of work, and building capacity for social dialogue, while also actively shaping consumption choices to align with new economic models by engaging with citizens.
- Socially fair and just access to infrastructure for basic needs, such as housing, transport and digital connectivity, must be provided to allow for wider transition opportunities, which can contribute to job creation.

Policy pointers

- In policy debates, more attention should be given to the effects of climate change on different socioeconomic groups and the benefits of the transition. This could strengthen the case for change and create the governance capacity and political conditions needed to deliver a just transition.
- Strategic cooperation between public authorities, social partners and civil society is needed to ensure the strategic coherence of the transition across European regions and economic sectors. This includes engaging with changes in lifestyles and patterns of consumption and providing reliable information to the public, while considering the different starting points for various socioeconomic groups.
- Public policy should play a greater role in securing and fairly distributing resources in a climate-neutral world, including in helping direct investment while relying less on market-based allocation mechanisms. This will ensure fair outcomes for different socioeconomic groups and European regions.
- Diverse perspectives and integrated data collection and analysis capabilities should be embedded in regions to avoid detrimental effects on regional populations resulting from relying for too long on a 'business as usual' assumption, while also leveraging education to get people behind the transition.
- Regional capacities and assets should be factored into tailored transition paths for different regions, including the strength and make-up of the industrial base, the nature and resilience of public services and welfare systems, and social dialogue mechanisms.
- Trust-based relationships between populations, governance organisations and the private sector must be nurtured to use all available regional assets and to foster and use a regional innovation system to deliver economic diversification and attract new economic activities to the region.
- The necessary investment and governance capacity must be guaranteed to enable all regions to deliver appropriate infrastructure solutions to citizens, and create support by leveraging innovation and community wealth-building solutions, such as the development of (partially) community-owned green affordable housing.
- Regions should be equipped to embed transparency, including demonstrably making effective use of public money, participate in political processes and tackle vested interests to build trust and enable new forms of socioeconomic cooperation.

Introduction

Achieving climate neutrality

The EU has set itself ambitious targets for achieving climate neutrality by 2050, as outlined in its 2020 Green Deal. The precise trajectory that this transition will take is highly uncertain. What is needed to make this goal a reality is nothing short of a clean industrial revolution. Socioeconomic policies will be required to deliver fair results for citizens and regions across EU Member States, and ensure public support for the transition. In addition, social dialogue and collective bargaining can greatly contribute towards achieving outcomes beneficial to both workers and companies affected by the just transition.

In exploring the wider repercussions of the transition, this report identifies potential socioeconomic impacts for different EU population groups and regions until 2050. The results presented contribute to the debate about how additional policies can be deployed to ensure the maximum effectiveness of the Just Transition Mechanism while minimising the adverse social and distributional effects in the EU. It assists policymakers and other stakeholders by providing insights and policy pointers on developing measures aimed at achieving a just transition.

A just transition to a climate-neutral economy provides and guarantees better and decent jobs, social protection, more training opportunities and greater job security for all workers affected by global warming and climate change policies.

(Eurofound, 2022a)

To generate these insights in this highly complex setting, a foresight approach was adopted. The central method was the use of (qualitative) scenarios to consider alternative, plausible and imaginable futures towards a just transition in the EU. This scenario-based approach helped explore how different trends and drivers might affect different regions and socioeconomic groups to understand emerging economic and social inequalities. Eurofound has published this foresight exercise alongside two other studies: one that develops a conceptual framework on the impact of climate change and policies in the context of the transition to climate neutrality and another that looks back at the recent socioeconomic impacts of the transition (Eurofound, 2023; forthcoming-a). Eurofound also explores the role of social dialogue in the just transition (Eurofound, forthcoming-b). Research is ongoing on the role of social partners in territorial just transition plans, while also exploring the roles of other actors and considering challenges and opportunities (Eurofound, forthcoming-c).

With the EU's adoption of the European Climate Law (June 2021), it committed to achieving climate neutrality by 2050 and set itself a binding target of reducing greenhouse gas emissions by at least 55% (compared with 1990 levels) by 2030. The Just Transition Mechanism was introduced in recognition of the fundamental socioeconomic change required by the European Green Deal. It aims to promote EU cohesion and maintain social fairness and inclusiveness, key objectives of the European Pillar of Social Rights. It is made up of three pillars, namely grants through the Just Transition Fund, investment through InvestEU to obtain additional private investments, and public sector loans to enable public sector agencies to invest in vital infrastructure and support systems. The Just Transition Mechanism's explicit goal is to 'leave no one behind' in this process (European Commission, 2019). The mechanism, together with the 'Fit for 55' package – including, crucially, the Social Climate Fund – provides support for regions, industries and workers that face the greatest transition hurdles. This report explores whether additional policy measures may be required to ensure fair outcomes for regions and population groups and thus secure EU cohesion.

What is a just transition?

The term 'just transition' is believed to have been coined by North American trade unions to provide a framework for discussions on the kinds of social and economic interventions necessary to secure workers' livelihoods in the shift from high-carbon to low-carbon, climate-resilient economies (Popp et al, 2018). From those early origins, the term has become widely embedded in policymaking as part of the pursuit of the Sustainable Development Goals. This is illustrated, for instance, by the following reference in the Paris Agreement:

Taking into account the imperatives of a just transition of the workforce and the creation of decent work and [good-]quality jobs in accordance with nationally defined development priorities.

European Commission policy documents provide a loose definition of the term 'just transition'. The Council recommendation regarding the fair transition refers to the fact that 'Fairness and solidarity are defining principles of the European Green Deal' (European Commission, 2021a, p. 1). The Just Transition Mechanism itself is introduced as ensuring that 'the transition towards a climate-neutral economy happens in a fair way, leaving no one behind' (European Commission, undated-a).

1 Foresight approach

This report aims to inform further research and policy development with a view to maximising opportunities and alleviating negative impacts of the transition to climate neutrality. The three key research questions are as follows.

- What are the potential socioeconomic implications of the transition to climate neutrality, for European regions and populations groups, until 2050?
- What further inequalities may emerge among social groups and how can they be addressed?
- What initiatives and policy choices can help prevent economic and social divergence among geographical areas?

A foresight methodology was followed to answer these questions. According to the European Commission, this is defined as a ‘discipline of exploring, anticipating and shaping the future to help build and use collective intelligence in a structured, systematic and systemic way, so as to anticipate developments’ (European Commission, 2020a). A foresight approach aims to shed light on possible actions that can be undertaken today to shape the future. Scenarios are the central foresight approach used in this report to explore alternative futures of and implications for different EU and regional stakeholders. Scenarios enable the exploration of a much wider range of potential developments and actions than purely data-driven analysis in the form of forecasts and econometric methods can deliver. They allow stakeholders to qualitatively explore what may happen rather than attempting to predict what will happen. This makes them a particularly useful tool for considering highly complex issues in changing and unstable environments, with the aim of identifying emerging issues where proactive actions could positively shape future outcomes.

Desk research

The scenarios were developed based on a literature review. The review helped identify key themes and tensions around socioeconomic outcomes that may arise from the transition trajectory envisaged by EU policies. Insights were gathered from relevant literature on challenges and opportunities for a just transition, which fed into the development of three scenarios through a key factor-based scenario methodology. In this approach, different projections for key factors (the drivers identified as playing a role in shaping different possible futures) are tested for plausible combinations that create distinctive scenarios.

This allows for the systematic, transparent and modular development of scenarios, which can be updated smoothly at any time, including in further work beyond this research. An impact-uncertainty analysis was then undertaken to determine how the key factors would feature in the scenarios, with those of high impact and with great uncertainty commanding a central role.

EU foresight

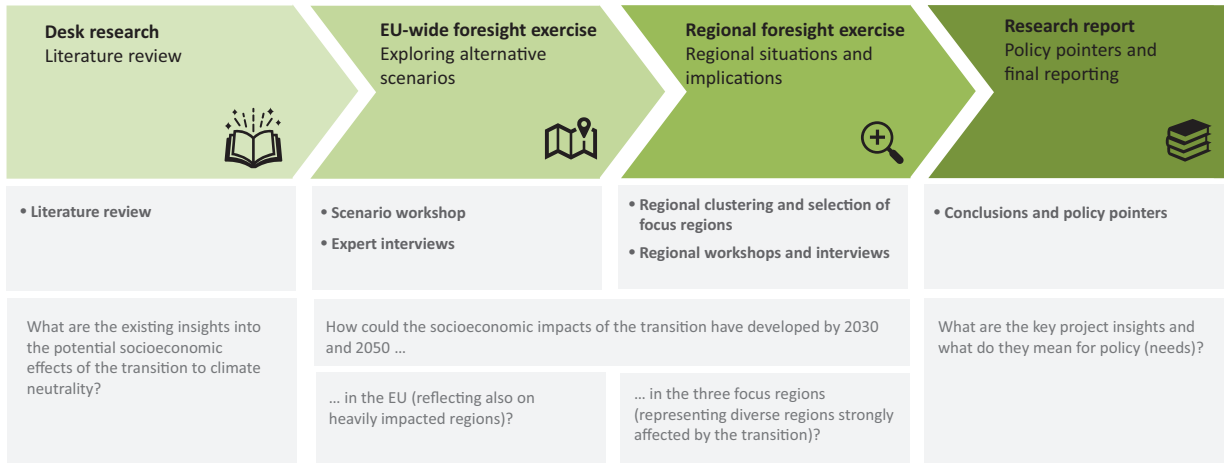
The resulting three plausible EU transition scenarios (see Table 1 for a summary) offered a framework for discussions with stakeholders on the socioeconomic implications of the transition and key policy measures to alleviate resulting inequalities. A limited number of scenarios were used as this approach favours complex topics that affect a variety of policy fields, such as the just transition. It also allowed for a more in-depth consideration of the implications and helped ensure user-friendly results that could be clearly communicated.

Using the scenarios to stimulate forward-looking discussions, an online EU-level expert workshop was held to discuss the role that key policy measures and institutional change might play in shaping possible just transition futures. Participants were asked to consider likely impacts of the scenarios on different socioeconomic groups and regions within the EU until 2050. The involvement of a variety of stakeholders with different perspectives and from different backgrounds played a key role in strengthening the scenarios. It helped identify potential blind spots that may have been overlooked in the original scenario development process and provided a sounding board for the preliminary results derived. The scenarios were then further refined and built on as a result of the insights gathered.

Regional foresight

Three online regional workshops were held to discuss potential implications for individual regions of the transition to climate neutrality. Participants included regional and local stakeholders representing governments, employers, employees, non-governmental organisations and research organisations. The expertise of regional research partners was sought to identify and engage local stakeholders and embed local knowledge in the discussions and findings. The scenarios were again

Figure 1: Key stages of research



Source: *Future Impacts*

used to stimulate discussions about key challenges and opportunities from the transition for the regions and to assess the potential socioeconomic impacts at regional level. In addition to the workshops, follow-up interviews were undertaken to ensure all key stakeholders’ perspectives were reflected in each region (a list of contributing stakeholders is included in Annex 3).

The evidence gathered during the desk research, EU-wide foresight exercise and regional foresight exercise was consolidated into this final research report (Figure 1).

Limitations

This report contributes to the discussion of policy choices with regard to the just transition. Decision-makers should be aware that the scope and scale of the work undertaken does not provide the basis for a comprehensive analysis of the situation throughout European regions or of the completeness of possible policy measures. The methodological approach was chosen to ensure that outputs could be generated within the scope and timeline of the research. This needs to be kept in mind when using the results.

Scenarios for the workshops

Scenarios were developed to initiate discussions at the workshops. The scenarios are not predictions, but offer a way to consider alternative, plausible and imaginable futures of potential pathways towards a just transition in the EU.

The three scenarios draw on the specific insights gained from the literature review, alongside the experts’ perspectives collected at the workshops and during the interviews. Insights into the challenges and opportunities for a just transition in the EU until 2050 formed the basis of the scenario narratives, with further detail on possible or plausible developments and events integrated into the storylines. The scenarios focus on the EU but also consider global developments where they play a part in influencing wider socioeconomic developments in Europe.

An overview of the three scenarios is provided in Table 1.

Table 1: Overview of the scenarios of the transition by 2030

Scenario 1: All aboard the well-being transition	Scenario 2: A piecemeal transition	Scenario 3: A struggling transition
<ul style="list-style-type: none"> ◦ Transition to climate neutrality ahead of schedule, pushed by geopolitical events. ◦ Electricity generation fully renewable, transport sector greening rapidly. ◦ International democratic renaissance, prominent EU role in (fair) global transition. ◦ New EU tax system and rights for individuals (for example, housing). ◦ Smart cities (first) drive transition in regions, local actors play a key role. ◦ New broad cross-generational environmentalism movement, qualitative growth paradigms, strong progress towards a circular economy¹ and short regional supply chains. 	<ul style="list-style-type: none"> ◦ Transition to climate neutrality progresses as planned. ◦ Increase in the use of renewable energy mainly for electricity generation, fuels remain largely fossil. ◦ Ongoing global crises affecting the EU (including new migration crisis). ◦ In the EU, costs and delays and infighting between Member States are constant issues. ◦ There are increased disparities between regions (with innovation hubs and regions where manufacturing is in decline) and population groups creating winners and losers from the just transition. ◦ Some reshoring (where a company relocates production to the home country), but at a cost (reduced industry competitiveness). 	<ul style="list-style-type: none"> ◦ Transition to climate neutrality falters. ◦ Relatively cheap oil/gas dominates, transfer from fossil fuel- and carbon-intensive industries slow due to protests. ◦ Ongoing series of heavy-impact global crises (geopolitical crises and crises caused by climate change): short-termism rules. ◦ EU cohesion suffers, lack of shared will or agreement and decision-making. ◦ Convenience rather than carbon neutrality has become the guiding principle. ◦ EU economy suffers in trade wars, lack of innovation.

Source: Authors' own elaboration

The following describing what Europe might look like in 2030 and beyond according to each of the three scenarios.

Scenario 1: All aboard the well-being transition:

Triggered by geopolitical events, but based on a fundamental shift in political consciousness, the EU moves rapidly towards climate neutrality. By 2030, power generation has become fully renewable, and the transport sector is rapidly shifting towards non-fossil fuels. Progress was often accomplished through bottom-up processes and grassroots movements: local actors played a key role in the placement of reshored industries, cities took the lead in circular economy schemes and the focus on qualitative growth paradigms was supported by a broad cross-generational coalition of public stakeholders. Globally, a democratic renaissance revived supranational organisations and united a now much less volatile world, and the climate-neutral movement is becoming universal.

Scenario 2: A piecemeal transition: Under the paradigm of energy autonomy, the transition to climate neutrality is progressing as planned. By 2030, a clear majority of electricity is generated using renewable energy, while in

the transport sector fuels are only slowly beginning to shift to non-fossil fuel alternatives. Internal debates on metrics and costs have dampened ambitions, while ongoing global crises affect Europe in the form of new waves of migration. To secure supply chains, some industries have been reshored, but at the expense of industry competitiveness. In the process, disparities between regions and population groups have increased, leading to clear winners and losers of the just transition.

Scenario 3: A struggling transition: After a successful start to the transition, Europe failed to make progress beyond the initial gains. Convenience rather than carbon neutrality became the guiding principle: when prices for fossil fuels fell, public debate emphasised the temporary drawbacks of turning away from fossil energy sources. Targets were first softened and then abandoned. By the second half of the 2020s, a series of geopolitical crises meant that short-term solutions became all that mattered. With the EU in political gridlock, Member States began to follow national policies. In 2030, tensions within and between populations are high, in a stuttering economy with millions lacking the skills to find work, and environmental considerations are seen only as a luxury.

¹ The circular economy is a model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible. In this way, the life cycle of products is extended (European Parliament, 2023).

Three focus regions

The three focus regions – the South Aegean, Wielkopolska and Provence-Alpes-Côte d’Azur (PACA) – were identified based on a data-led clustering exercise combined with consideration of additional criteria such as representativeness and accessibility. The aim was to select regions affected by the transition to climate neutrality, but with different starting points and experiences of the transition, to illustrate potential pathways and how the impacts of the transition might differ between European regions.

As a starting point for the clustering exercise, regions were selected among those identified by the Just Transition Mechanism and Just Transition Fund as likely to be strongly affected by the transition to climate neutrality (European Commission, undated-b). These are regions either heavily reliant on fossil fuel-based industries (coal/lignite, oil and gas, peat and shale oil extraction, petroleum refining, coking and fossil fuel-based energy production), other carbon-intensive manufacturing industries (metal, chemical, cement, fertiliser and others) or both (Happaerts, 2021). These regions will need to restructure their industries and economic systems. Selecting from these already identified regions offered a way of building on existing research while aligning this research with EU policy processes. It helped to connect the work to existing initiatives and their stakeholders (Happaerts, 2021; AARC, undated).

For the clustering exercise, data at the level of Nomenclature of Territorial Units for Statistics 2 (NUTS2) regions were chosen. NUTS2 is the standard level of reference for Cohesion Policy analysis and support (European Commission, 2022a; Eurostat, 2022). Data availability is also much better for NUTS2 level than, for example, NUTS3 level. Analysis at NUTS2 level was also recommended as most suitable during the peer review process.

Existing research on relevant indicators of the social effects of environmental policy was then used to identify a concrete set of potentially relevant and suitable indicators at regional level (Heyen et al, 2021). The indicators also needed to consider completeness of recent data and avoid data gaps. For these purposes, 2019 data were the most complete across European regions. The final set of indicators was then determined through a mapping exercise of available NUTS2-level regional data. The final indicators spanned four indicator domains, with an indicator for each domain:

- health and demographics: life expectancy at birth
- poverty and social exclusion/(un)employment: unemployment rate (unemployed people as a percentage of the economically active population)
- education/working conditions and skills

development: tertiary education attainment level (share of the population aged 25 to 64 years who have completed tertiary education)

- income and income distribution/economic development: gross domestic product (GDP) based on purchasing power parity per habitant

The overall process led to the identification of three final clusters of regions, which were broadly differentiated by the characteristics listed in Table 2.

Table 2: Characteristics of the European regional clusters

Cluster	Characteristics
1.	<ul style="list-style-type: none"> ○ intermediate unemployment rates ○ intermediate life expectancy ○ highest GDP per capita ○ highest tertiary education attainment levels
2.	<ul style="list-style-type: none"> ○ lowest unemployment rates ○ lowest life expectancy ○ lowest GDP per capita ○ lowest tertiary education attainment levels
3.	<ul style="list-style-type: none"> ○ highest unemployment rates ○ highest life expectancy ○ intermediate GDP per capita ○ intermediate tertiary education attainment levels

Note: Rankings describing ranges of absolute values for each indicator as ‘highest’, ‘intermediate’ and ‘lowest’ were used to facilitate the clustering process, which aimed to identify clusters that were as distinct as possible.

Source: Authors’ own elaboration

From each of the three clusters, one focus region was selected: PACA in France from cluster 1, Wielkopolska in Poland from cluster 2 and the South Aegean in Greece from cluster 3. In selecting these regions, access to regional stakeholders and existing processes was another key criteria (for example, including the viability of securing the support of regional partners in the scope and timeline of the research). Overall, the following criteria were therefore used to identify the three focus regions:

- regions that are typical of the cluster they represent with respect to the indicator data
- geographical diversity in terms of Member States and European subregions
- accessibility of local partners to connect the research to local transition and regional development processes and ensure stakeholder reach (by drawing on existing network relationships)

The following sections provide a summary of each of the selected focus regions.

Provence-Alpes-Côte d’Azur, France

PACA is considerably more diverse than the other two chosen regions due to both its topography and its industrial base. The former ranges from the Mediterranean coast to the Alps. The region’s industrial base includes a significant petrochemical and fossil fuel industry sector, which is particularly vulnerable to the transition. Tourism also plays a prominent role (JTP, 2021). With a total surface area of almost 32,000 km² and a population of some five million, PACA was ranked third in France for overall GDP and third in France for GDP per capita in 2020 (Statista, 2022). It is considered a ‘strong innovator’, with above-average public investment (European Commission, 2021b). In 2021, the unemployment rate was 8.2%, the long-term unemployment rate stood at 2.5% and the employment rate was 65.7% (IZ, 2022a).

Wielkopolska, Poland

Wielkopolska covers just under 30,000 km² and has a population of around 3.5 million inhabitants. The region has a strong industrial base, with significant automotive activities, clusters of more traditional industries and a growing service sector. Wielkopolska is one of the fastest growing regions in Poland, but its innovation performance is below the European average (Dabrowski, 2019). In 2020, the unemployment rate

was 3.7% and the employment rate stood at 56.4% (EURES, 2021). There is significant lignite mining, but decarbonisation has already begun, with ambitious decarbonisation projects in the pipeline (CEEnergy News, 2021). Overall, however, renewables are only expanding slowly, and local communities are struggling with declining revenue from taxes and fees (CEEnergy News, 2021).

South Aegean, Greece

Composed of 79 islands, the South Aegean region covers a large area of just over 5,000 km², but has a mere 340,000 inhabitants (OECD, 2020). Economically, the region depends on tourism (which is the source of 95% of all local GDP) (Siskos et al, 2019). This is not expected to change. Even though the blue economy² has been identified as a potential area for development, the economic development focus in recent years has remained on further strengthening the region as a tourism destination. In 2021, the unemployment rate (averaged over the seasons) was 19%, the long-term unemployment rate stood at 4.4% and the employment rate was 53.6% (IZ, 2022b). The region lacks significant value chains and lags behind in innovative activities, ranking a poor 11th among 13 Greek regions on the European regional innovation scoreboard, with a research and development (R&D) expenditure per capita of just 17% of the national average, and an expenditure of almost 0% (OECD, 2020).

² The blue economy refers to economic activities related to oceans, seas and coasts, covering a wide range of interlinked established and emerging sectors (European Commission, 2022b).

2 Potential socioeconomic implications of the transition to climate neutrality

This chapter presents the combined results from the literature review, the EU-wide and regional workshop discussions, and the interviews. Four main themes emerged from the synthesis of the consulted literature and provide the structure for this discussion:

- theme 1: securing livelihoods, welfare and fairness
- theme 2: refocusing economic development
- theme 3: renewing infrastructure
- theme 4: enabling systemic change in European regions

Theme 1: Securing livelihoods, welfare and fairness

Key insights

Literature highlights

- While net employment gains are expected in the EU, labour demand and supply may not be matched in individual regions and for particular (groups of) workers. (Re)skilling and bespoke support for job transition, with a prominent role for state and social partners, will be required for workers and wider populations affected by the transition.
- Beyond job losses, a failure to address ensuing social challenges, such as addressing job polarisation³ and ensuring adequate welfare for regions and population groups who stand to lose out, is a risk.
- Existing inequities may be reinforced without a constant focus on the distributional effects of measures to mitigate climate change and consideration of entirely new welfare models.
- Beyond this, there are more fundamental challenges to how the just transition is currently approached in the EU policy context. In this regard, shifts towards a stronger focus on sufficiency⁴ at a societal level with a fair distribution of resources, as an outcome of policies to tackle climate change, and towards more localised economic models (notably through circular economy approaches), would be ways to ensure fairness and welfare.

With carefully integrated policy mixes, greater fairness can be delivered as part of the transition. The adoption of sufficiency lifestyles has the potential to change the very way in which social inclusion is achieved.

Suggestions from stakeholders in the workshops

- The negative impacts of climate change and the potential benefits of the just transition should receive more attention in the policy debate to make a stronger case for change.
- Differences in personal circumstances beyond individuals' current employment status, such as digital skill level, age or qualifications, need to be considered when delivering reskilling opportunities, job transition support and welfare support.
- There should be less reliance on market-based mechanisms of demand and supply to address issues arising from climate change and in the transition towards climate neutrality.
- Regional capacities and assets (natural, human and capital) and potential migration effects need to be factored into tailored transition paths for different regions. These capacities and assets include the strength and make-up of the industrial base, the nature and resilience of public services and welfare systems, and mechanisms of social dialogue.
- Upfront investment and buy-in from regional populations is needed to restructure regional economies towards sufficiency at a societal level with a fair distribution of resources and a circular economy.

³ Job polarisation occurs when there is a concentration of labour demand towards jobs in the high and the low tails of skills requirements distribution.

⁴ Sufficiency refers to the concept of reducing resource consumption to limit the effect on the environment.

Insights from the literature review

This section provides an overview of key issues regarding Theme 1 (Securing livelihoods, welfare and fairness) that emerged from the literature review (Table 3), before considering them in more detail.

Job losses

The literature review clearly identified job losses as a result of carbon-intensive industries being phased out as one of the key challenges for a just transition (Eurofound, 2021; European Commission, 2021d; IRENA

and ILO, 2021). A number of specific estimates can be found in the literature regarding the potential effects on different sectors and industries, from fossil fuel extraction and processing to the automotive industry and manufacturing more generally. Specific examples include unemployment levels of up to 62% among young people already being recorded in some regions as a result of the transition (WWF, 2020). An estimated 237,000 direct jobs in coal-intensive regions in the EU will be lost by 2030 (Irimie et al, 2020), but the overall workforce in Germany, for instance, is expected to be 1.2% larger by 2070 (Philip et al, 2021).

Table 3: Overview of identified socioeconomic impacts on regions and population groups under Theme 1: Securing livelihoods, welfare and fairness

Challenge	Regions	Groups
Job losses	<ul style="list-style-type: none"> Coal-intensive regions (Irimie et al, 2020). Regions with a strong automotive industry (Eurofound, 2021). Regions with carbon-intensive manufacturing (European Commission, 2021c). 	<ul style="list-style-type: none"> Workers in the coal industry and related sectors (Irimie et al, 2020; WWF, 2020). Workers in the automotive industry (Eurofound, 2021). Workers in high-emission industries such as the chemical, steel and cement industries (European Commission, 2021d).
Reskilling and transitioning into new sectors and occupations	<ul style="list-style-type: none"> Regions with strong fossil fuel activities (Heyen et al, 2020). Regions with an insufficient focus on lifelong learning (Irimie et al, 2020; Norden, 2021). 	<ul style="list-style-type: none"> Employees with cultural identities linked to ‘brown’ industries, such as cement, iron and steel (Irimie et al, 2020). Older and less educated workers (Heyen et al, 2020).
Job polarisation	<ul style="list-style-type: none"> Regions with carbon-intensive industries (European Commission, 2021c). Rural regions in the circular economy (Heyen et al, 2020). Regions with negative demographic trends (Pilati and Hunter, 2020). 	<ul style="list-style-type: none"> Those with low skills levels/potentially poor labour conditions in new sectors (Heyen et al, 2020). Women taking up precarious and low-paid jobs in the service sector (Walk et al, 2021). Groups not well integrated in the labour market (IRENA and ILO, 2021).
Maintaining welfare during the transition process	<ul style="list-style-type: none"> Regions experiencing degenerative processes, for example long-term structural unemployment, depopulation, poverty and ageing (Irimie et al, 2020). 	<ul style="list-style-type: none"> Potential to affect outlook for generations (Irimie et al, 2020). Groups affected by negative effects of carbon pricing (Oczkowska and Pellerin-Carlin, 2019).
Existing inequalities may be aggravated by measures to mitigate climate change	<ul style="list-style-type: none"> Regions with low development levels, for example poor industrial structure, lack of innovation capacity and a low level of social welfare provision (WWF, 2020). Rural and peri-urban areas⁵ with low-income levels (Eurofound, 2021). 	<ul style="list-style-type: none"> Households affected by negative distributional impacts (BusinessEurope, 2021; European Commission, 2021c). Groups in vulnerable situations most affected by climate change (Sovacool, 2021).
Opportunity	<ul style="list-style-type: none"> ‘Double dividend’ for regions of lower emissions and net increase in employment (European Commission, 2021c). Opportunity for more fundamental critique of socioeconomic systems at regional level (Kreinin, 2020). Employment gains from the shift to renewable energy, energy efficiency and circular economy sectors (Heyen et al, 2020; Rasmussen et al, 2021). 	<ul style="list-style-type: none"> Decrease in household energy bills (European Environment Agency (EEA) and Eurofound, 2021). Co-benefits (Rasmussen et al, 2021). Less risk from environmental hazards/better access to ecosystem services (Heyen et al, 2020).

Source: Authors’ own elaboration

⁵ Peri-urban areas can be described as rural-urban areas that are situated between the outer limits of cities and the rural environment.

Reskilling

The literature suggests that net job gains are expected from the transition to climate neutrality, as renewable energy and other green technologies, for example in the circular economy, create new employment opportunities (Heyen et al, 2020; IRENA and ILO, 2021). In case of mismatches in the labour market, that is, where the demand for workers cannot be met regionally, there is an increased need for labour migration and attracting workers from outside the region if skilling, reskilling and upskilling do not meet the needs of regions. However, the papers reviewed also highlight that proactive interventions for reskilling and searching for jobs will be needed to help affected workers enter new industries and jobs.

Older workers and those with low skills or cultural identities closely bound to a particular industry are expected to find it the hardest to accomplish this. The literature calls for a holistic approach, with close coordination among industry, government, and educational and training institutions and attention paid to individuals' unique characteristics (for more information, see FES and HBS, 2020; Heyen et al, 2020; Irimie et al, 2020; Norden, 2021).

Job polarisation

Changes in employment patterns, for instance job polarisation, are also highlighted. Structural unemployment in carbon-intensive regions, a rural/urban divide potentially emerging from new industries in the circular economy, wider demographic trends, low unionisation rates and pressure on labour conditions for lower-skilled workers are all seen to create a formidable challenge to a just transition (for more information, see Heyen et al, 2020; Pilati and Hunter, 2020; European Commission, 2021d; IRENA and ILO, 2021; Rasmussen et al, 2021; Walk et al, 2021).

Maintaining welfare during the transition process

Beyond creating new employment opportunities, maintaining welfare during the just transition emerges from the literature as a major challenge (BusinessEurope, 2021; Defard and Thalberg, 2022). The social and spatial effects of changing patterns of unemployment, different needs regarding reskilling and the broader distributional impacts of the transition to climate neutrality (for example, through the rising cost of living) are all identified as core areas for attention in seeking a just transition (Irimie et al, 2020; European Commission, 2021d).

Existing inequities may be aggravated by measures to mitigate climate change

The literature focuses particularly on the challenge of ensuring that measures to mitigate climate change deliver social fairness. The negative effect of many current climate policies is highlighted in the literature (BusinessEurope, 2021; European Commission, 2021d;

Gough, 2021). Many papers stress the need to carefully consider the distributional effects of such policies to secure acceptance of the transition (Heyen et al, 2020; EEA and Eurofound, 2021; Eurofound, 2021). These include, for instance, references to the need for upfront investments allowing consumers to take advantage of new climate-friendly technologies, such as renewable energy technologies (Heyen et al, 2020), and calls to consider that detrimental effects of climate change tend to be experienced more acutely by social groups in vulnerable situations (Sovacool, 2021). Different regional starting points are also identified as shaping socioeconomic outcomes for people in different regions (Heyen et al, 2020; Eurofound, 2021).

Opportunities

The literature identifies a key opportunity to deliver greater social fairness through the transition to climate neutrality, where economic restructuring, specific measures to mitigate climate change and fiscal tools are integrated carefully, with sensitivity to the particular challenges identified above (EEA and Eurofound, 2021; European Commission, 2021d; Rasmussen et al, 2021). Reducing the impact of environmental hazards on groups in vulnerable situations and providing better access to ecosystem services are singled out as co-benefits with the potential to improve individuals' health and well-being and deliver greater social fairness as a result of the transition (Heyen et al, 2020; European Commission, 2021d).

While some uncertainty remains regarding the precise patterns of jobs being lost and new jobs being created, net job gains and more diverse employment opportunities are expected to arise from growth in economic sectors that are conducive to the transition to a climate-neutral economy, that is, renewable energy, energy efficiency and the circular economy (Heyen et al, 2020; IRENA and ILO, 2021; Rasmussen et al, 2021).

The literature review also revealed a school of thought that offers a fundamental challenge to the common understanding of the just transition. Sources suggest that achieving fair outcomes in the transition will mean looking beyond just replacing carbon-intensive jobs (Rasmussen et al, 2021). Instead, they focus on sufficiency at a societal level with a fair distribution of resources as a core principle and call for a shift in the economic paradigm, including through the adoption of circular economy models. This would entail greater attention on sectors that provide the infrastructure of everyday life (for instance, utilities, infrastructure, public services, distribution systems and retail banking), which are estimated to already provide 40% of all jobs (Gough, 2021), and the careful management of resources, including waste streams. More far-reaching opportunities to achieve greater social fairness are identified through a fundamental challenge to the current production and consumption system as part of a broader socioecological transformation. This is based

on critiquing ‘the logic of the treadmill of production, productivism, and the work relation itself’ and ‘demanding a move towards prioritising care work and societally reproductive labour, including re-commoning’⁶ (Kreinin, 2020, p. 2). In this context, sufficiency at a societal level with a fair distribution of resources is seen as providing an opportunity to weaken the link between employment and meeting basic needs, including consumption, as a way of facilitating social inclusion. This is because a ‘needs-based economy’ would require the welfare state to have ‘much broader competencies and powers’, while social status would be secured through different means (Gough, 2021, p. 9).

Possible policy interventions: Considering actual or possible policy interventions to address job losses from the transition in a socially fair and just way revealed a strong focus on the nature, quality and source of reskilling interventions. The important role of the social partners in this was also emphasised (European Commission, 2021d). The state was found to have a key role in reskilling, for example in facilitating strategic skills-planning approaches, as an information provider and broker for reskilling and job transfer support, but also in regulating, shaping or even delivering the skills provision and combining it with welfare support (Heyen et al, 2020; Irimie et al, 2020; IRENA and ILO, 2021).

Examples of measures to address pre-existing inequities ranged from generic legislation, such as equal pay legislation or special provisions for carers in the workplace, to interventions designed to build a more diverse workforce. Compensation programmes that look beyond workers in the sectors that are most immediately affected by the transition were also called for, including programmes going beyond accessible reskilling programmes by also addressing underlying social fairness concerns and allocating resources according to need (IRENA and ILO, 2021; Walk et al, 2021).

Finally, as part of an approach providing universal basic services, meeting basic needs would be decoupled to a very large extent from an individual’s labour market position by extending these universal services to the housing, transport, healthcare and childcare sectors, among others. The approach amounts to ‘a proposal to safeguard and develop existing public services and to extend this model of provision into new areas’ (Gough, 2020, p. 1; for more information, also on overall issues with access to public services see Eurofound, 2020; Coote, 2021; Gould and Moore, 2021; Eurofound, 2022b). Indeed, universal basic services advocates see it as ‘more egalitarian and sustainable than Universal Basic Income (UBI)’, with a ‘stronger redistributive

performance and impact on income inequalities’ (Gough, 2021).

European-level perspectives in the workshops

The EU-level workshop participants thought that the negative impacts of climate change itself needed to be front and centre of welfare considerations and policy considerations towards 2050. Socioeconomic groups and regions in more vulnerable situations are likely to be most affected by these impacts. The negative effects on different socioeconomic groups should receive more attention in the policy debate to highlight that policy responses are needed to ensure protection from such hazards.

As a general principle, reducing the reliance on market-based allocation mechanisms in responding to climate change (for instance, use of the solidarity principle or private profit motives in the allocation of risks and rewards through insurance systems) was singled out as having a crucial impact on future outcomes for different socioeconomic groups.

Considering where **job losses** might occur, the participating workshop participants stressed that all sectors will be affected by the transition in one way or another. Reskilling and welfare policy interventions need to reach beyond immediately affected sectors, acknowledging the broader disruption of work biographies and the need for a strong generic safety net. Similarly, contributors identified the extent to which responsibility for reskilling is shared between governments, workers and employers as a key determinant of socially fair and just outcomes by 2050.

Regarding **changes in jobs and employment patterns**, contributors highlighted that underlying labour market mechanisms would play an important role in shaping outcomes for different groups. Further outsourcing and deregulation, for instance, could lead to deskilling; precarious work, with the erosion of working conditions; disruptions to working lives; and migration away from poorer regions. These were all seen as potential threats to the welfare and quality of life of socioeconomic groups at the lower end of the social hierarchy.

Skills and employment outcomes were also seen to depend on the specific direction of the industrial restructuring process. The growth of the circular and sharing economy, for instance, was seen to create more diverse job roles with skills requirements at different levels. Within-country and cross-border barriers to achieving a circular economy should be removed.

⁶ Re-commoning refers to the return to a collective organisation of use.

Further digitalisation, by contrast, was expected to exert pressure particularly on medium-skilled jobs. Only where reskilling initiatives were strategically integrated with industrial policies and investment decisions did contributors see socially fair and just outcomes as likely.

Greater **state responsibility for citizens' welfare** combined with a more decentralised economy and a focus on sufficiency shaping consumption patterns (for example, through 'sharing economy' models and increased reuse) were seen as potential facilitators of a better quality of life for many by 2050.

Mobility and housing were identified as two areas of basic human need with a considerable direct impact on climate change itself and the social fairness that can be achieved in the transition. They called for commensurate public investment and the adequate provision of public transport to achieve a just transition by 2050. Examples of the distributional effects of different climate change mitigation policies are also seen in the transport and housing sectors. For instance, leaving housing and transport provision and costs to be determined purely based on the interaction of demand and supply was seen to exacerbate challenges for both urban and rural areas and central and remote regions alike.

More generally speaking, ensuring that social fairness is in the design of all fiscal tools deployed in the context of the transition was seen as important. The distributional and wider social effects of any measures to support the move to carbon neutrality would always need to be actively considered in policy design to ensure that basic needs can be met in an affordable way. Carefully calibrated state intervention, for example through subsidies and regulations, was seen to be most likely to make use of potential synergies between climate change mitigation and health and well-being gains.

How lifestyles and consumption patterns will evolve by 2050 was also identified as having a major impact on welfare and fairness. High energy use, for instance, would exacerbate the negative effects of associated green policies (such as carbon and energy taxes resulting in higher energy prices). Participants also saw social inclusion as currently often being facilitated based on consumption choices (about travel and symbolic consumption,⁷ for instance). Without an integrated socioenvironmental perspective, taking account of and seeking to shape lifestyles and consumption choices, less affluent households would

be likely to sacrifice quality of life. However, concerns were also raised that a sufficiency route would require a degree of demand management, with the risk of political backlash to the transition to climate neutrality.

Regional perspectives on key challenges and opportunities

The regional workshops complemented this generic perspective with insights into how the socioeconomic impacts of the transition are likely to play out in different places.

Job losses and reskilling

Wielkopolska contributors had a strong focus on the question of how to navigate job losses and reskilling in coal production, a key sector in the region that was immediately affected by the shift away from fossil fuels. Contributors expressed doubts about whether the scale of job losses and reskilling needs could be addressed at all, particularly considering that many indirect jobs linked to the mining/lignite industry would be affected too. Workshop participants thought that there may be 'employment for a small group of specialists, but this will not compensate for unavoidable lay-offs'. Achieving the energy transition and implementing reskilling interventions equally successfully and simultaneously would be the greatest challenge to the region's future prosperity. Any delays could trigger a downward spiral, with people leaving the region rather than waiting until prospects improve. Contributors therefore saw a real risk that opposition to the transition might arise locally without strong tripartite agreements providing certainty for affected workers.

In both Wielkopolska and the South Aegean, the state's capacity to deliver reskilling was queried. Contributors from the South Aegean spoke of the importance of local education providers and infrastructure. In addition to upskilling and providing a wider range of vocational training opportunities, they stressed the importance of ensuring that continuous reskilling and lifelong learning programmes, with a focus on locally relevant transition skills, were made available in the region. For the costly process of reducing the environmental impacts of closing and flooding open mines in Wielkopolska to be delivered successfully, for instance, reskilling would need to respond to highly specific localised issues and needs. Across all three focus regions, contributors thought that where the provision of education and training was managed well, this would create opportunities for young people, in particular to prosper in new sectors and activities.

⁷ Symbolic consumption refers to the consumption of goods and services due to their symbolic values rather than their functional ones.

In Wielkopolska, managing cultural legacies from carbon-intensive activities was identified as a challenge. People's investment in a particular way of life in mining areas means that, beyond pure reskilling, 'social and professional activation, change of mentality, and inclusion in society' would need to be supported. Provisions would need to go beyond workers themselves and offer support for miners' families, adding to the overall cost of reskilling, supporting people into new sectors and occupations, and offering social protection for affected workers and their families in the interim. Going beyond the current European Social Fund arrangements, individual circumstances would need to be taken into account, for example by offering tailored bridging mechanisms into retirement for older workers. Appropriate levels of subsidy would need to be available to provide strong incentives and allow sufficient time for people to reskill and move into new jobs.

Reskilling efforts supporting a shift towards sufficiency with a fair distribution of resources as anticipated in Scenario 1 'All aboard the well-being transition' were generally considered positive but would require upfront investment and buy-in from the population at large. Contributors in the PACA region suggested that reskilling for new activities and sectors would create opportunities for diverse population groups. In order to deliver on innovative ways of meeting human needs under a sufficiency paradigm, from agriculture to reprocessing and technology R&D, new skills would be required across the board. Promoting the 'maker movement'⁸ with a focus on repair and maintenance in particular was said to create opportunities for relatively low-skilled jobs.

Job polarisation

Wielkopolska stakeholders expressed concerns that workers in the coal industry might have unrealistic expectations regarding severance payments, while public investment in the creation of like-for-like jobs was expected to be prohibitive in terms of cost per job. New jobs would therefore need to be created through entrepreneurship. These jobs might not have similar pay and conditions to those in the coal-mining industry.

Contributors from the South Aegean were concerned that green jobs might not be accessible to unskilled workers, that employers might generate the funds necessary for the transition by lowering wages and livelihoods, and that the livelihoods of elderly workers in particular might be affected by their inability to invest (in new fishing boats, for example) to keep up with developments in the transition.

With relatively high levels of existing inequality, in the PACA region job shortages and increased job competition were expected to affect low-skilled and migrant workers in particular. And yet more migrants, particularly climate migrants, might arrive in the region in the years up to 2030 and 2050. Contributors therefore called for strong support for workers in securing appropriate working conditions (including protection from the effects of climate change and assistance in navigating new working practices) and fair pay, combined with job and competency planning at regional level (including provision for people in vulnerable situations to acquire the skills required to play an active role in the transition).

With regard to remote working, PACA stakeholders thought that the potential to create new opportunities for graduate and skilled workers needed to be considered in conjunction with a risk of deteriorating working conditions (for instance, increasing workloads, with associated psychological and social risks). Health at work, including mental health, would need to be an important focus to secure socially fair and just outcomes of the transition to climate neutrality.

Maintaining welfare and social fairness

Across the three focus regions, securing individual welfare emerged as a central feature of any just transition effort. In the South Aegean, pre-existing issues were all feared to come under further pressure if energy costs were to rise. These include limited transport opportunities, particularly for groups in vulnerable situations, with the resulting isolation of many islands; highly seasonal and often precarious jobs with poor conditions, particularly for young and migrant workers; and deficiencies in healthcare structures. At the same time, investing in key services, from health to education and utilities, was seen as a way for new kinds of professions to emerge, offering 'year-round green jobs for young people and, ultimately, a less lopsided age structure'.

Strong welfare provision would be important to avoid a 'vicious downward cycle' of environmental degradation and economic decline combined with limited access to new green technologies for an ageing population and deteriorating public services eroding opportunities and residents' welfare. Accelerated by the pandemic, young people have already started to leave, leading to rapid ageing on the South Aegean islands and a significant psychological toll on those who remain.

⁸ The 'maker movement' refers to an individual's ability to create and market products that are recreated and assembled from other discarded or broken products.

Wielkopolska contributors echoed concerns about a downward spiral if the region began to be perceived as ‘an area where something is coming to an end’. Hopes for opportunities to earn ‘decent wages in forward-looking industries’ in Wielkopolska were tainted with concerns about the complexity of the transition process and a high risk of people falling through the net: ‘During the transition everyone is vulnerable’. Older workers might lose out on pension rights, youth unemployment might be exacerbated, and inhabitants of more peripheral and post-mining areas might find themselves excluded from the labour market in other parts of the region.

South Aegean contributors thought quality of life could not be maintained by relying purely on market-based mechanisms of demand and supply, calling for greater state responsibility for citizens’ welfare. Subsidies and regulations would be needed to deliver, for example, sustainable transport and housing solutions, and ensure adequate medical care and educational provision. Without public intervention, new opportunities would be privatised and benefit only a small group of people.

Participants at the Wielkopolska workshop were concerned that the public budget shrinking, as a result of the industrial restructuring process (for instance, due to the loss of mining concessions and income from taxes) might prevent the required overhaul of the entire public services and welfare system and the required future-proofing of tax incomes.

Contributors across the three regions identified that a better quality of life could be ensured through lowering pollution, improving the health of the population and achieving an overall shift towards a focus on well-being as a potential opportunity from the transition. In Wielkopolska, flooding disused coal pits to create lakes, for instance, could improve the local environment,

delivering benefits for the local population, attracting new residents and strengthening the touristic qualities of the area. However, contributors in PACA emphasised that groups in vulnerable situations would need protection from the effects of climate change itself.

The risk of inequities being heightened through the transition was prominent in PACA. New agricultural practices, for instance, would also need to improve regional food resilience and access to healthy food for all. The risk of energy poverty and higher mobility costs among those on low incomes who, crowded out of the housing market in more central locations, have to travel to work, was also prominent. For Marseille, for instance, with one of the highest poverty rates in Europe, this prompted the question of how these groups can be included in the ecological transition when their basic needs are not met. A squeeze on purchasing power was seen as a potential stimulus for social unrest, which would ultimately endanger the transition as a whole. Avoiding an erosion of purchasing power and ensuring a strong emphasis on social inclusion were seen as essential. Other examples of potential causes of social unrest include owner-occupiers unable to retrofit their homes to make them more energy efficient or suffering catastrophic loss of value of properties affected by flooding or erosion, which could severely damage personal finances, including retirement arrangements.

Regional planning was seen as key to addressing some of those issues. Beyond direct support for the employment, mobility, housing and health needs of people in vulnerable situations throughout the transition, participants in PACA thought that more socially fair and credible alternatives to current models of provision in these areas should also be promoted, for example alternatives to detached, single-family housing or active travel modes, such as walking or cycling and public transport use.

Theme 2: Refocusing economic development

Key insights

Literature highlights

- Innovation, in particular innovation with sustainability objectives, plays a key role in the just transition. This is challenging in regions with relatively weak innovation systems. Broad civil society and social partner engagement should be ensured.
- In regions with limited capacity to engage with complex financial instruments, a new more localised economy adopting circular economy principles can draw on regional assets to reduce environmental degradation and pollution, for example, by ensuring more intact ecosystems and the use of safer products with less toxins.
- At the same time, there must be adequate scope for social innovation, rather than business-led technological innovation, and economic diversification will be needed to ensure that opportunities are created for socioeconomic groups in different circumstances and with different assets.

Suggestions from stakeholders in the workshops

- A continued focus on reshaping financial markets and holding private investment to account from a public good perspective is essential in directing funding towards sustainable investments.
- Overall strategic coherence of transition management throughout the EU will be needed to avoid ‘the slow death of old industries’ and a race to the bottom for European regions.
- When refocusing economic development, there is a clear need to look beyond immediately affected sectors and ideally to fundamentally change the industrial production system by leveraging entrepreneurship and sharing data and social innovations in the areas of consumption (a change in diets, for instance) and production (for example, new multi-stakeholder business models and new concepts of economic value generation).
- New economic opportunities from the transition need to be made accessible to all. This can be achieved by strengthening consistent collective worker representation, including for new settings and forms of work, and actively shaping consumption choices to align with new economic models.
- Trust-based relationships between populations, governance organisations and the private sector will need to be nurtured to mobilise all available regional assets and leverage regional innovation systems to deliver economic diversification.

Insights from the literature review

This section provides an overview of key issues regarding Theme 2 (Refocusing economic development) that emerged from the literature review (Table 4), before considering them in more detail.

Industrial restructuring that achieves or retains economic prosperity in a climate-neutral world emerges from the literature review as a key challenge at the heart of the transition to climate neutrality. This translates into a challenge for regions to orchestrate coherent investment in new economic activities, in skills and talents, and in research and innovation (Irimie et al, 2020).

Leveraging innovation

The literature attributes particular importance to the role of innovation in achieving a just transition. Innovation capacity as a means to secure greater diversification is identified as a key requirement for a successful transition at regional level. Several sources point out that this poses a particular challenge to regions with relatively weak innovation systems, which is often the case in carbon-intensive regions (European

Commission, 2020b; Irimie et al, 2020; Pilati and Hunter, 2020; Heyen et al, 2021).

Leveraging mission-driven innovation is a key tool in the transition towards climate neutrality (Norden, 2021), but securing competitiveness through the commercialisation and deployment of new technologies and delivering socially fair and just outcomes are formidable challenges for regions (European Commission, 2020b; BusinessEurope, 2021). Providing the scope for experimentation with technological and social innovations with the potential to trigger alternative ways of thinking and living, while managing the associated trade-offs and conflicts, is essential for a successful transition (European Commission, 2020b; EEA and Eurofound, 2021; Ludden et al, 2021; Walk et al, 2021). Social innovation has also been identified as a potential enabler in this context, with benefits especially for citizens, who gain more power and influence through such processes (Filho et al, 2021). However, a number of barriers prevent an increase in the roll-out of social innovation in the sustainability context, such as ‘the lack of funding resources and related instruments, the large

Table 4: Overview of identified socioeconomic impacts on regions and population groups under Theme 2: Refocusing economic development

Challenge	Regions	Groups
Leveraging innovation	<ul style="list-style-type: none"> ‘Lagging’ regions in the Cohesion Policy context (European Commission, 2020b). Regions that lack diversification and have limited capacity for innovation (Heyen et al, 2021). Regions most affected by the phasing out of carbon-intensive activities (Irimie et al, 2020). 	<ul style="list-style-type: none"> Those with limited financial capacity and therefore unable to influence investment decisions and innovation trajectories (Walk et al, 2021). Those affected by trade-offs in relation to behavioural changes required, for example for greater energy sufficiency (Ludden et al, 2021).
Investment	<ul style="list-style-type: none"> Regions with low productivity, limited exports, sectors losing competitiveness and/or investment capacity gaps (Irimie et al, 2020; Pilati and Hunter, 2020; BusinessEurope, 2021). Regions with difficult industrial legacies (WWF, 2020). 	<ul style="list-style-type: none"> Small and medium-sized enterprises and start-ups lacking access to private capital (Norden, 2021).
Digital convergence	<ul style="list-style-type: none"> Regions with poor digital infrastructure (Pilati and Hunter, 2020). Regions with weak innovation systems (Norden, 2021). 	<ul style="list-style-type: none"> Individuals with a lack of digital skills (educational gap) (Heyen et al, 2020). Ageing workforce that may be disadvantaged by demand for digital skills (Heyen et al, 2020).
Adopting a systemic perspective	<ul style="list-style-type: none"> Regions adopting short-termism (Hafner et al, 2020, pp. 35–36). Regions affected by higher production costs (Heyen et al, 2020). 	<ul style="list-style-type: none"> Low-income groups affected by reduced purchasing power (Heyen et al, 2021). Groups affected by reduced social inclusion (for example, through lower affordability of resource-intensive goods such as those associated with travel and symbolic consumption) (Heyen et al, 2021).
Opportunities	<ul style="list-style-type: none"> Regions exporting green technologies (BusinessEurope, 2021). Regions taking advantage of localised supply chains/a circular economy (IRENA and ILO, 2021; Ludden et al, 2021; Heyen et al, 2021). 	<ul style="list-style-type: none"> More groups in vulnerable situations are less exposed to environmental hazards and have more equal access to ecosystem services (Heyen et al, 2020).

Source: Authors’ own elaboration

administrative and bureaucratic requirements, a lack of strong political support, and the absence of an overarching definition regarding social innovation’ (Filho et al, 2021).

Securing financial resources for investment

Securing the investment necessary for extensive economic restructuring is another main challenge identified. Not least as a result of policy uncertainty, the financial system is described as still adhering to short-termism (Hafner et al, 2020; Norden, 2021). And yet access to private capital is seen to underpin the very innovation dynamics required to successfully navigate the transition. The existing industrial and productivity profiles of regions, their integration into national and international value chains, and any challenging elements of legacies from previous industrial activities all affect their ability to attract private investment (for more information, see Pilati and Hunter, 2020; WWF, 2020; BusinessEurope, 2021; Philip et al, 2021).

Maintaining adequate public investment in infrastructure and services for citizens where economic restructuring as a result of the move away from carbon-intensive

activities may put pressure on public finances creates a further challenge to achieving the flow of investments required to secure a just transition (Heyen et al, 2020; Irimie et al, 2020). The need to engage with complex financial instruments linked to national and European support programmes where capacity is lacking and specifically a reliance on incentivising private investment that is built into the Just Transition Framework are seen to have the potential to further aggravate the resulting inequities between regions (Pilati and Hunter, 2020; Euractiv, 2021).

Digital convergence

Many question marks remain over the role of digital convergence in achieving a just transition (for more information, see European Commission, 2019; EEA, 2020a). To begin with, providing the necessary infrastructure and training, and fairly allocating the associated infrastructure costs will be difficult (Pilati and Hunter, 2020). The main challenge, however, relates to developing the kinds of digital business models that can help reshape work and entrepreneurship. Lagging regions are described as facing an uphill struggle in overcoming existing disparities to achieve this (Heyen et al, 2020; Norden, 2021).

Adopting a systemic perspective

Economic development policies at regional level require a carefully managed and transparent transition process in order to avoid becoming locked in a direction that might prevent them from taking advantage of new technologies and sectors (WWF, 2020). Adopting a systemic perspective is necessary to anticipate and accommodate the longer-term effects of climate change on productivity, output and economic growth (Philip et al, 2021). The literature highlights the need for a significant and multidimensional transition programme encompassing legal and technical developments, employment, infrastructure, capacity, skills and expertise, and culture (for further information, see Hickel and Kallis, 2019; Heyen et al, 2020; Pilati and Hunter, 2020; BusinessEurope, 2021; IRENA and ILO, 2021).

Several sources highlight that alongside deploying conventional economic instruments, more systemic change is needed. This will depend on the effective use of a broader policy mix to enable the kind of innovation and experimentation that can produce beneficial and fair outcomes of deeper change in current production and consumption systems. With sustainability as the guiding principle, the literature calls for measures that look beyond headline climate and energy issues and their immediate effects on the fossil fuel and manufacturing industries, to factor in other areas such as agriculture and fisheries (for further information, see Irimie et al, 2020; EEA and Eurofound, 2021; Heyen et al, 2021). The link to changing lifestyles is also highlighted as part of a socioecological transformation (Kreinin, 2020; see Theme 1 (securing livelihoods, welfare and fairness)).

Opportunities

The literature review suggests that the manifold challenges identified in relation to economic restructuring can potentially be turned into an opportunity. New sectors and markets are expected to work in favour of EU exports, for example with green technologies (BusinessEurope, 2021). Similarly, the localisation of supply chains is seen to offer opportunities, for instance for infrastructure services but also for entirely new business models serving the circular economy (IRENA and ILO, 2021). If these opportunities are identified and seized effectively, it is suggested that all regions, including those with a difficult legacy from carbon-intensive industries, stand to benefit from them (Heyen et al, 2020, 2021). Taken together, these opportunities are seen as having the potential to generate tangible benefits through reducing environmental degradation and pollution,

reducing inequalities in the distribution of environmental hazards, improving access to intact ecosystems and their services (food, clean air, water, climate stability, and so on), and improving the safety of products (Heyen et al, 2020).

Possible policy interventions: In terms of policy interventions deployed so far, the literature review identified a strong focus on stimulating, encouraging and enabling economic diversification. Public authorities leveraging proactive industrial policies to embed future-proof economic activities in regions is particularly prominent in the literature. The tools used have included subsidies and the fostering of local supply chains, for example through the use of procurement legislation and an innovation systems approach to create a comprehensive approach that would deliver a competitive advantage, and a parallel reskilling drive to serve new economic activities and sectors. Specific mechanisms discussed in the literature also included examples of renewable energy companies committing to community investments to stimulate, for instance, sustainable tourism activities (for further information, see Heyen et al, 2020; Irimie et al, 2020; IRENA and ILO, 2021; Norden, 2021; Rasmussen et al, 2021).

Targeted strategies to maximise the value of existing industrial assets, for example establishing science and technology parks in heavy industry sites, are also identified in the literature. The Eden Project in Cornwall and the cultural rebranding of the Ruhr region in Germany are prominent examples of projects with a strong tourism focus with the same goal of maximising the value of outdated industrial assets (Heyen et al, 2020; Irimie et al, 2020). Going one step further, there are examples of partnerships between anchor companies, private investors and trade unions working to capitalise on policies promoting renewable energy generation to proactively convert outdated economic activities into activities that draw on similar resources, for example a pulp and paper plant being converted into a biogas refinery.

Looking ahead to potential additional policy interventions, the literature included suggestions to put a much stronger emphasis on reskilling and educational opportunities that integrate digital and green skills (Norden, 2021; Dwivedi et al, 2022). More radically, there were also calls for more active EU involvement in mitigating transition discrepancies between Member States to address a perceived overreliance on private investment, and to align trade and foreign policy with climate diplomacy to secure a transition reach beyond the EU itself (Philip et al, 2021).

European-level perspectives in the workshops

The EU-level workshop participants provided the following insights with regard to anticipated effects on and key levers to shape socioeconomic outcomes.

Investment flows were seen as key in ultimately determining outcomes of industrial restructuring for different regions and their populations. A systemic lens would therefore need to be adopted in particular for the assessment of returns on any investments, for example considering not purely financial returns but also social and environmental ones. The contributing experts thought it paramount for policy interventions to continue to focus on reshaping financial markets, for example further refining and reinforcing the European taxonomy for sustainable activities⁹ to direct funding towards sustainable investments.

Patterns in the ownership of natural assets and the relative emphasis on productivity gains in the short to medium were seen as key determinants of private investment flows. Influencing both of these would therefore need to be an important policy focus. Similarly, the extent to which industrial policy adopted a forward-looking perspective extending to sectors that will only indirectly be affected by the transition was seen as crucially important.

The discussions highlighted that if innovation was to remain largely market-mediated, in 2050 commercial value would continue to be prioritised over delivering solutions to meet societal needs. This would require substantial ongoing public investment in research, while more diverse opportunities to generate value, leveraging technologies and social innovation to address key threats of climate change, were likely to be forgone. Changing the dynamics driving innovation in policy and practice would therefore be paramount.

Regarding potential policy initiatives to shape the fortunes and locations of different sectors as a result of the transition, it was suggested that developing a much more detailed understanding of the dynamics driving such processes would be required. Specific elements that were discussed in this respect included the nature and availability of raw materials, the potential threats of cheap imports, the effects of different types of subsidies on industrial change, the competitive dynamics between different regions and migration flows triggered through phasing out carbon-intensive industrial activities. The call to action in this respect included a focus on the need to query underlying assumptions.

An integrated European perspective that considers uncertainties, synergies and trade-offs across European regions was seen by the EU-level workshop participants to have an important role in shaping the overall strategic coherence of transition management towards 2050, for example avoiding ‘the slow death of old industries’ and capitalising on reshoring key industries. Supporting the increasing localisation of supply chains by strengthening regional production systems, including a focus on the circular economy, was also seen as an important lever. The EU-level workshop participants involved stressed that the extensive multilevel negotiations across regions and Member States required for such strategic coherence would be very resource intensive, placing a considerable burden on regional governance systems. Without them, however, contributors feared that the transition would potentially lead to a ‘race to the bottom’ for European regions.

Regional perspectives on key challenges and opportunities

Industrial restructuring and economic renewal

The South Aegean and Wielkopolska provide powerful examples of how a ‘business as usual’ attitude can hold back the industrial restructuring required for a successful regional transition. In the South Aegean, tourism, as a profitable monolithic industry contributing 95% of GDP in the region and with an important role in the Greek economy as a whole, was the main focus. However, the ‘blue economy’, which refers to sustainable use of ocean resources for economic growth, was not mentioned by workshop participants even though it was identified as a potential area for development for the islands. According to the World Bank, the blue economy is the ‘sustainable use of ocean resources for economic growth, improved livelihoods, and jobs while preserving the health of ocean ecosystem.’

In Wielkopolska, an early mover in phasing out coal, the policy and investment focus on the coal-mining area of the region was seen as insufficient. Other industries – equally affected by the transition to climate neutrality – might be ignored and lag behind. This was seen as a ‘mentality problem’ blinding people to the role of new, more modern, sustainable ventures (small and medium-sized enterprises (SMEs)) that might need only a small amount of support to grow. Doubts were expressed about whether the current business community – largely focused on serving the needs of

⁹ The European taxonomy for sustainable activities is a European Commission classification system designed to direct investments towards sustainable projects and activities (European Commission, undated-c).

mine operators – would be able to pull its weight in renewable energy-led economic renewal, for example in the hydrogen industry, identified as having potential in the region.

In PACA, the sheer scale of change needed, particularly in the petrochemical industry, was acknowledged. SMEs in particular would struggle to adapt, because they lack the means to invest, developing renewable energy (including solar, wind, biomass, geothermal) would be challenging and changing tourism practices (as part of climate change adaptation) would require attention. Discussions on this topic, however, focused primarily on the need to fundamentally ‘change the industrial production system’, for example by boosting carbon sequestration in soils and biomass with appropriate attention paid to different parts of the region: major cities, rural and alpine territories that are difficult to access, and the strongly dependent Corsica.

Innovation and entrepreneurship

For Wielkopolska, the low level of entrepreneurship – individuals establishing a business and existing businesses’ propensity to invest – was identified as an obstacle to a circular economy, owing to its need for new materials and design methods. Insufficient R&D capacity was identified as a key stumbling block for economic renewal and the development of new industries for a zero-carbon resource-efficient economy (for example, logistics, energy, agriculture and healthy food, tourism and leisure industries). A focus on small-scale renewable energy investments was seen as a way to promote local entrepreneurship and wealth creation and stimulate investment in ‘more innovation activity, more research, [and] more interesting jobs’. To enable this, for example for hydrogen technologies as an existing early transition investment in the region, investment along the whole R&D and innovation pipeline and supply chain development support would need to be secured, to demonstrate locally that this is a viable option for the energy transition.

Contributors in Wielkopolska called for an approach that looks beyond ‘business as usual’, that is, beyond individual industries, focusing instead on wholesale economic renewal and moving away from traditional economic policy approaches and towards more systemic perspectives. This should include providing accessible support for businesses to navigate the transition, promoting and enabling innovation and entrepreneurship, reskilling to encourage a culture of entrepreneurship (including through subsidies), providing support for diverse population groups with the aim of creating new enterprises, and increasing and improving governance capacities through upskilling.

Barriers to the sharing of data (for instance, relating to the energy profiles of different islands and the associated viability of different renewable energy

sources) were highlighted by a contributor from the South Aegean as hampering investment. This illustrates the need for a shared public and private sector commitment to directional innovation. Workshop participants thought that carefully integrating market forces, implementing targeted public interventions and conducting appropriate regulation would be key in exploiting important natural assets to develop new sources of income. These would need to be carried out with a social innovation perspective, that is, by considering ways of delivering the necessary behaviour change. Showcasing potential benefits to local people by enabling innovative pilot projects (such as mobile marinas supplying electricity to local residents) would be key in achieving carbon-neutral ways of living and economic renewal. In selecting and designing such pilot projects, the ‘focus should rest on longer-term profits for the community rather than private and/or short-term benefits’.

Social innovation (rather than business-led technological innovation, which might be taken as a given in a highly diversified industrial region) took centre stage in PACA. Innovation in industries interacting directly with ecosystem services – food, agriculture and land management – were brought to the fore here. Workshop participants, for instance, acknowledged the need to change diets in order to steer agricultural practices in a new direction and reduce the impact of agricultural land use. New agricultural models should look beyond agricultural yield to consider a wider range of outputs. Reintroducing local production networks with short supply chains and greater food autonomy were seen as key in equipping the region for a just transition.

Investment

Across the three regions, access to investment to underpin the transition in different industries was a key concern. PACA contributors thought that investments by the regional authorities would be needed to drive an innovation dynamic for a just transition. While providing access to investment, a new risk culture in businesses would need to be nurtured, one that adequately considers the risks of climate change itself – to businesses’ activities and to citizens – and gives SMEs in particular agency to make appropriate choices.

In Wielkopolska, European funding through the Just Transition Fund was identified as an opportunity to invest in ‘the new economy’. ‘If used appropriately’, participants thought that it could ‘kick-start the circular economy’ and diversify the regional economy to make it more robust. Backing a hydrogen hub on the former site of the lignite mine in Konin, for instance, was seen as a key step. All public economic development funding – European, national, regional and local – would need to be geared towards ‘stimulating a whole innovation ecosystem to foster new opportunities’.

South Aegean workshop participants highlighted that much-needed private investment would have to be facilitated (for example, to provide information on green opportunities, such as data on the energy profiles of all the islands) and that investors would need to be held to account with regard to their providing a public benefit (for instance, foreign investments would need to contribute to improving sustainable infrastructure and protecting workers' rights through collective labour agreements).

In Wielkopolska, workshop participants expressed their suspicion regarding corporate motives and decisions. Would they simply 'take the money and run'? 'Are power companies really prepared to keep investing in the region, or will they pocket the money for the closures and move elsewhere?'. Would they see this as 'an opportunity to introduce automation and job losses?'. This echoed the problematisation of groups with 'vested interests' in the South Aegean, which were regarded as too influential in transition planning, as they advocate for specific business or sectoral interests. New modes and skills in governance entities for dealing with such groups will be needed, including wider participation approaches to transition planning.

Adopting a systemic perspective

Adopting the systemic perspective required to make strategic investments in economic renewal was seen to be beset by a number of issues. To begin with, Wielkopolska contributors thought that where established jobs fell away during the transition citizens would have less disposable income, with repercussions for local businesses and the potential to create a cycle of decline. Suggesting that the current use of coal as a stopgap for gas (with coal production currently increasing in Poland) was sending conflicting signals

provided an example where short-term considerations too often outweighed long-term investment choices (in this case, energy independence potentially preventing the closure of coal mines), jeopardising a systemic approach.

'A fundamental rethink of life on the islands', generating co-benefits to stimulate fundamental change, was called for in the South Aegean, 'moving away from seeing nature as a commodity and instead enabling equitable access to nature, for both budget tourists and all citizens'. In PACA, a fundamental shift in the underlying economic models was seen as a key opportunity for the region. Contributors suggested that a new economic development policy prioritising the use of locally recycled and locally sourced biomaterials (as anticipated in circular economy models), together with food autonomy bringing security to inhabitants, could lead to sufficiency with a fair distribution of resources emerging as the new trend in the region. This would create an opportunity for existing manufacturing industries to transform and new sectors to emerge. Adopting a mantra of constantly innovating by applying 'no regret solutions'¹⁰ while using integrated accounting and impact assessments to understand what is being achieved was seen as key to making the most of this opportunity.

A move towards a societal sufficiency mindset, with low-tech and nature-based solutions replacing high-tech approaches, was also seen to improve the affordability of the transition, enabling people in precarious situations to partake on a more equal footing. The important role of lifestyles and cultures and the challenge to the role of employment as the only route to secure livelihoods, as embedded in the scenario analyses, are implicit in these considerations.

¹⁰ 'No regret solutions' are cost-effective measures that are consistent with addressing risks of climate change and do not create any hard trade-offs with other policy objectives. The measures can be implemented in a precautionary way even though there is no certainty about the future of climate change.

Theme 3: Renewing infrastructure

Key insights

Literature highlights

- Improving infrastructure emerges as a key tool to deliver just outcomes for different socioeconomic groups from the just transition.
- Citizen engagement is key to achieving the potential benefits of the infrastructure renewal process, including improved public health and well-being.
- Infrastructure renewal holds the promise of job creation, and new types of infrastructure can contribute to social inclusion. But declining tax revenues pose particular challenges for infrastructure renewal in regions affected by the phasing out of carbon-intensive industries.
- New ways of delivering infrastructure-based services include approaches informed by universal basic services thinking or prosumer models.¹¹

Suggestions from stakeholders in the workshops

- Infrastructure renewal is a foundation of industrial restructuring, but it must be responsive to specific regional circumstances and may have to overcome local opposition.
- Ensuring socially fair and just access to infrastructure for basic needs (such as housing, transport and digital connectivity) is a key prerequisite for the realisation of wider transition opportunities.
- Necessary investment and governance capacity need to be nurtured to enable all European regions to deliver appropriate infrastructure solutions to their citizens, including leveraging community wealth-building solutions to garner support.

Insights from the literature review

This section provides an overview of key issues regarding Theme 3 (Renewing infrastructure) that emerged from the literature review (Table 5), before considering them in more detail.

Adapting, replacing and developing new infrastructure

The built environment is seen as an example of when infrastructure renewal, required for the transition to carbon neutrality, can create unfair social outcomes, for instance gentrification introduced on the back of energy

Table 5: Overview of identified socioeconomic impacts on regions and population groups under Theme 3: Renewing infrastructure

Challenge	Regions	Groups
Adapting, replacing and developing new infrastructure	<ul style="list-style-type: none"> Regions unable to raise capital (Hafner et al, 2020). Regions affected by declining tax revenues (Heyen et al, 2020). Regions with limited planning and implementation capacities (Luderer et al, 2021). 	<ul style="list-style-type: none"> Lower-income residents are pushed out of city centres by renovations¹² (Rasmussen et al, 2021). Low-income groups lack the opportunity to become energy prosumers (because they have no spare resources for energy investments) (EEA, 2022a).
Opportunity	<ul style="list-style-type: none"> Potential job creation through investments in infrastructure updates (Heyen et al, 2021). Improved social inclusion for citizens through improving access to green spaces and public services such as transport (Heyen et al, 2021). 	<ul style="list-style-type: none"> Improved public health and well-being (Rasmussen et al, 2021). Improved social inclusion and health benefits (Heyen et al, 2020).

Source: Authors' own elaboration

11 Prosumer models are characterised by actors who both consume and produce renewable energy, for example households connected with solar, storage or smart management systems.

12 Renovictions refers to the eviction of all of a building's tenants on the grounds that a large-scale renovation is planned.

renovations and changing property values in city centres in response to the desirability of low-carbon lifestyles (Rasmussen et al, 2021). In addition, there is a risk that decreasing tax receipts through economic restructuring may affect existing public infrastructure in the areas of transport, education and leisure (Heyen et al, 2020; Pilati and Hunter, 2020).

From an economic development perspective, lagging regions (regions where development levels are significantly lower than the EU average) may not be equipped to deliver the required rapid planning and implementation of infrastructure renewal. Investment is again seen as a particular bottleneck for renewable energy infrastructure. This has the potential to create a divide between richer western European countries and their neighbours in central and eastern Europe with a remaining strong dependence on coal (Hafner et al, 2020; Euractiv, 2021; Luderer et al, 2021).

Opportunities

In terms of opportunities, improving public health and well-being is identified as a benefit of successful infrastructure renewal, for example through building more energy-efficient housing; creating urban green spaces; reclaiming land from carbon-intensive activities, facilitating social interaction and leisure; and ultimately contributing to social inclusion and wider ecosystem health, which would reduce the detrimental effects, for example, of pesticides (Heyen et al, 2020; Ludden et al, 2021; Rasmussen et al, 2021). Investments in infrastructure and skills can also prevent accelerated rural-urban migration and boost food security by furthering opportunities in agriculture (FES and HBS, 2020).

Possible policy interventions: Examples of policy interventions related to infrastructure renewal found in the literature review were associated with a continuum of measures, starting with ensuring that social fairness is considered in planning and delivering infrastructure renewal, but also covering stronger measures to ensure that vulnerable social groups will benefit from investment in infrastructure projects (EEA, 2020b, 2022b). Ensuring social fairness in the planning and delivering of infrastructure renewal involved both legislation and direct citizen involvement in an inclusive design process. Ensuring that vulnerable social groups benefit from infrastructure projects related, for instance, to innovative programmes combining funding for energy efficiency measures with extensive targeted outreach programmes to reach groups in the most vulnerable situations (Heyen et al, 2020; IRENA and ILO, 2021; Rasmussen et al, 2021; Defard and Thalberg, 2022). In addition, effects of an increase in low-paid work and problematic conditions for migrant workers emerging from growth in the construction sector will need to be considered and incentives increased to

ensure good working conditions (Rasmussen et al, 2021). There is also a call for migration policy to be linked with transition planning to address expected increase in labour migration (Eurofound, 2021).

The universal basic services approach identified in relation to welfare also extends to infrastructure renewal, with calls in the literature to deliver infrastructure services as public goods, for example free public transport, and for investment in active travel (such as public transport, and walking and cycling routes). In relation to housing in particular, examples discussed in the literature included a community wealth-building element, for instance backing community land trusts to develop (partially) community-owned, green affordable housing and preserve community land ownership, and prosumer models whereby individuals or groups of consumers generate their own renewable energy (EEA and Eurofound, 2021; Rasmussen et al, 2021; EEA, 2022a).

European-level perspectives on the scenario dynamics

EU-level workshop participants at the workshops and in interviews did not place a strong emphasis on the implications of the three scenarios for infrastructure renewal.

However, against a backdrop of digitalisation being seen as an essential ingredient of the transition towards climate neutrality, internet connectivity and digital skills were seen as the ‘other side of the coin’ of mobility, with a key role to play in equalising opportunities between regions and populations.

Regional perspectives on key challenges and opportunities

Industrial restructuring and economic renewal

The prominent role that infrastructure played in discussions with South Aegean contributors illustrates how important infrastructure renewal is for the process of industrial restructuring and economic renewal. Workshop participants pointed out how rising costs of fossil fuels have the potential to undermine the current economic model, which relies heavily on the viability of existing connections for tourism and the provisioning of island residents. And yet the very nature of the landscape poses technical challenges and requires substantial investment in new infrastructure, for example for renewable energy. This is likely to be replicated in other remote areas with similar geographical peculiarities. Against this backdrop, EU support for the development of decentralised energy infrastructure and digital infrastructure (such as broadband coverage) throughout its territory was identified as important by workshop participants in the South Aegean.

A 'not in my back yard' effect was seen as creating further obstacles to the creation of the infrastructure required for the South Aegean not to be left behind (such as charging points for electric yachts to avoid sustainably minded tourists being drawn to France or Italy instead). Participants saw this as a result of a lack of public debate about the essential need to embark on the transition to renewable energy. And yet participants saw an opportunity to 'leapfrog' straight to new forms of decentralised utility (electricity, water, health and transport) provision. Smaller-scale solutions, adapted to 'the unique characteristics of each island', could take advantage of state-of-the-art technologies.

New energy infrastructure

With regard to the complexities involved in developing new energy infrastructure (for instance, replicating the current integration of electricity, heat and gas with residual heat from power generation used for district heating), contributors in Wielkopolska highlighted potential risks regarding the accessibility and affordability of renewable energy. A lack of knowledge of alternative energy technologies (such as green hydrogen technology) and disposable income for upfront investment in new equipment needed might be obstacles to people adopting new technologies.

Combined with energy generators' priorities around profitability, this might lead to inflated energy costs for consumers. Active energy sector integration was therefore called for, for example through the establishment of a collaboration platform for cross-sectoral discussions on price setting or appropriate volumes for energy crop farming.

In Wielkopolska, getting decentralised renewable energy infrastructure right was also seen as having a potential knock-on effect on people's attitudes. Among citizens, achieving a degree of self-sufficiency in this way and actively contributing to the transition to climate neutrality would generate a sense of being 'a link in the chain', thus resulting in more positive perceptions of the transition to climate neutrality.

Public welfare and social fairness

In PACA, contributors focused primarily on the role of infrastructure in improving public welfare and social fairness. A current lack of access to public transport and digital connectivity, for people outside the main urban centres was seen as a key issue in achieving a just transition. Contributors thought that the need to reconcile social inclusion with environmental concerns was not yet considered in decision-making. One participant mentioned the construction of a bypass around Arles as an example where 'rather than rethinking intraregional transport, more natural spaces are being destroyed'.

Theme 4: Enabling systemic change in European regions

Key insights

Literature highlights

- Effective compensation mechanisms between European regions may be needed in the short term but integrated territorial strategies for a broader sustainability transition must be the long-term goal.
- Effective multilevel governance requires investment in capacity development down to regional and local community levels.
- An integrated evidence base drawing on social, economic and environmental data can help to facilitate long-term systemic change through a reconfiguration of wider production and consumption systems.
- Strengthening mechanisms for continuous social dialogue and institutionalising broad civil society engagement will be crucial in navigating conflict, as will reconfiguring institutionalised power relationships between the state, the corporate sector, trade unions and citizens to make them more conducive to a just transition.
- The specifics of regional socioeconomic systems and patterns of disadvantage between different socioeconomic groups need to be considered.

Suggestions from stakeholders in the workshops

- Regions suffering from a lack of social cohesion and/or a lack of trust in governments, and/or whose national governments have only a weak commitment to the transition, face particular challenges.
- Without investing in governments' capacity to, for example, encourage citizens' engagement and empowerment, their acceptance of the EU as an effective mechanism to deliver convergence is at stake.
- Strengthening collective worker representation, including for new settings and forms of work, and investing in innovation in new multi-stakeholder models, will be key in overcoming political short-termism and establishing regenerative economy models (for instance, a bioeconomy drawing on local ecosystem services and a circular economy).
- Integrated data collection and analysis capabilities need to be embedded in regions to avoid detrimental effects on regional populations resulting from 'business as usual' attitudes.
- Equip regions to embed transparency, including demonstrably making effective use of public money, and participation in political processes, and to tackle vested interests to nurture trust and enable new forms of socioeconomic cooperation.

Insights from the literature review

This section provides an overview of key issues regarding Theme 4 (Enabling systemic change in European regions) that emerged from the literature review (Table 6), before considering them in more detail.

Engaging stakeholders at different governance levels

Regarding European governance arrangements, the literature suggests that a careful balance needs to be found between empowering people at local level and effective cooperation between EU, national and regional/local levels. Effective compensation mechanisms for regions that stand to lose out economically from the transition are seen as an essential part of the agenda, but devising integrated territorial strategies for a broader sustainability transition is seen as the ultimate goal. Potential governance and capacity constraints that often result in a lack of trust in governments in lagging regions are seen as an issue that needs to be addressed for this

process to be feasible (for more information, see Pilati and Hunter, 2020; European Commission, 2021c; Defard and Thalberg, 2022).

The literature review delivered clear evidence of the need to integrate different perspectives to achieve the systemic change required for a just transition (Ciplet and Harrison, 2019). At regional level in particular, involving a diversity of stakeholders in charting a path forward was seen as paramount. The evidence reviewed suggests that beyond stakeholders at different governance levels and in different policy spheres, wider society needs to be engaged. Innovative processes of goal-oriented multi-stakeholder engagement with the scope to consider wider production and consumption systems are called for in the literature. This is seen to be particularly challenging in regions in which there is already a lack of social cohesion, where navigating the socioeconomic effects of the transition may lead to further fragmentation, for example deunionisation, further outsourcing and societal polarisation (for more information, see EEA, 2020a; Hafner et al, 2020; Irimie et al, 2020; EEA and Eurofound, 2021; Walk et al, 2021).

Table 6: Overview of identified socioeconomic impacts on regions and population groups under Theme 4: Enabling systemic change in European regions

Challenge	Regions	Groups
Engaging stakeholders at different governance levels	<ul style="list-style-type: none"> Regions in Member States that have not fully committed to phasing out coal (Kreinin, 2020; Pilati and Hunter, 2020). Regions with a lack of social cohesion (Irimie et al, 2020). 	<ul style="list-style-type: none"> Institutionalising civil society involvement (WWF, 2020).
Power relationships, the reconciliation of different interests and institutional change	<ul style="list-style-type: none"> Regions affected by a political lock-in¹³ (Normann and Tellmann, 2021). Regions with a lack of cohesion/trust in governments (FES and HBS, 2020; Irimie et al, 2020). Regions with governance constraints (Pilati and Hunter, 2020). Remote/rural regions attracting new investors (WWF, 2020). 	<ul style="list-style-type: none"> Trade unions (and their social partners) (Normann and Tellmann, 2021). Social groups challenging the EU just transition concept and approach (Wilgosh et al, 2022). Social groups affected by deunionisation/fragmentation (Kreinin, 2020; Walk et al, 2021).
Measuring/ understanding effects of individual changes	<ul style="list-style-type: none"> Regions with sectoral strengths in areas with a close link to wider sustainability, such as agriculture and fisheries, but limited direct climate and energy strengths (Heyen et al, 2021). 	<ul style="list-style-type: none"> Groups affected by issues around access to and the affordability of energy, mobility and food, including with regard to ‘prosuming’; the fairness of green taxes; and the net employment effects of the transition (Heyen et al, 2021).
Opportunity	<ul style="list-style-type: none"> Strengthening regional resilience through mobilising all stakeholders to engage with a regional systemic perspective. 	<ul style="list-style-type: none"> Adopting an inclusive approach to transition management to avoid communities feeling abandoned (EEAC Network and NESC, 2020).

Source: Authors’ own elaboration

Power relationships, reconciling different interests and institutional change

Several sources highlight that finding integrated regional solutions will entail conflict, as power relationships, institutional context, different cultural identities and political persuasions with regard to the nature and process of a just transition will need to be navigated (Ludden et al, 2021; Sovacool, 2021). Trade unions are identified as potentially having a key role to play in reconciling different positions by adopting a longer-term perspective and accounting for different ways in which workers might be affected by the transition. However, just like state and industry actors, their partners in social dialogue, trade unions too may have to address what is described as a ‘political lock-in’ arising from mutual dependence between these three groups of actors in fossil fuel economies (for more information, see NESC, 2020; Normann and Tellmann, 2021).

The risk of powerful actors such as the fossil fuel industry shaping the European just transition concept, and policy interventions inspired by it, is highlighted in the literature. Such interventions may lock out more

fundamental criticisms of European socioeconomic policies, which would lead to the just transition becoming institutionalised to preserve the status quo (for more information, see FES and HBS, 2020; Irimie et al, 2020; Kreinin, 2020; Irimie et al, 2020; Wilgosh et al, 2022).

Crucially, the literature suggests that mobilising the whole range of stakeholders in adopting a systemic perspective for the transition to climate neutrality at regional level is seen as part of the answer. It is also identified in the literature as holding the promise of strengthening regional resilience (the ability of regions to accommodate changes in the socioeconomic environment while ensuring the continuous welfare of people living there) (European Commission, 2020c). Institutionalising civil society engagement, supporting organisational actors in looking beyond narrow agendas and creating the space for discussions about fundamental change are seen to have the potential to facilitate agreement on transformative visions or at least negotiate compromises and navigate conflicts (for more information, see EEAC Network and NESC, 2020; WWF, 2020; Euractiv, 2021; Wilgosh et al, 2022).

13 A political lock-in often takes place when there is mutual dependence between the state and the fossil fuel industries in fossil fuel economies.

Measuring and understanding effects of individual changes

The literature identifies a key challenge in mapping systemic interdependencies in the transition towards climate neutrality in sufficient detail based on clear indicators and drawing on sound data to support decision-making. The lack of an integrated dataset regarding social fairness in the built environment is offered in the literature as an example of how such deficiencies in data availability act as obstacles for actors in different sectors to develop shared conceptual frameworks or language. Crucially, this is also an obstacle to identifying and maximising possible co-benefits arising from the transition (Euractiv, 2021; Heyen et al, 2021; Rasmussen et al, 2021).

The lack of a social dimension in data supporting economic policy development for the transition is highlighted in the literature. However, the evidence suggests that even data on the economic outcomes of different aspects of an industrial transition are lacking. Monitoring the achievement of the Sustainable Development Goals and the European Pillar of Social Rights, for instance, is described as not effectively integrated across governance levels and policy spheres. Limited regional data collection and analysis capacities are described as an obstacle to garnering EU support based on clear transition plans (for more information, see IASS, 2019; Pilati and Hunter, 2020; Heyen et al, 2021).

Possible policy interventions: The need for transparency for all affected stakeholders was emphasised in the literature, for example ensuring the availability of clear information on, and access to, all documentation related to the phasing out of coal in the EU (WWF, 2020).

Furthermore, a strong focus on more proactive measures to ensure the appropriate representation of, and just outcomes for, different views and perspectives involved in managing the transition at different governance levels was recommended. With regard to new ways of working, examples in the literature notably extended to the forging of broad alliances not only between social partners but also involving non-governmental organisations, research entities and communities themselves to negotiate compromises and garner political support. Particular emphasis was placed on ensuring the inclusivity of such alliances, acknowledging issues of structural power relationships and creating enabling conditions for excluded groups to engage (for more information, see Heyen et al, 2020; Irimie et al, 2020; WWF, 2020; BusinessEurope, 2021; EEA and Eurofound, 2021; Eurofound, 2021; Walk et al, 2021; Defard and Thalberg, 2022).

Finally, the literature review highlighted the need to build governance capacity to enable actors at all governance levels to pull their weight in developing and implementing integrated policy solutions. Calls for more horizontal support measures were coupled with examples of moves to coordinate policymaking across public policy areas. Ensuring appropriate data collection to guide systemic decision-making, for example through approaches such as backcasting (defining a desirable future and then working backwards to identify the policies and programmes required to secure that future), was mentioned, as well as the development of whole systems strategies and action plans (for more information, see Heyen et al, 2020; Pilati and Hunter, 2020; Wälitalo et al, 2020; EEA and Eurofound, 2021; Eurofound, 2021).

European-level perspectives on the scenario dynamics

Experts at the European workshop stressed that for regional stakeholders to truly engage with multilevel governance, additional structures and resources were urgently needed. Support for the EU as an effective mechanism to deliver convergence was predicted to be at stake by 2050, if top-down decision-making prevails. The use of EU Social Climate Fund resources was quoted as an example where groups in vulnerable situations had not been able to feed into decision-making. A move away from overly technocratic processes and much stronger involvement of civil society actors, including more extensive use of participatory democracy mechanisms, were seen as part of the answer.

Workshop participants agreed that protecting and extending the political room for manoeuvre for a just transition through ensuring a more inclusive political process was a prerequisite. Without it, populations at large were seen to be at risk of becoming more susceptible to populism and/or political apathy. This would undermine any consensus-based decision-making for the kind of distributional measures required to achieve a just transition. Workshop participants also highlighted, however, that engagement with a devolved decision-making process would be highly resource intensive for individuals and would require a considerable investment of public resources and personal time in educating citizens about the issues at stake in the transition.

The extent to which it will be possible to demonstrate the benefits of the transition across all years to 2050 was seen to set the tone for the political sphere and delimit the choices available for political decision-makers. Clearly finding evidence of the socioeconomic benefits of climate policies and communicating them, forming alliances with clear responsibilities, and safeguarding

fundamental human, social and political rights were seen as paramount to achieving greater political engagement. However, the expectation was that any political process suited to navigating conflict and achieving compromise will need to be continually adapted to ongoing migration from outside Europe. The discussion on migration also echoed insights from the literature review on expectations of an increasing number of people migrating to the EU for work, particularly due to growth in the construction sector. This sector has a high share of migrant workers, and stronger incentives are needed to ensure good working conditions (Rasmussen et al, 2021).

Regional perspectives on key challenges and opportunities

Citizen engagement

Contributors across all three focus regions were clear that without empowering local populations, it would not be possible to adopt a long-term strategic perspective. A lack of ecological awareness in the general population, often combined with precarious lives, prompted fears in Wielkopolska that ‘if people are forced to choose between their livelihoods and the environment, they may opt for the former’, jeopardising the transition to climate neutrality altogether. PACA suggested offering training leading to the achievement of something like a ‘2050 passport’ or a role for citizens as ‘transition ambassadors’.

Any educational effort would need to be inclusive. South Aegean contributors thought it important to reach population groups in vulnerable situations with awareness raising and education around energy efficiency and green technologies, for instance. In Wielkopolska, the need to alleviate structural inequalities was highlighted, for example through ‘securing equitable access to nature, opportunities, [and] mobility – boosting local ecosystems stewardship and access’. PACA participants thought that any campaign should highlight the role of solidarity in achieving the best possible outcome for all.

In Wielkopolska, the importance of changing the narrative through bottom-up initiatives, by ‘envisioning positive futures for the region’ and equipping local people to lead the change and overcome persistent local opposition, was highlighted. Capacity building for political engagement and investment in transparent, inclusive decision-making processes to nurture trust in institutions could usefully draw on the positive aspects of the deeply embedded culture of the coal-mining community.

A word of caution came from the PACA region, where contributors thought that it was important to recognise that ‘action is needed now to address immediate needs but seeing change may take time’. Establishing new

ways for citizens to participate and be represented will not be easy. As part of a process of democratic renewal, stakeholders in the region advocated ‘developing the commons’ to strengthen social interactions. Examples of how this could be done included creating co-working spaces; ensuring access to shared economic, social and environmental data; and leveraging planning to create spaces for social diversity.

Reconciling different interests and institutional change

Participants in the South Aegean suggested that business choices were still very much dependent on the existing economic model, including the returns it promises, the incentives it creates and the patterns of interaction it is based on. Concerns expressed included ‘vested interests such as shipping companies actively resist[ing] the shift away from fossil fuels’ or ‘locals starting forest fires to free up plots of land’. Such opportunistic behaviour was seen as a result of limited governance capacity, relating to, for example, deficiencies in the planning system and the fragmentation of the island economy.

Against the backdrop of a more diverse and resilient regional economy, and referring to a number of existing models in France, contributions from PACA included in-depth collaborations between businesses, organisations focused on delivering social objectives and local stakeholders as a key way to reconcile different interests, for example through forming cooperatives, sharing skills and investment. As businesses are key players in the transition, they should be equipped to play a constructive part in it, for example through providing them with targeted information about and support in adopting regenerative business strategies. This will be key in nurturing a ‘regenerative economy’, in which returns for economic actors are linked to the positive results their activities produce, from carbon sequestration and regenerative hydrology to improving human health, and preserving intangible cultural heritage. Innovation will need to extend to the very way businesses are governed, with contributors calling for ‘social dialogue, within companies and economic actors more widely’, to determine company strategies.

Governance capacity

In workshop discussions in the South Aegean, the need to be responsive to particular conditions, needs and opportunities at subregional level (abundant supplies of wind on some islands, for instance) while devising cross-cutting measures applying to the whole region, for example in relation to transparency and open data, was identified as a key issue. This issue is likely to be found in other regions with limited governance capacity.

There was a sense of neglect compared with populous metropolitan areas, described as a ‘not Athens, not Attica’ phenomenon, and participants agreed that an effective multilevel governance process with improved coordination across all levels would be needed to make islanders’ voices heard. Decentralising the allocation of funds but also focusing on making better use of public funding – with clear benchmarks for success, appropriate monitoring and efforts to tackle corruption – should be part of this.

PACA contributors highlighted a lack of political commitment to focusing on the root causes of failures in policymaking. The electoral cycle and the current split of competencies between different levels were seen as creating formidable issues for long-term policymaking. In response, as stated by a workshop participant, ‘the region has to be able to think about

and for itself, [and] the different regional stakeholders have to be able to collaborate and agree on common aims and indicators and experience self-efficacy’.

Wielkopolska contributors identified governance needs at different levels: a secure planning horizon for businesses; an enhanced capacity of local authorities, for example to secure funding; a capacity to steer the transition to reliably produce public benefits at national level; and a European-level capacity to keep pace with what’s required for the effective delivery of the transition on the ground, for instance planning and technical legislation and state aid arrangements. Without this enhanced capacity and full commitment to facilitating the transition, contributors saw a risk that market actors might prevail, prioritising short-term profits over the long-term benefits of the transition.

3 Discussion and policy pointers

The research undertaken in this foresight exercise echoes many of the themes of the overarching European Commission policy guidance for a fair and inclusive transition towards climate neutrality (European Commission, 2021e). However, it also highlights areas that may not yet be sufficiently addressed by related policy initiatives. In particular, it outlines key concerns on the impact of the transition for different population groups and regions in the long term.

Looking at all the findings, three cross-cutting conclusions can be identified, especially from the literature review and the scenario-based engagement with workshop participants. The following sections focus on key drivers for institutional change that emerged as necessary for ensuring a just transition.

Creating governance capacity for a just transition to climate neutrality

- Both the negative effects of climate change on different socioeconomic groups and the potential benefits of the transition (for instance, for health and well-being) should receive more attention in the policy debate.
- The capacity and resources required to enable effective multilevel governance interactions are currently not in place and need reinforcing. While different pathways will present different costs and benefits for those involved, setting climate neutrality as a common goal is an important condition for gaining sufficiently broad stakeholder support for a just transition.
- Civil society engagement has a key role to play in creating the political room for manoeuvre required to deliver a just transition. Citizens need to be equipped with reliable information and knowledge to effectively engage with democratic decision-making processes, including through formal education.

Providing strategic direction in the development of a climate-neutral economy

- Recognising that all economic sectors will be affected by the transition in one way or another, just transition interventions need to reach beyond immediately affected sectors and work towards reconfiguring entire production and consumption systems.

- Achieving European strategic coherence in managing the transition will be of the utmost importance in influencing the direction of economic restructuring, including the location of new wealth creation activities, such as small-scale renewable energy investments, and associated supply chains.
- Lifestyle and consumption patterns play an important role in shaping economic activities and livelihoods and the social fairness of consumption. Just transition policies need to consider changes in people's lifestyles and their consumption choices, both in taking direction from changes on the ground and in leveraging public policy tools to influence people's choices.
- Strong strategic cooperation between public authorities, social partners and civil society will be required to keep any unintended consequences, such as job polarisation or inequalities in terms of social welfare, of the transition to a minimum. Policymakers will need to continually refresh their understanding of the effects of policy decisions on regions and populations when making any necessary adjustments.

Securing and fairly distributing returns from economic activity and resources in a climate-neutral world

- To secure socially fair and just outcomes, public policy will need to play a greater role in securing and fairly distributing resources in a climate-neutral world. To achieve this, appropriate policy signals need to help direct investment and the reliance on market-based allocation mechanisms needs to be reduced. The distributional effects of policy measures designed to facilitate the transition need to be a key consideration within this.
- The well-being benefits of a just transition, themselves a return from new forms of economic activity, need to be evidenced and clearly demonstrated to secure continuous political support.
- As unintended consequences are likely to result from the systemic change required to deliver the transition, the state needs to assume the responsibility for providing a strong generic safety net, which includes considering the precise welfare outcomes of the way in which public services are delivered.

Policy pointers

Beyond these broader insights, perspectives from across the different foresight exercises highlight the importance of taking different starting points and capacities into account. Structured by the themes of the previous chapter and differentiating between potential impacts for different population groups and regions, the following policy pointers were derived from an analysis of the findings.

Securing livelihoods, welfare and fairness

Policy pointers on population groups

- To deliver more flexible and targeted job transition and welfare models, consideration should be given to discontinuities in working lives, for example gaps in retirement contributions and needs for upskilling to embark on a new career, and sociocultural aspects, for instance individuals' identities being linked to a particular way of life, such as long-term employment in sectors with large monolithic employers or precarious and seasonal employment patterns.
- Potential conflict in existing and emerging patterns of job polarisation and associated fairness outcomes (for example, in relation to support and compensation for those losing secure livelihoods versus inclusion of those already disadvantaged in the labour market) need to be factored into transition arrangements by making targeted support available to protect workers' terms and conditions of employment.
- In terms of reskilling, the extent and precise ways in which a shift in production and consumption systems towards models geared towards sufficiency with a fair distribution of resources could reshape how populations secure their livelihoods will have to be considered, for example with regard to balancing skills provision for employment and meeting basic needs or in relation to the need to enable individual entrepreneurship and the adoption of new business models in the circular economy.
- Co-benefits arising from the transition need to be maximised in regional responses to the transition, for instance opportunities to enhance local quality of life through environmental reclamation and access to nature, or the creation of social spaces through regional planning.
- The effects of possible migration patterns resulting from economic restructuring brought about by the transition need to be considered when identifying the welfare support required for regional populations, for example support for the elderly in situations of strong out-migration or social cohesion support for populations in regions experiencing strong in-migration.

Policy pointers on regions

- Devising responses to the nature and scale of anticipated job losses at regional level will need to take account of scale effects (for example, where a key sector or individual employer is affected), scope effects (where effects are more diverse and distributed) and timing effects (where the impact of the transition on jobs and livelihoods in the region is likely to be more indirect and therefore time delayed).
- Mechanisms to negotiate employment terms and conditions at regional level may be considerably weakened by the anticipated wholesale industrial restructuring. This includes the degree of institutionalisation of social partner interactions, and the extent to which workers in different sectors, and employer organisations, representing not only industrial sectors but also SMEs, are represented in such negotiations. It will be important to strengthen consistent collective worker representation, including for new settings and forms of work that reach beyond established industrial patterns. Furthermore, engaging more and new types of employers, and creating solidarity among individuals that are affected by the transition, including individuals in non-standard employment, will be key.
- Transfers between regions may be required to account for differences in the extent to which existing assets (natural, human and capital) are likely to create opportunities to establish new climate-neutral industries that would enable the direct transfer of jobs (from fossil fuel industries to renewable energy, for instance).
- Existing national models for the redistribution of wealth and welfare provision need to be factored into regional responses, including their capacity to adapt to the change brought about by the transition at regional level (for example, taking account of the extent to which tax incomes are future-proofed and can adapt to changes in the regional business landscape, or the strength of hard and soft public service infrastructure and its capacity to explore entirely new models of welfare provision, such as universal basic services or a universal basic income).

Refocusing economic development

Policy pointers on population groups

- Enabling support delivered on an outreach basis will be required to help different socioeconomic groups find their niche in a new industrial landscape, for example to engage with new sectors and industries or to facilitate entrepreneurship in response to new economic opportunities.

- The change in industrial consumption and production systems as part of economic restructuring efforts, including a shift towards circular economy models, will require individuals to shape and adapt to new ways of meeting basic needs and making wider consumption choices. This requires support for behaviour change, for example nurturing the skills and motivations required for citizens to adopt sufficiency lifestyles, including by providing reliable information to the public. Ensuring food security and meeting basic needs more generally, while also engaging with regional businesses to support new business models, are also necessary.
- The anticipated fundamental industrial change will depend on attracting investment while equipping populations to make the necessary changes in their own lives. This requires trust-based relationships with governance organisations and the private sector. Holding private investors account for public benefit is therefore a basic requirement for successful economic restructuring.

Policy pointers on regions

- The strength of regional innovation systems will be a key determinant of their capacity to attract, create and embed new economic activities to the region, including models that are based on reconfigured production and consumption systems such as circular economy activities. The ability to integrate public, private and third-sector resources to trigger social innovation will need to be strengthened in regions where this is underdeveloped, for example by supporting the region's strategic capacity to anticipate change, investing in small-scale pilot and demonstration projects, and strengthening communication and transparency regarding enterprise opportunities through data sharing. Regions with limited diversification, with low skills levels and/or experiencing out-migration are likely to be most affected.
- Different regions' assets and potential to contribute to strategically integrated economic restructuring throughout the EU need to be identified and capitalised on. This includes opportunities for regions with limited technological development to leapfrog to new sustainable technologies and business models; opportunities to capitalise on regional ecosystem services to enable change in industrial production systems, for example securing regional food resilience or new agricultural models or prioritising carbon sequestration in soils and biomass; and support for new solidarity economy business models, which promote local development and fair commercial relationships.
- Where the national commitment to the transition to climate neutrality is limited, regions need to be enabled to access EU support and investment for economic restructuring, for example through devolved decision-making regarding the use of EU funding, support with attracting private investment or holistic business support at regional level targeting businesses throughout regional supply chains.

Renewing infrastructure

Policy pointers on population groups

- Lower-income groups in particular will be affected by higher costs of energy and housing. They are likely to face challenges in accessing affordable 'climate-proof' housing, leading to increased risk of spatial¹⁴ and quality-of-life segregation. Policy needs to ensure the accessibility and affordability of decent housing, for example by avoiding gentrification as a result of increases in property values and housing costs in city centres.
- Low-carbon transport and digital infrastructures are essential ingredients of the transition to climate neutrality. Ensuring that these are widely available (particularly in rural and remote regions) and affordable is a prerequisite for ensuring social inclusion and access to work for different groups, especially given the expected speed of change in labour markets in the transition. Infrastructure renewal will need to ensure socially fair and just access to such services and enhanced social inclusion, for example by leveraging legislation, adopting inclusive design processes with citizen involvement or equipping populations with the skills required to make effective use of new digital infrastructure.
- A larger supply of public services will be necessary to ensure social inclusion and fairness. Younger generations in particular would benefit from improved prospects in this regard, with universal basic services and 'prosumer' models being most prominently discussed as possible solutions, along with subsidised public transport, a greater state responsibility to meet basic needs and community wealth-building approaches to give communities a greater stake in the delivery of infrastructure-based services. Policymakers will need to consider and investigate where and how far such solutions could be applied.

¹⁴ In this instance, spatial segregation refers to the separation of groups of people away from the rest of society in neighbourhoods or whole regions due to economic factors.

Policy pointers on regions

- The time pressure and scale of change will be a challenge, especially for regions starting from earlier stages of development and/or facing declining tax revenues from the phasing out of carbon-intensive sectors. Two critical bottlenecks will need to be addressed by policy to enable these regions to deliver the infrastructure renewal required to underpin the transition process: improved access to funds and improved governance capacity, for example through skills transfers or support for additional personnel.
- For regions with unique natural environments that limit the roll-out of large-scale solutions, opportunities to adopt innovative approaches, for example decentralised energy and water infrastructures and novel health infrastructure, need to be explored. Support for local governance structures in accessing funding, as well as tailored solutions for developing long-term plans and visions with civil society, will be required.
- Processes for developing long-term visions and plans have been identified as critical to increasing local support from the population and for facilitating cooperation between different stakeholders. Examples could include enabling citizens to gain access to renewable and decentralised electricity in their homes or in community buildings. This is especially important in regions that face rising unemployment due to a decline in carbon-intensive sectors, for example in the face of immediate short-term negative effects such as job losses, as well as in regions starting from earlier stages of development.
- Improving public health and well-being is identified as a key opportunity emerging from large-scale infrastructure renewal projects. Policy will need to consider direct and indirect co-benefits in terms of social inclusion in designing infrastructure renewal projects and assessing their impact.

Enabling systemic change in European regions

Policy pointers on population groups

- Raising awareness and facilitating learning about the transition, particularly for groups with limited ecological awareness, was identified as essential in laying the foundations for the kind of systemic change required to deliver a just transition. This should include ensuring that institutional education and training infrastructures deliver appropriate skilling and reskilling. This would need to cover both generic skills and knowledge of the challenges and opportunities of the transition and specific aspects of the transition trajectory at regional level.

- Without a voice in making investment decisions regarding transition measures, affected groups are unlikely to identify potential benefits of the transition and may therefore oppose necessary interventions. Ensuring adequate mechanisms to enable groups in more vulnerable situations to feed into decision-making, for example for mechanisms such as the EU Social Climate Fund, and supporting bottom-up initiatives involving diverse population groups are key first steps in changing the narrative and overcoming local opposition to the transition, thereby creating an enabling setting for systemic change.
- Social groups who challenge the current just transition concept and approach often have limited input into charting a path towards carbon neutrality in their region. And yet they may have an important role to play in ensuring a more integrated perspective is adopted. It will be important to strengthen social interactions to allow cross-fertilisation between different attitudes and perspectives and catalyse democratic renewal. Approaches that may be suited to this include what has been described as ‘developing the commons’, including, for example, setting up co-working spaces; ensuring access to shared economic, social and environmental data; and leveraging planning to create spaces for social diversity.
- More detailed monitoring of systemic effects of the transition on different population groups is necessary, especially where a lack of available data currently poses a major barrier. This could, for example, relate to the integration and improved real-time sharing and accessibility of data covering an integrated view of environmental, economic and social indicators. Policy measures could support more detailed and integrated data collection and analysis at regional level to ensure the accessibility of relevant data for use in EU policymaking.

Policy pointers on regions

- Regions with limited governance capacity are often characterised by a lack of trust in government, increased pressure from stakeholder groups with vested interests in the context of transition planning (for example, advocating strongly for a certain course of action based on the specific interests of their business or sector) and the prevalence of opportunistic behaviour. These are formidable obstacles to social justice outcomes and, as a result, any buy-in into systemic change. Introducing greater transparency in political processes, including demonstrably making effective use of public money, while holding private investors to account, will go a long way in getting these populations on board with the transition.

- ‘Business as usual’ mindsets combined with limited flexibility in the institutional fabric involved in negotiating solutions and outcomes for different population groups in the region bring a risk of political lock-in. The transition may also lead to further fragmentation, for example deunionisation, further outsourcing and societal polarisation. Promoting and supporting new types of multi-stakeholder collaboration involving public authorities, social partners and wider civil society are advocated as ways to develop more integrated longer-term visions for the transition to climate neutrality at regional level. They are seen to offer a way to reconcile different interests and facilitate institutional change, particularly where these span collaborations in both the economic sphere (focused on new types of economic activity) and the political sphere (focused on negotiating uncertainties, synergies and trade-offs).
- A long-term vision, co-created with civil society and stakeholders in the regions, can be a tool for mobilising support and for enabling a systemic perspective, especially in regions of Member States that have not yet fully committed to the phasing out of coal or other carbon-intensive sectors. Empowering stakeholders at local level while strengthening regions’ access to multilevel governance mechanisms up to European level can help mobilise populations in support of a transition that is demonstrably suited to delivering just outcomes. New approaches and skill sets will be necessary to engage stakeholders at different governance levels, and support is needed for regional governance to rapidly develop these capacities.
- Acknowledging that for many regions the transition is likely to initially reduce tax revenues, a staged and well communicated approach is essential. In such an approach, long-term goals serve as signposts for the desired direction of development. In the short-term, capacity to be responsive to changes in the environment and continuous learning drawing on real-time data and insights will need to be integrated into the relevant policy processes. National and EU-level support will be necessary in gaining insights on best practices and in ensuring sufficient governance capacity and funds are available in the regions.

Follow-up research

While this research has provided a variety of insights into the possible socioeconomic impacts of the transition to climate neutrality, it also highlights a need for further research. The multilayered foresight approach applied here in engaging a broad variety of stakeholders could also be applied, for example, to other regional levels or to gather more details on specific topics. More in-depth and detailed stakeholder engagement, including citizens, could be beneficial to map possible desirable pathways. A vision-led backcasting approach could also identify further details on potential bottlenecks and barriers and around the unintended consequences of pathways towards reaching existing climate neutrality targets (in terms of socioeconomic impacts). Furthermore, secondary or tertiary, effects of economic restructuring in regions heavily affected by the transition and their neighbouring regions might be of interest for further research. While the qualitative foresight approach followed in this research enabled the coverage of a wide range of topics and the involvement of a diverse group of stakeholders, a quantitative foresight approach could provide more details around potential long-term impacts in different trajectories. Therefore, using a more quantitative or a combined qualitative–quantitative approach to integrating key indicators on socioeconomic and environmental conditions in different regions and for different population groups under different assumptions could be worthwhile in follow-up research.

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Annexes

Annex 1: List and definitions of key factors

The key factors listed in Table 7 were identified from the literature review as major drivers of future developments or as highly influential on future developments. While they may vary in their specific link to the transition to climate neutrality, their potential relevance concerning socioeconomic impacts is what was focused on in their selection.

Using a key factor-based methodology, projections (that is, alternative pathways that potential future developments could take) were developed for each key factor based on the initial conditions and drivers. These were then mapped against a number of dimensions (for example, high versus low penetration and improving versus deteriorating conditions). Plausible combinations of different projections were then identified through a qualitative consistency analysis and combined to form the basis of the raw scenarios.

Table 7: Key factors and definitions

STEEPL category*	Name	Definition
Society	Value changes	Core values changes including attitudes to gender, consumption, ownership of material goods, work, and so on, as well as to society in general.
	Development of regional social and economic disparities	Social and economic disparities at regional level within the EU, expressed in relative differences with regard to, for example, employment and income, personal wealth levels and public infrastructure.
Technology	Digitalisation (and other technologies)	The leveraging of digital technology and digitised data and the transformation of industries as a result of new digitally enabled business models (such as the platform economy) or new forms of work (for example, remote work).
Economy	Economic greening	New business models and production processes with a greater focus on environmental values to reduce (primary) resource inputs, including through increasing resource efficiency, using secondary resources/recycling and reducing waste.
	Regionalisation	Shortening (or non-shortening) of supply chains to reduce vulnerability or complexity in production and logistics, and lower environmental footprints.
Environment	Climate change impacts	As average temperatures increase, hazards such as heatwaves and floods become more frequent and severe, while drought and rising sea levels intensify. As impacts vary regionally, so do adaptation measures.
	Environmental and biodiversity degradation	The deterioration of the quality of air, soil, water and other resources and a corresponding loss or threat to ecosystems, habitats and biodiversity.
	Uncertainty and frequency of global catastrophes/crises	Globalisation has vastly increased the length of supply chains and the degree of division of labour. As a result, regional economic and natural catastrophes and crises may now affect other world regions or be felt worldwide.
Politics	Economic (and societal welfare) policy	Use of financial incentives and subsidies and education and skills policies to actively shape the economy and societal welfare towards desirable outcomes (excluding regulatory measures), which go beyond efficiency and stability.
	Geopolitical landscape and power shifts	The global geopolitical landscape is subject to shifts that see the relative rise and fall of different nations, changes in alliances and collaborations, and a switch between economic protectionism and collaboration.
Legal	Use of regulation	Regulatory measures, excluding financial incentives and subsidies, to ensure that the political aims of the EU are realised. These include measures taken by EU Member States to meet targets set by the EU, and those that have effects outside the EU (such as legislation to reduce carbon leakage).

Note: * The terms 'society', 'technology', 'economy', 'environment', 'politics' and 'legal' (STEEPL) are used to denote the various macroenvironmental areas.

Source: Authors' own elaboration

Annex 2: Detailed descriptions of the scenarios

Scenario 1: All aboard the well-being transition

There was no lack of sceptics when the EU unveiled its climate neutrality targets, and the truth is people could be forgiven for remaining sceptical; in the past, ambitious climate targets were too often watered down or rendered meaningless by legal loopholes. And who knows how things might have turned out, had geopolitical events not forced Europe's hand in the early 2020s? All of a sudden, Member States were aware of just how susceptible to economic blackmail their dependency on fossil fuels made them, and how unscrupulous petrostates were in using the leverage they had. Europe had woken up to a new reality.

The EU moved fast, united by the common purpose of energy autonomy. While the primary target was to end fossil fuel use for electricity generation, other measures to reduce Europe's carbon footprint were not pushed back, neglected or at risk of falling off the radar, but at most a little delayed. During the first half of the decade, on- and offshore wind parks multiplied, photovoltaics were installed on every suitable roof (and, as some critics say, on a fair number of less-than-ideal ones) and large-scale battery parks brought an end to base-load power plants. All that remains is for the transport sector to be fully greened; with heavy goods vehicles switching more and more to green hydrogen fuels and a massively expanded e-mobility infrastructure, it should not take that much longer.

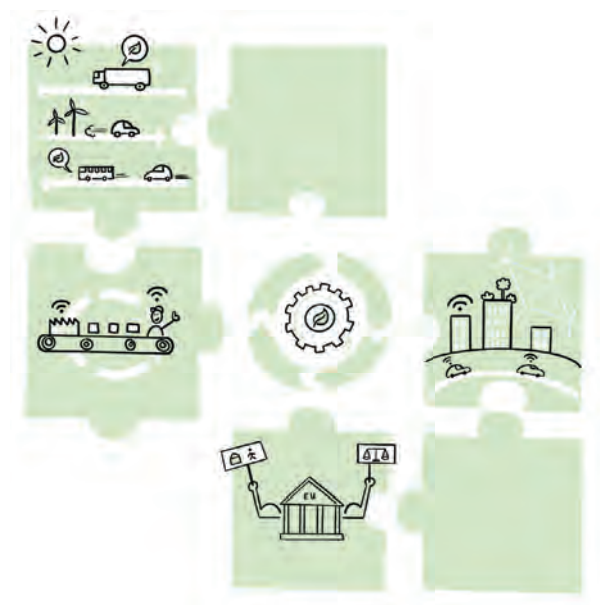
These successes birthed an infectious sense of possibility. Once inertia has been overcome, keeping a body in motion becomes easier and easier. Now that people have realised that putting the environment first does not mean that what matters to them is ignored, everyone has become aware of how attractive and beneficial the idea of living in harmony, maybe even synergy, with nature is. This new environmentalism is not limited to boosting renewables and making sure that ambitious EU legislation to protect soil and biodiversity does not fall victim to lobbying. In addition, demand for ethical food products is much greater than before, and large parts of the population have adapted their diets in an effort to reduce their personal carbon footprints. Hence, land use has changed significantly, including a massive expansion of the EU's natural carbon sinks, and the 2035 targets for the land use, land use change and forestry sector have almost been met. The sharing economy has grown rapidly, helped by targeted EU legislation such as the right to repair and the sustainable goods regulation. Manufacturing is becoming more and more dematerialised, with fewer inputs needed. This general willingness to change, and to adapt and reinvent all kinds of rules of the game, also

played a crucial role in the (re)skilling revolution. People were willing to expand into new areas, and acquire abilities rather than possessions; the reskilling piece of the puzzle of the just transition fell on fertile ground. And companies were competing around the most innovative and climate-positive solutions in all sectors of the strongly reshuffled markets.

However, digitalisation originally progressed a little slower than hoped for, held back by security concerns and the lack of a comprehensive European information technology (IT) manufacturing base. But once the latter had returned to Europe together with other industries in the reshoring movement of the mid-2020s – driven as much by the wish to shorten supply chains and reduce vulnerability as by protectionism and trade wars elsewhere – the continent pushed ahead, in particular with regard to green low-energy and low-input IT. Now the digital revolution could really begin: cities (actually) turned smart and took the lead in changing the economic paradigm; it was here that the first loops were closed, and the circular economy was born. The ubiquity of remote work made it possible for people to move away from metropolitan areas to smaller towns, reducing disparities between regions. Reshored industries and innovative SMEs often settled in the old husks of obsolete power stations and lignite-processing plants, ensuring that no job lost remained unreplaced and empowering local stakeholders to play key roles in the transition.

Europe's economy has used its early mover advantage well. Green energy, increased recycling and reduced inputs have insured it against global market volatility, and leadership in green technologies has brought new

Figure 2: Visualisation of Scenario 1: All aboard the well-being transition



Source: Future Impacts

customers, as Europe has begun to export know-how and technology to developing nations as part of its ‘hydrogen diplomacy’. The ‘Brussels effect’ also worked in its favour: Europe’s attractiveness as a market has meant that many nations simply adopt EU standards sooner or later, making exports easier for European producers.

The EU remains as united in its purpose as it was in the heyday of the transition to climate neutrality. With its efforts to realise decarbonisation, dematerialisation and renaturalisation simultaneously, it has begun to enter the ‘magic triangle’ of sustainability: efficiency, sufficiency and consistency. And with a budget funded by EU-wide taxes rather than Member State contributions, its legislative bodies feel free to enact legislation that tackles key issues directly. This makes life better for everyone, as these bodies don’t have to wait for individual governments to spend political capital they may just not be willing to part with. Climate change impacts may not have lessened, but adaptation has improved along with mitigation. This new, inclusive EU has become a role model for the world and a leader in the global movement towards climate neutrality; it is hard to believe that only a little over a decade ago it was considered a spent force.

Scenario 2: A piecemeal transition

In the early 2020s, the political will was there, and when the geopolitical situation called for a rapid transfer to renewables that’s exactly what the EU achieved. With its political independence threatened, and a solid majority of the population clamouring for action against climate change and environmental degradation, the Union closed ranks and began a hard push and concerted effort towards carbon-neutral electricity generation. Would it have been possible to use the momentum to achieve more? Possibly, but a good horse only jumps as high as it has to, or as it thinks it has to.

In retrospect, it may have been ‘the vaccine miracle’ that gave Europe a sense of optimism, and the widespread conviction that given enough incentives the market would do the rest. In addition, Europe’s newly found unity had its limits; the shared political will did not extend much beyond energy independence. Hence, the increase in the use of renewables was primarily driven by subsidies and focused on electricity generation, and in this respect it was remarkably successful. The EU’s renewable capacity grew by leaps and bounds, and by the end of the decade utilities had long stopped advertising their energy as ‘green’; all electricity was.

For the consumers, however, convenience was still king. They cared about the reduction in comfort the change to renewables brought in some areas: range anxiety stopped many from switching to electric vehicles, plus there was always a relatively cheap supply of fossil fuels from exporting states eager to create revenues by

expanding production, in particular when it came to fuel for road transport. However, recycling and the use of secondary resources have increased significantly, and in a few sectors some Member States – or at least some regions within some Member States – have come considerably closer to achieving a circular economy. Some progress has been made in the decarbonisation of agricultural production, but consumer demand for low food prices means that the carbon neutrality target for 2035 will probably not be realised.

Not only with regard to fuel but also with respect to digitalisation, the EU continues to depend on imports. Europe’s homegrown IT capacity has increased significantly during the past decade, but still lacks the local champions to match the Chinese and US behemoths. However, as one of the world’s largest marketplaces, the EU has used its power well to set standards for the rest of the world. Not only privacy laws but also standards for artificial intelligence, IT energy and resource consumption often come from Brussels, even if the European industry remains unable to catch up with the tech leaders. The great digital reskilling initiative, while not falling flat, was thus never able to achieve its full potential, primarily because in many regions the jobs that would have incentivised people never materialised.

One of the reasons for this was the fierce competition for reshored industries, which meant that these usually went to the innovative and economically powerful regions. It was only too rarely that disadvantaged areas were really enabled to develop their strengths with innovative, bottom-up decision-making and sufficient support. Rather, many say, funds were squandered on ‘white elephants’, vanity projects that lacked a supporting infrastructure: the remains of old industries expensively revamped to attract tourists who never came, innovation incubation hubs in regions that could not draw the talent necessary to make them a success, or reshored industries that required a constant flow of subsidies to keep going in regions unable to support them, and that never became fully competitive. Overall, however, Europe’s economy is still going strong and globally remains very much a force to be reckoned with, but its economic landscape is extremely uneven. On average, living standards have improved, but in the ‘rust spots’ of obsolete industries some population groups remain left behind.

As a political force, the EU has to build coalitions to pursue its interests, both internally and externally. Member States are usually able to ‘patch things up’ if enough is at stake, but constant infighting saps a lot of the EU’s strength. The world in general is also often at odds, and Europe feels every crisis. There may be no large-scale conflicts (at present), but the challenges of climate change have still not been comprehensively tackled. Most of the global mitigation measures and redistribution measures that would have allowed

Figure 3: Visualisation of Scenario 2: A piecemeal transition



Source: *Future Impacts*

smaller and less prosperous nations to deal with the impacts of global warming were never enacted. This has led to a constant stream of climate refugees, many of whom head for Europe, where populists use them for political gain. Looking back, it is clear that the EU definitely has not wasted the past decade, but it has also never fully realised its potential in terms of the transition to climate neutrality, which is, most say, piecemeal at best.

Scenario 3: A struggling transition

It could be that the targets set were unachievable and unrealistic, or that Europe simply lacked the tools that were essential to make significant progress towards climate neutrality. Looking back, does it matter all that much? For 10 years now, the EU has remained more or less rooted in place with regard to climate action and appears to have even been pushed back in other areas. At any rate, the challenge that seemed to have been clear in everyone's mind in the early 2020s was never fully met, and the professed political will evaporated like Europe's waterways do now in the inevitably hot summers.

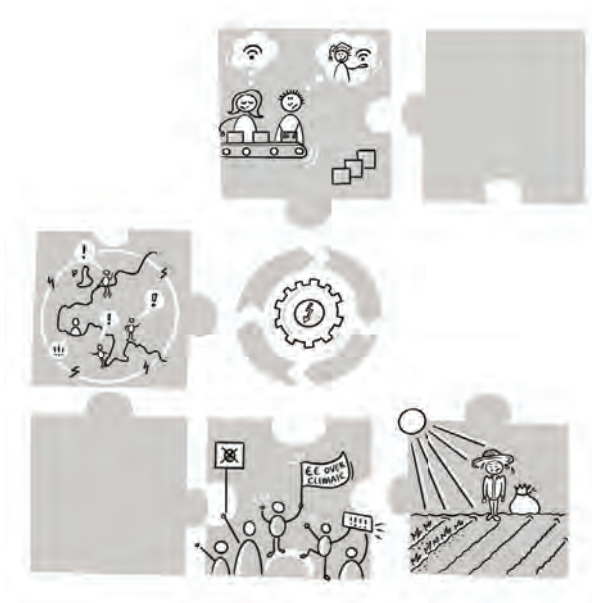
The almost simultaneous eruption of two volcanoes: that's what it felt like to people during the early 2020s when, immediately after the COVID-19 pandemic had left everyone longing for more tranquil times, the geopolitical situation exploded. Russia's attack on Ukraine brought an end to what had appeared to be a period of stability, even if in retrospect the signs of the coming explosion had long been evident. All of a sudden, the issue of energy appeared in a harsh new light; political autonomy was at stake. And the EU, with ambitious climate targets already having been unveiled,

threw itself into the race towards climate neutrality like a sprinter competing in a marathon. Vast projects were kickstarted; however, they often did not deliver on even a minimum amount of local stakeholder involvement. At the same time, Member States unwilling to build long-term trust with stakeholders haggled over budgets and focused more on selling their actions to domestic electorates than on actual progress. Mired in controversies, the transition process became bogged down.

If anything was to blame, it was short-termism: the feeling that there was always one more crisis that had to be dealt with first, and fast. Dysfunctional supranational organisations meant that Europe shouldered more responsibility, in particular with regard to climate migration crises, which became almost seasonal: with no support forthcoming from the affluent nations, people in developing nations had little hope for the future and pinned everything on emigration. And within Europe, the sunk cost fallacy meant that stopgap measures, such as liquefied natural gas terminals, were often made permanent. Oil and gas always seemed to drop in price just when major decisions to reduce consumption were due. Lobbying meant that counterproductive, harmful subsidies were never abolished, and again and again 'socioeconomic costs' for the less well-off were used as an argument for stopping key measures, and mass protests were instigated to push issues back. Crucial legislation died in committees or was watered down to the point where it offered little progress, if any. Environmental taxes never shifted in focus from revenue generation to achieving environmental and climate objectives: targets remained unchanged, and revenue fell, and that was that. A mood of defeat descended over Europe. By the second half of the decade, several Member States decided to go it alone and achieved remarkable successes in reducing their carbon footprints, but these were nowhere near what could have been possible for a united Europe.

As a result, Europe's economy is now experiencing a downward trend. On the one hand, the argument for reskilling never really got off the ground, depriving businesses in the medium term of the talent they so desperately needed. On the other hand, the continent's dependency on outside inputs makes it subject to geopolitical volatility, and of that we saw a lot. On top of these two major issues, the envisaged European IT base never really materialised; international tech giants continue to play off Member States against each other. However, while many are worried about just how bad the long-term implications of the lack of a real and far-reaching transition to climate neutrality (let alone a just transition for all) will be in the next decade, many also believe that this is all that is possible. In any case, the situation is not any better outside Europe. Facing an incredibly complex world and personal hardships, people yearn for simple, immediate solutions. Political leaders who now triumph at the ballot box have little

Figure 4: Visualisation of Scenario 3: A struggling transition



Source: *Future Impacts*

patience for crafting and adhering to multinational agreements, which makes it much harder for the EU to exert influence abroad.

As a result of the lack of progress in Europe (and beyond), regional disparity in the EU is in fact worse than it was before the kick-off of the transition to

climate neutrality. Poorer regions argue that they have, in spite of theoretical support, basically been left to fend for themselves. With some hit particularly hard not only by sectoral recession but also by climate change impacts, migration towards regional hubs is unabated. The words 'Would the last one to leave please turn off the lights?' can be found spray painted on the remains of homes and businesses that have long stood empty.

The more fortunate have, for the most part, little interest in 'cutting back' for the environment. A new Biedermeier period is taking place: people want to be comfortable, disappear into virtual worlds and not be confronted with the unsustainability of their own lifestyles. And those who consume less out of necessity, because they lack the funds, are unable to access the training they require to carry out more highly skilled and better paid work. When it comes to employment and the impact of climate change, 'beggars can't be choosers': the growing number of illicit workers lack even the most basic legal protection, and heat-related deaths at work in the summer have become commonplace. Social mobility continues to decline, while conflicts erupt more aggressively than ever along generational fault lines: younger cohorts find their hopes dashed by older generations who hold better jobs and only care for their own offspring. The much-vaunted transition of the early 2020s was to have secured their future, but by 2030 the only net-zero the continent has achieved, it seems, is net-zero hope.

Annex 3: Participants of the workshops

Exercise	Format of contribution	Participants' organisations
		In some cases, more than one participant contributed from the same organisation
EU scenario workshop	Workshop	<ul style="list-style-type: none"> European Trade Union Institute (worker organisation) Trinity College Dublin (research organisation) BusinessEurope (employer organisation) European Environment Agency Volkswagen (business) Eurelectric (worker organisation) Wuppertal Institute for Climate, Environment and Energy (research organisation) International Labour Organization (international agency) Bertelsmann Foundation (research organisation) Laudes Foundation (non-governmental organisation (NGO)) University of Greenwich (research organisation)
	Post-workshop input/interview	<ul style="list-style-type: none"> European Commission Directorate-General for Regional and Urban Policy European Commission Directorate-General for Employment, Social Affairs and Inclusion
South Aegean regional workshop	Workshop	<ul style="list-style-type: none"> Oxygen Yachting (business) University of the Aegean (research organisation) Development Agency of South Aegean Region (regional development agency) Association of PV Energy Producers in East Aegean (employer organisation and local NGO)
	Post-workshop input/interview	<ul style="list-style-type: none"> Mediterranean restaurant on the island of Kos (employee) Thalassa Foundation (local NGO) University of Athens (research organisation) Hellenic Yacht Crew Association (employee)
Wielkopolskie regional workshop	Workshop	<ul style="list-style-type: none"> Centrum Zaawansowanych Technologii UAM (research organisation) Wielkopolskie Regionalne Obserwatorium Terytorialne (local authority) Climate-KIC (local NGO) Niezależny Samorządny Związek Zawodowy Pracowników Ruchu Ciągłego Veolia Energia Poznań (worker organisation) Rozwój TAK – Odkrywki NIE (local NGO) Agencja Rozwoju Regionalnego Transformacja Sp. z o.o. (regional development agency)
	Post-workshop input/interview	<ul style="list-style-type: none"> Veolia Energia Polska (business) UM Poznań Wydział Rozwoju Miasta i Współpracy Międzynarodowej (local authority) Stowarzyszenie Młodzi Lokalsi/Młodzieżowy Strajk Klimatyczny (local NGO) Urząd Miast Poznań Wydział Rozwoju Miasta i Współpracy Międzynarodowej (local authority) Ministerstwo Funduszy i Polityki Regionalnej (national authority) ZE PAK S.A. (employee)
PACA regional workshop	Workshop	<ul style="list-style-type: none"> Agence de la transition écologique en Provence-Alpes-Côte d'Azur (regional development agency/national authority) Direction régionale de l'économie, de l'emploi, du travail et des solidarités PACA (local authority) Agence d'urbanisme Pays d'Aix-Durance (local authority) Pôle d'Équilibre Territorial et Rural du Pays d'Arles (local authority) Tout Petit Monde; Réseau Entreprendre Cote d'Azur (business) GeographR (business) ImmaTerra (business) Mandataire FO (worker organisation) Carsat Sud-Est (local authority) European Commission Directorate-General for Regional and Urban Policy Marseille city (local authority) Alpes-Maritimes department (local authority) Airbus (employer organisation) Mandataire Confédération Française de l'Encadrement – Confédération Générale des Cadres (worker organisation) Mesopolhis (Sciences Po Aix); Plan Bleu (research organisation) University of Montpellier (research organisation) independent consultancy (research organisation) European Commission Directorate-General for Employment, Social Affairs and Inclusion
	Post-workshop input/interview	<ul style="list-style-type: none"> Confédération des PME (employer organisation) Région Sud/PACA (national authority)

Annex 4: Peer reviewers

Name	Organisation
Nadja Doerflinger	KU Leuven
Panagiotis Fragkos	National Technical University of Athens
Uwe Fritsche	International Institute for Sustainability Analysis and Strategy
Karlo Hainsch	Berlin Institute of Technology
Eva Hideg	Corvinus University of Budapest
Eloi Laurent	Sciences Po
Pasquale Marcello Falcone	Parthenope University of Naples
Sinead Mercier	University College Dublin
Adeline Otto	KU Leuven
Erik Pruyt	Center for Policy Exploration Analysis and Simulation
Karl-Henrik Robèrt	Blekinge Institute of Technology
Tadeusz Skoczkowski	Warsaw University of Technology
Roxana Voicu-Dorobantu	Bucharest University of Economic Studies

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The EU's transition to a climate-neutral economy requires nothing short of a clean industrial revolution. This report explores the potential socioeconomic implications of such fundamental change for different European regions and population groups, following a foresight approach. Scenario-focused engagement with stakeholders and experts was conducted to gain a better understanding of emerging economic and social inequalities at EU and regional levels. The research findings are presented together with policy pointers on developing measures to achieve a just transition that leaves no one behind.

The European Foundation for the Improvement of Living and Working Conditions (Eurofound) is a tripartite European Union Agency established in 1975. Its role is to provide knowledge in the area of social, employment and work-related policies according to Regulation (EU) 2019/127.

