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POLICY BRIEF //

Territorial perspective on green industrialisation

As part of the European Green Deal, the European Commission presented a Green Deal industrial plan in February 2023 with the aim of enhancing the competitiveness of Europe's net zero industry, supporting a fast transition to climate neutrality and ending the age of fossil fuels (European Commission, 2023a).

This policy brief aims at contributing to the implementation of the Green Deal industrial plan and supporting European regions in their green industrialisation processes by discussing local and regional opportunities for and obstacles to benefitting from green industrialisation. In addition, it sets out to inspire stakeholders at different levels of governance by presenting approaches implemented in different regions and Member States to address challenges that can be encountered.

This policy brief lays out why regions need green industrialisation and goes on to discuss how green industrialisation can contribute to solving global challenges. Chapter 3 addresses opportunities and challenges that can be experienced by local and regional public authorities in relation to restructuring existing industries and/or regarding the creation of green industries in their territories. Chapter 4 concludes and offers some policy advice.

A more detailed overview of issues potentially encountered by regions throughout their green industrialisation processes, and tools and good practices, can be found in the ESPON working paper 'Territorial perspective of green industrialisation'.

KEY POLICY MESSAGES

- Green industrialisation forms one building block of a more comprehensive green transition process that is needed to withstand the manifold consequences of the unfolding climate crisis. It requires far-reaching socioeconomic changes and large-scale structural changes in places that are short of workforce.
- Various EU instruments are available that can assist European municipalities and regions in the transition process towards green industrialisation, such as the European Urban Initiative, the New European Bauhaus, the long-term vision for rural areas and the Joint Research Centre's *Handbook of Territorial and Local Development Strategies*.
- Education efforts are needed to clearly explain to people why the different transition processes are necessary and what the effects might be of certain choices compared with others. This would lead to the greatest possible support and sense of ownership by civic society.
- Communication efforts are needed to provide information and raise awareness. People need to know why different transition processes are necessary. Raising awareness is crucial to ensure greater involvement of all sectors of society, including citizens, in the transition to green industrialisation.
- Policymakers should focus more on climate policies and consider more flexible policy designs and instruments to reach climate targets. As local/regional development conditions are very different across Europe, locally/regionally targeted development plans need to be devised and implemented.

1
Why regions need green industrialisation

Climate change is acknowledged as an urgent global challenge that must be addressed with various cross-sectoral mitigation and adaptation measures at all levels of governance. Greenhouse gas emissions are the main driver of climate change. The reduction of such emissions requires a move towards renewable energy sources and more efficient energy systems. . The greening of carbon-intensive industrial sectors is an important step towards reaching carbon neutrality by 2050, and it offers at the same time multiple development opportunities for regions that have experienced structural challenges for decades. The transition to green industrialisation will need to be supported by multisectoral policies across governance levels, not only to accelerate the deployment and distribution of clean energy but also to ensure value retention and generation for regions with relevant industries.

1.1
Dealing with climate risks

Over the last few years, European regions and cities have seen more and more extreme weather events such as exceptional heat, droughts, wildfires and floods because of a globally changing climate. In response to these events, governments at all levels of governance have started taking measures to both mitigate the effects of and adapt to climate change. But even if global efforts to reduce greenhouse gas emissions prove effective, the risk to regions of experiencing climate-related hazards is expected to increase (EEA, 2016; ESPON, 2011, 2022a).

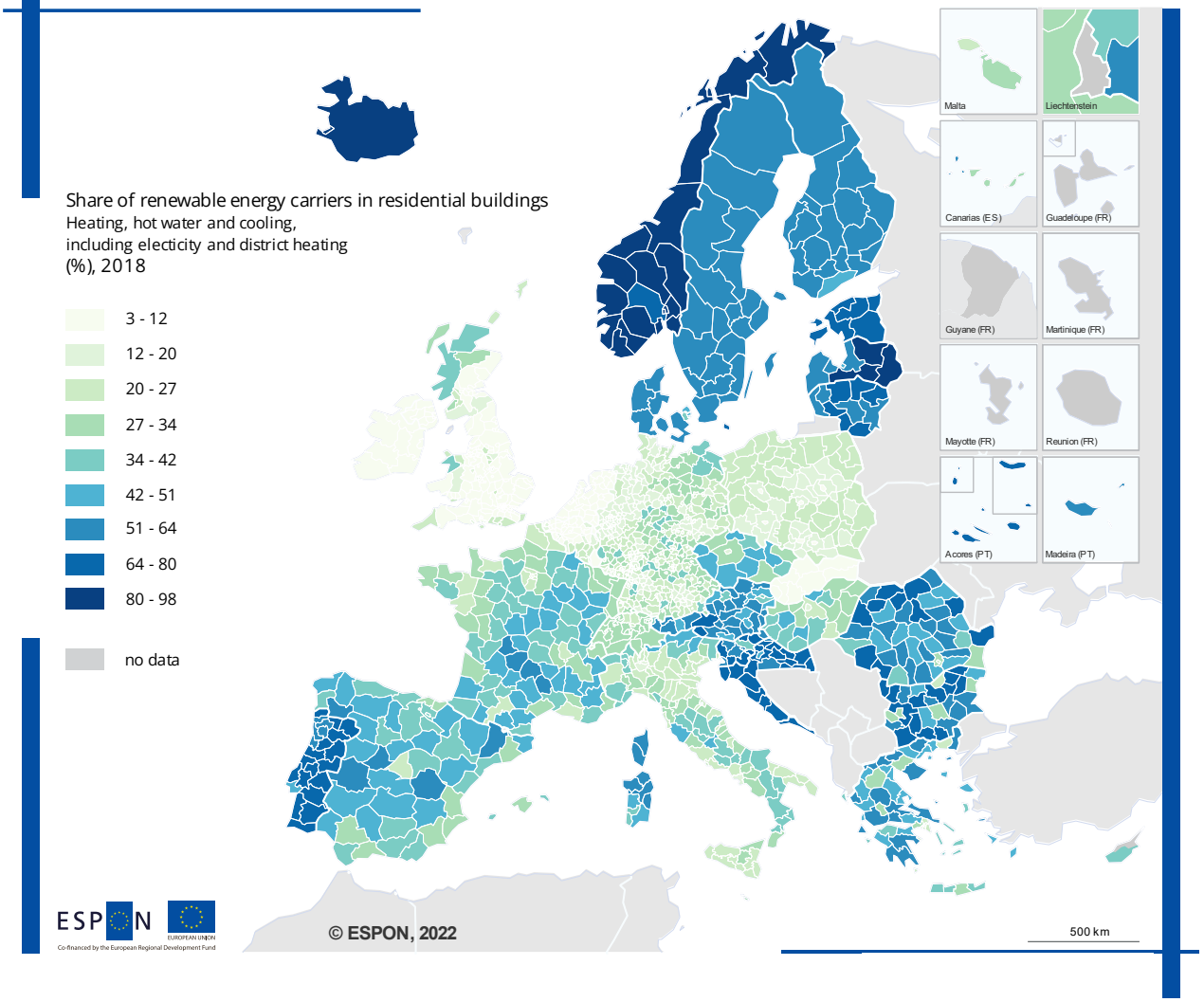
ESPON – European Territorial Observation Network climate scenarios show that European regions' risk of being affected by climate-induced hazards increases across many countries towards the end of this century, particularly in coastal areas. It is therefore expected that risks of hazards typically associated with southern European countries (i.e. extreme heat, droughts, wildfires) will become more widespread in the rest of Europe. As a consequence, ecosystems, economic sectors, and human health and well-being will continue to be adversely affected across the continent.

1.2
The clean energy challenge

Green industrialisation can be a key contributor to the limiting of climate change and the risks it entails. One of the cornerstones of green industrialisation is the move from fossil fuel dependency to clean energy solutions. Heating and cooling of buildings, for instance, account for about half of the EU's energy consumption, with space heating and hot water production making up the biggest part of households' final energy consumption (ESPON, 2022b). Renewable energy will play a crucial role in the decarbonisation of this sector, although the transition process advances at different rates across Europe (see Map 1.1).

The European Green Deal, presented in December 2019, strives for a clean energy transition that shifts energy production away from fossil-based energy sources towards renewable energy sources (European Council, 2019). Most European regions are not yet in line with the policy ambitions set out in the Green Deal regarding the absolute share of renewables (i.e. 49 % by 2030 in the building sector, with an annual increase of 1.1 %) (ESPON, 2022b). High energy prices due to the post-COVID-19 economic recovery, the relaxation of travel restrictions, and the Russian war of aggression against Ukraine intensified the need to accelerate the clean energy transition.

Map 1.1
Share of renewable energy carriers in residential buildings, 2018



Regional level: NUTS 3 (2016)
Source: ESPON LOCATE, 2022
Origin of data: Eurostat, own calculations, 2020
© UMS RIATE for administrative boundaries

The Russian war of aggression against Ukraine in particular initiated a period of profound instability and risk, including an unprecedented energy insecurity and cost-of-living crisis. In response to these challenges, the European Commission, together with Member States, made several adjustments to energy and commodity markets and flows. These changes limited the excessively high gas prices, cutting energy costs for households and businesses (European Council, 2023). In this way, the Russian war of aggression against Ukraine reaffirmed the ambition of the European Green Deal, including the 'leave no person and no place behind' principle. In fact, it could act as a catalyst for the green transition in Europe, as it has revealed the continent's dependence on energy imports and spurred ambitions to accelerate the clean energy transition to meet the goals laid down in the European Green Deal.

2
Green industrialisation as part of the solution for global challenges

As the risk of slowed-down decarbonisation became clear after the COVID-19 pandemic, consensus developed at the international level that world leaders need to counteract this trend to accelerate the transition towards more sustainable and inclusive developments. A relatively novel concept that gained traction in the European context is the 'green transition', which can be broadly defined as a far-reaching sociotechnical shift towards a climate-neutral and greener economy. At the industrial level, the green transition entails a conversion from carbon-intensive industrial processes towards more sustainable, environmentally friendly solutions. This transformation has been termed 'green industrialisation'.

2.1
Defining the green industrialisation

The United Nations Industrial Development Organization (UNIDO) defines 'green industries' as those that promote 'sustainable patterns of production and consumption, i.e. patterns that are resource and energy efficient, low-carbon and low waste, non-polluting and safe, and which produce products that are responsibly managed throughout their lifecycle' (UNIDO, 2011a). Green industrialisation is described as a process that aims at attaining sustainable economic growth and promotes sustainable economies. To be successful, green industrialisation relies on three core transformations (Fücks, 2019; UNIDO, 2011b):

- the move **from fossil fuels to renewable energy sources**, entailing a complete overhaul of how energy is generated, transported, stored and used;
- an **increase in resource efficiency**, so that the same amount of raw material or energy can be used for more; and
- the **transition to a circular economy** in which all waste will be recycled and reused – in other words, decoupling economic development from resource depletion, environmental degradation and pollution.

To accomplish the transformations envisaged, UNIDO asserts that a two-pronged strategy is needed (UNIDO, 2011b).

1. **Greening of existing industries.** Existing industries need to become more sustainable and reduce the environmental impact of their production processes and products, for example by using resources more efficiently, by replacing fossil fuels with renewable energy sources and by reducing pollutant discharges (Luken and Clarence-Smith, 2019). There should also be a focus on extending the lifetime of products and building circular systems in which products and materials are repaired, reused or recycled at the end of their lives.
2. **Creating new green industries.** The development and expansion of new green industries that provide sustainable goods and services should be stimulated. This includes activities related to material recovery, recycling, waste management and energy conservation.

By striving towards more sustainable industrial production and consumption systems, green industrialisation contributes to reaching the Sustainable Development Goals (SDGs). In particular, key priorities such as promoting inclusive and sustainable industrialisation (SDG 9) and responsible consumption and production (SDG 12) are directly enabled by green industrialisation. In addition, green industrialisation also contributes to reaching social and environmental goals by creating new good-quality jobs and reducing pressures on the environment.

2.2
A transition on its way

The industrial sector in Europe accounted for around 24 % of greenhouse gas emissions in the European Union in 2020. However, this figure has decreased steadily during the last two decades, indicating that the transition to a low-carbon economy has already started.

The decarbonisation of European economies rests on far-reaching processes of green industrialisation and innovation. The adoption of renewable energy sources is perhaps the most significant sign of such transformations. Between 2005 and 2020, the share of renewables in electricity production increased spectacularly in the EU (129 % increase). Similarly, the environmental goods and services sector already constitutes a considerable share of the EU economies. Measured in terms of gross value added as a percentage of gross domestic product (GDP), the environmental goods and services sector represents 2.2 % in the EU. In employment terms, these figures translate into 4.5 million jobs at the EU level (Eurostat, 2023).

Consumption choices are another important driving force influencing economic decarbonisation. According to figures from Eurostat, consumption-based greenhouse gas emissions declined by 5 % in the EU-27 between 2014 and 2019 (Eurostat, 2022). One major ongoing development at the global level is the mass adoption of electric vehicles. According to the data provided by the International Energy Agency (IEA), 22 % of the cars sold in the EU-27 in 2022 were electric vehicles (IEA, 2022).

Green investors flock to the northernmost region of Scandinavia in search of accessible and cheaper renewable energy and an abundant supply of raw materials. Traditional mining of iron ore and other metals is coupled with strategic deposits of critical raw materials, which are also relatively abundant in the region. In early 2023, the mining company Luossavaara-Kiirunavaara Aktiebolag (LKAB) announced the discovery of a - million-tonne deposit of rare earth metals exceeding in Kiruna, Sweden (LKAB, 2023). This can be considered Europe's largest deposit of these critical raw materials, which are extremely important for green technology including wind turbines and electric vehicles.

However, progress in green industrialisation is not free of challenges. One aspect of concern is the capacity of energy systems to adapt to the new industrial landscape. The increasing demand for renewable energy from industry and transport may place additional pressure on existing energy infrastructures. Other areas of concern are the potentially higher material consumption and land take linked to new energy production sites (wind and solar) and also the intensification of energy-oriented forestry and agriculture activities.

2.3
Benefits of green industrialisation

With the Russian war of aggression against Ukraine, ongoing inflation and disturbed supply chains, burdens on businesses and entire industrial sectors in Europe have increased. This has raised concerns that the green industrialisation process in Europe may slow down. Several countries, including Germany, the Netherlands and Poland, extended the lifespan of coal-fired power plants to reduce energy prices and increase energy security (Dennison, 2022). Nonetheless, the Russian war of aggression against Ukraine and its impacts have also created a strong impetus to move green industrialisation forward, not only to reach climate goals and mitigate global warming but also to make European industries less dependent on energy exports from less stable world regions.

An accelerated green industrialisation can bring various opportunities and benefits for societies in Europe.

- **Reaching climate goals.** Reducing industrial emissions of greenhouse gases by increasing resource efficiency, phasing out fossil fuels and transitioning to circular production and consumption patterns is key to meeting existing targets on the path to climate neutrality.
- **International competitiveness.** Countries, regions and sectors that are front runners in developing and adopting new green technologies are likely to develop comparative advantages on the global market. They will set regulatory and technological standards and export green products and knowledge, thereby gaining economically.
- **Cost reduction and resilience.** Investments in renewable energy and resource efficiency will reduce primary energy consumption and the demand for virgin resources, thereby creating potentials for cost reduction. European economies will also become more resilient and less dependent on volatile prices of raw materials on international markets.
- **Productivity increases.** The green industrialisation process is likely to trigger productivity increases thanks to the digitalisation of many of the industries in transition.

For people living in municipalities where key green industrialisation processes and investments take place, the following benefits can accrue.

- **Job creation.** One of the prime benefits expected from green industrialisation is the creation of new green jobs, especially in areas such as green energy generation, transmission and storage, the construction and transport sector, manufacturing and metallurgy.
- **Population growth and public services.** Wherever investments in green industries lead to the creation of new green jobs, this may offer new perspectives for resident populations and thereby reduce outmigration. For rural and remote areas, it may also contribute to attracting immigrants from other regions and abroad, thereby offering opportunities to maintain or even expand public services.
- **Increased health and well-being.** Green industrialisation can help to reduce pollution and improve water and air quality, thereby promoting the quality of local habitats and environments and also the health and well-being of citizens. Nonetheless, there is a risk that the green transition may also impair well-being and quality of life at local level, and affect wildlife and traditional livelihoods, for instance, if land that was traditionally used for recreation or as grazing grounds is used for new purposes such as the development of wind parks or for the extraction or critical raw materials.

3.
What regions need to achieve green industrialisation

Transitioning to green industrialisation does more than bring about development opportunities and challenges for the industries and societies concerned, as mentioned in Chapter 2. Public authorities in regions and municipalities also encounter opportunities and challenges in relation to the restructuring of existing industries and/or the creation of green industries in their territories. Some of these opportunities and challenges are addressed in the subsequent sections.

3.1
Demography, employment and shortage of skilled labour

For decades, many rural and remote areas in Europe have experienced outmigration, particularly of young and highly educated women, and the shrinking and ageing of the remaining population. As a consequence, these regions have had to cope with numerous development challenges, for instance in recruiting and retaining workforce for social services and other public and private sectors of the economy, which has resulted in difficulties in ensuring continued access to public services (Berlina and Lundgren, 2020; Bogason et al., 2021). In many rural areas, depopulation and economic decline have created and perpetuated a vicious circle of a further shrinking and ageing population and further losses of productivity and access to public services, therefore lowering their attractiveness as places to live and work.

Beyond the health and social care sector, many countries throughout Europe experience skills shortages, as skilled workers across sectors approach their retirement age, qualified successors are lacking and more people wish to work part-time or reorient their professional life. As a consequence, many posts remain vacant for longer periods of time. The European Commission acknowledges this 'talent development trap' as a risk to territorial cohesion that might hamper the resilience and competitiveness of the EU, and it has therefore launched the 'talent booster mechanism' to support EU regions (European Commission, 2023b).

Particularly rural, remote and/or shrinking regions that often experience more difficulties in attracting people could focus on their young people who are neither in employment nor in education or training. Many young people in these regions do not complete upper secondary education and are left with poor employment prospects (19 %, compared with the EU average of 13 %). To ensure more inclusiveness and address skills mismatches and labour shortages, investments in reskilling and upskilling through education, training and lifelong learning are needed. Investments are needed in training that focuses on those skills that match the current and future needs of the local labour market (European Commission, 2023b).

Aware of the particular challenges of rural regions, the European Commission launched 'A long-term vision for the EU's rural areas' to address the specific development issues with a wide range of actions. This vision defines the role and development potentials of these territories in transitioning to a greener society and economy in Europe. In addition, an EU rural action plan was issued to 'pave the way to fostering territorial cohesion and create new opportunities to attract innovative businesses, provide access to quality jobs, promote new and improved skills, ensure better infrastructure and services, and leverage the role of sustainable agriculture as well as diversified economic activities' (European Commission, 2021).

One of the prime benefits expected from green industrialisation is the creation of new green jobs. This may offer new development opportunities

benefiting people living in rural and remote regions in particular; these regions have been lagging behind in their economic development in recent decades.

Current evidence suggests that the newly created green jobs will primarily be 'good-quality' jobs that offer adequate wages, job security, low levels of repetition and a low risk of automation and delocalisation abroad (Terzi, 2022). Although the green transition will in the long run result in the disappearance of some jobs in traditionally carbon-intensive sectors, studies suggest that the required upskilling and retraining for the newly created green jobs could mostly happen through retraining on the job, which would facilitate job transition (Bowen et al., 2018). That way, existing local workforce could be prepared for the changes to come. Furthermore, there will also continue to be a need for non- or low-skilled workforce, even in the green transition sector (NSPA, 2022).

For green industrialisation to take off, a large share of people will need to work in jobs related to the knowledge economy. The knowledge economy is an economic sector that is 'able to produce new knowledge from technologically advanced sectors and/or functions present in a territorial area and/or where knowledge is obtained through links (formal or informal) with other economies' (ESPON, 2018a). This economic sector is crucial for the design and deployment of solutions for the transition process from non-renewable to renewable energy sources (Wang et al., 2022).

Moreover, due to an increasing population in some municipalities and regions following an expansion of green industrialisation, there will be a need for additional workforce in other sectors, for instance in public administration and social and health care. These developments could halt outmigration from rural regions and turn these regions into 'transition communities' that use sustainable industrial production and business practices to become more attractive to people as places to live. However, this may only be the case for rural areas in commuting distance of these green industries. More distant rural regions could lose out on the benefits of green industry developments.

Finally, a major limiting factor in spatial planning and local/regional restructuring is the shortage of human resources in public authorities, particularly in small municipalities (ESPON, 2011). Small local authorities with few staff can experience difficulties in planning and supporting the processes that are necessary to adjust their society and economy to the green transition, particularly if large investments are required. In these cases, multilevel governance support is crucial for increasing the chances of implementation of local initiatives. Nurturing cooperation across different governance levels and also institutional development are key for enabling regions, particularly those that have lagged behind for decades in terms of socioeconomic development, to make full use of their development potentials (ESPON, 2017).

Attracting and retaining skilled workers is a challenge given the increased competition among countries around the world. Generally, new approaches to finding and recruiting human resources are needed across all sectors of regional economies. Methods of 'active sourcing', a recruitment concept that involves targeted, proactive searching in order to approach and recruit potential new employees, will need to be applied a lot more in the future to find and attract required workers. To facilitate long-term retainment of workers, employers need to develop a holistic approach to talent management, which involves the identification of potentially hidden talents of all employees that could be useful for their employer, and subsequent internal recruitment (Schreiber, 2023).

Relevant policy measures for attracting skilled workers mostly focus on favourable migration conditions but also concern quality of life (see Section 3.2). Proximity to unspoilt nature, good access to services of general interest, good access to high-quality food, the presence of natural and cultural heritage, connectivity and good governance are key factors of attractiveness. Another important aspect is spouse employability, that is, the possibility for a partner to also find employment in the region. The different aspects that can make a region attractive are further explored in Section 3.2.

3.2
Planning for the sustainable society – housing, local attractiveness and social sustainability

For regions to be attractive to residents but also to people who contemplate moving there, the provision of affordable housing, infrastructure, public services, connectivity and an attractive living environment is key. In the absence of such services and infrastructures, feelings of remoteness and social exclusion quickly accrue. Many rural and remote regions struggle with just these aspects due to long periods of 'downwards cycle' development and the related repercussions on human resources and public budgets (ESPON, 2017). Particularly in these challenged regions, towns and cities can play a key role in improving rural attractiveness and development by providing services for their surrounding areas. However, municipalities and regions that transition to green industrial production are likely to struggle with the predicament that arises from the need to take measures that improve local/regional attractiveness and quality of life given that their tax revenues, and thereby their financial resources, will increase only once new inhabitants have moved there and are paying municipal income tax (OECD, 2023).

When planning for growth, it is important for stakeholders to incorporate the needs of the resident population to avoid friction between newcomers and locals. Rapid transformations such as green industrialisation bear a risk of excluding some people who do not have the required skill set to find employment in the green economy. When this is combined with an influx of new people who take up jobs, which potentially also allow them to pay for higher-quality housing, services and infrastructure, feelings of being left behind can spur public discontent and result in segregated societies. Moreover, newcomers are often employed on a 'fly-in fly-out' basis and form a kind of parallel society not integrated in the overall development. That is why social sustainability should be a crucial aspect of any local/regional development strategy.

It is not always obvious what concretely defines the quality of a place and the overall quality of life there. Culture, for instance, can be an important element in the continued development of a municipality. The cultural vibrancy of a place is one expression of and opportunity for social interaction, as can be sports and other leisure time activities. Generally, well-thought-through strategies and dedicated architecture on a human scale, offering meeting places to people, can be instrumental (ESPON, 2023).

Discussions at the ESPON seminar in Luleå underlined the significance of a sense of community in any given place when it comes to attractive living environments and quality of life. Green industrialisation could even be the starting point for the development of new communities, as a lot of newcomers to towns and regions will find themselves in similar situations, starting a new life in a new environment. They could be helped in the beginning by 'ambassadors' of the local population who could support new residents in finding their way in their new home town/region, thereby easing the integration process (ESPON, 2023).

The quality of services provided to users is clearly one component of quality of life, as it directly affects the standard of living, at least of the part of population using those services. But quality of life goes beyond good-quality services. It is important to consider the perspective of people already living in a given place but not using certain services, and also the perspective of visitors, to get a complete picture of a place's quality of life (ESPON, 2020a).

As some municipalities/regions are set to grow in the wake of green industrialisation, the need for qualified workforce in the health and social care sector will become more acute. Qualified staff will be needed in different fields in kindergartens, schools, medical practices, hospitals and retirement homes. However, rural and sparsely populated regions have particular difficulties filling job vacancies and retaining people in the health and social care sector, with negative repercussions on the quality of care provided there. Difficult working conditions, temporary contracts, lack of opportunities for professional development and/or increasing competition from the private sector and new industries, where salaries are often higher, make attracting

qualified workers even more challenging. That is why recruitment and retention measures alone will not suffice to tackle the sector-specific challenges. Rather, the organisation and delivery of social care services need to be rethought for institutions to be able to offer new and improved services and new methods of service provision and to implement organisational changes (Penje and Berlina, 2021). Digital solutions and cross-border collaboration could be helpful in this context (see Section 3.5 and Chapter 4).

A useful tool for steering the growth development of a territory in an integrated way is the development of a vision as part of a long-term development strategy that relates to attracting particular target groups such as required workforce and/or tourists. To ensure buy-in of such a vision and strategy by residents and stakeholders alike, it is important to involve as many citizens and stakeholders as possible, and to clearly communicate what concretely needs to change and why, and what the challenges will be in the transition process. In-person meetings with residents and stakeholders are key to create trust and give people of all walks of life the opportunity to be heard (ESPON, 2023). Likewise, it is crucial to develop appropriate governance structures that secure stakeholder participation and mobilise the resources of different sectors in pursuit of long-term goals.

In the context of the climate crisis and ongoing biodiversity loss, the definition of short-, medium- and long-term development goals is crucial. Any planning for growing towns and cities should be mindful of potential risks for experiencing climate-related hazards such as river or coastal flooding and consider relevant adaptation measures.

3.3
Land take - land use conflicts and divergent interests

Green industries are dependent on clean renewable energy and many types of rare minerals. The production of renewable energy, the extraction of minerals from the soil, the housing of new inhabitants and increased transport needs all lead to new demands on available land, which may result in land use conflicts among those with competing interests. As land is limited and mostly already used for some other purpose, conflicts between land uses and the interest groups behind them inevitably arise.

One example of land use conflicts can be found in the very north of the Nordic countries. This part of Europe is traditionally the living area of the Sámi people, the only designated indigenous people in the EU. Reindeer herding is viewed as a fundamental part of Sámi culture and livelihood. Exploitation of Sápmi land and resources through mining has been occurring for centuries and has even increased in recent years because resource demand due to green industrialisation has escalated and procedures for dispossession have become quicker (Kløcker Larsen et.al., 2022). Since the Sámi as indigenous people have special rights, planning and decision-making processes should take these into account. The 'scaling up' research project is looking into this issue and aims to apply a comparative and transdisciplinary approach to develop new knowledge and planning solutions for mineral-related land use conflicts in Swedish Sápmi. The conceptual approach and planning solutions could be applied to other contexts and support transition to a sustainable society (Luleå University of Technology, 2022).

The attempt to accommodate different user interests and to change the use of land in some instances may lead to highly heterogeneous effects, with benefits for some groups of land users and losses for others. To address these effects around land use conflicts, participation processes are important and land use plans should ideally be inclusive by design. As pointed out in Section 3.2, it is crucial for any territorial development plan to create a sense of ownership for the citizens concerned. Resistance to certain developments often comes from long-term residents who feel their way of life might be threatened and therefore oppose the change. Open discussions in the framework of participation processes increase mutual understanding and facilitate the coexistence of different interests. They can also be an opportunity for industries to demonstrate more corporate (social) responsibility towards the local population. While such participation processes

take time, they will eventually be beneficial for all involved in major transition processes, such as green industrialisation, as they can help avoid new challenges, such as gentrification and other social frictions (ESPON, 2023).

In general, decisions on land use changes that intend to safeguard sustainability entail a trade-off between not only different interest groups but also the different dimensions of sustainability (i.e. economic, environmental and social issues). To avoid one dimension being sacrificed for the benefit of the others, it is crucial that all three sustainability dimensions are simultaneously and explicitly addressed and trade-offs are limited. In practice, economic considerations are normally sufficiently taken into account, whereas environmental and social aspects might need to be given more attention (ESPON, 2020b).

A first step in conflict resolution is making an inventory of the conflicts that can and do exist between different competing users of the land that is needed and affected by a green industrialisation process. Tools, instruments and mechanisms that can be used to identify and reconcile competing interests over land use are the following.

- The **strategic environmental assessment** (SEA) procedure can safeguard sustainability of land use changes due to green industrialisation by assessing the potential environmental impacts of all related strategies, plans and programmes. Strategic environmental assessment is required by an EU directive and has been transferred into the national polices of all EU countries (ESPON, 2019a).
- **Spatial planning** is a process whereby various land user interests can be brought together to determine how space can be allocated to meet the needs of different users. The outcome of this process usually takes the form of a plan, which represents a negotiated outcome of balancing various interests at a particular moment in time. The plan is not fixed but can change in response to developing circumstances and political imperatives (ESPON, 2022c).
- When space is limited, **multifunctionality** (i.e. the combination of different functions/uses in buildings, the use of rooftops and/or the combination of recreation and agriculture) is key. Appropriate solutions and combinations can be found by involving all stakeholders concerned, looking into smart uses of space and considering which functions can be combined and how (ESPON, 2022c).
- A **land use monitoring tool** improves the factual basis for spatial planning processes and regional development strategies. Moreover, such a tool ensures that all actors involved in the development of these processes and strategies, including citizens, have a common knowledge base for discussing the changing land use patterns (ESPON, 2021a).
- The **social impact management planning** (SIMP) tool helps local planners to outline a strategy to identify, monitor and react to ongoing social impacts of large-scale industrial activities in sparsely populated regions. In addition, the tool provides opportunities for local residents to air concerns and participate in developing local strategies for the future. This can benefit the private sector by obtaining and maintaining broad community acceptance and support for their project (Nordregio, 2017).
- **Compensation** of landowners when their land is being used or taken for development is normal practice in most countries. Providing compensation to municipalities and neighbouring citizens for controversial developments can ensure that there are local benefits and that there is better cooperation with the citizens that are being affected by these controversial developments (ESPON, 2023).

3.4
Territorial governance - how to obtain tangible local benefits?

As the previous sections show, there are multiple potential gains for rural regions in engaging in green industrialisation processes. Municipalities seem to be the right governance level for making sure that citizens' needs and also potential local development obstacles are taken into account. However, many municipalities and regions do not have the capacity to deal with the related development challenges by themselves. Local public authorities often struggle with a shortage and/or lack of skilled human and financial resources, both of which are needed for planning and managing the redevelopment of any place (ESPON, 2022c). Therefore, municipalities need the support of their regional or national government. Such support can, for instance, take the form of taxes from locally based industries or wind parks, which remain in the municipality for further investment in the local restructuring instead of going to other parts of the country or abroad, where the companies' headquarters might be located. Support could also be given through the allocation of specifically trained staff, for example professional moderators that can come in to solve land use conflicts (ESPON, 2023).

A key governance challenge in the green industrialisation of rural regions is to ensure that the benefits of the exploitation of natural resources can accrue to the local/regional population. The OECD sees development opportunities for rural regions through the deployment of renewable energy sources that can often be found there, but it also points out that 'development benefits are not automatic' and 'local economic growth will require more coherent strategies, the right set of local conditions, and a place-based approach to deployment' (OECD, 2012). By the same token, a recent research project for the Nordic Council of Ministers found that 'it is still uncertain whether renewable energy projects support local job creation and local procurement and to what extent locally sourced labour boosts long-term development in these areas' (Karlsdóttir et al., 2022).

If natural resources are being used for the greater good, for instance to boost the national economy, rather than resulting in tangible local benefits, geographies of discontent might arise. To avoid this, coordination of policies across sectors and governance levels is vital. Deciding which level of governance needs to deal with a certain issue is a tricky task and different countries address this in different ways. In the Netherlands, for example, when major system choices need to be made related to issues such as water safety, nature and agriculture, electricity and gas networks, it is the national government that takes responsibility. But even in these instances, there needs to be public consultation and involvement. In Hungary, on the other hand, the locations for the construction of several battery factories – which need a lot of water and land, raising environmental concerns – were decided at national level without any citizen involvement, which led to protests organised by local communities (ESPON, 2023).

Tools, instruments and mechanisms that can be used to obtain tangible local benefits are the following.

- **Functional planning systems.** Planning within functional regions helps to address the reality of environmental, commuting, economic and other flows across administrative borders, and usually coincides with new territorial governance arrangements (ESPON, 2018b).
- **Transnational coordination.** When it comes to the attraction of skilled workers from other countries, transnational coordination with stakeholders from potential sending countries of workers is needed, particularly because competition for the same human resources might arise (ESPON, 2014).
- **Local benefit analysis toolbox.** The local benefit analysis toolbox is a strategic planning tool that supports local authorities facing unique development challenges posed by large-scale industrial developments. With the help of this toolbox, local authorities can produce a location-based assessment of business development opportunities so that local economic benefits from large-scale, resource-based industries can be maximised. As a consequence, local communities can

better prosper based on their natural advantages (Nordregio, 2017).

- **Territorial impact assessment (TIA).** The ESPON TIA tool can help national authorities to find a good balance between resource exploitation and benefit creation when developing policies and strategies in relation to green industrialisation. It supports the identification of those areas or regions that may face the greatest impacts of particular developments, the nature of these impacts and their intensity. By taking into account potential asymmetric impacts, not only the effectiveness and efficiency of the policy but also political support for the policy can be increased, which boosts its benefits (ESPON, 2021b).
- **Pilot action.** Within the framework of the Territorial Agenda 2030, a pilot action has been launched to better understand how different sectoral policies can shape spatial imbalances (Territorial Agenda 2030, n.d.). The partners cooperating in this pilot action have been working on a manual to familiarise public administration representatives with the TIA methodology to assess the territorial impacts of public policies, strategies, programmes and legislative proposals. The forthcoming manual will discuss the main methods used for TIA in Europe and introduce a new participatory method that can take into account diffusion effects between areas subject to policy intervention and other areas.

To sum up, responsible leadership and governance capacity are key in improving territorial governance, which underpins the need for support of rural municipalities and regions in managing green industrialisation processes. However, the role of companies and industries within the green industrialisation process should not be forgotten. As employers, companies have a considerable influence on governmental decisions at all levels of governance. Some private businesses might drive green industrialisation, but their economic interests do not always align with the key goals of the green transition (ESPON, 2023).

3.5 Digitalisation in public service provision and planning – the need for good connectivity

During recent years, the massive increase in the use of digital technologies for production, distance working and learning, and the provision of services has provided new opportunities for peripheral and marginal areas. Digitalisation can help a region to attract skilled labour to the industrial and/or the public sector. By making use of digital solutions within, for instance, education and the health sector, and also in planning and stakeholder involvement, the quality, efficiency and accessibility of services can be improved. In addition, more telework can increase the appeal of non-urban living and lead to demand-driven developments of coworking spaces or improvements of telecommunication infrastructure (ESPON, 2022d). However, this development may also increase socioeconomic and territorial disparities if access to broadband connection and digital platforms are difficult or impossible for some social groups or in some territorial areas. Moreover, although digitalisation offers opportunities for rural areas, an increased use of digital solutions leads to a larger energy footprint, and therefore contributes to mitigating the climate crisis only if the increased energy need is counterbalanced by, for example, decreased need for physical transportation (ESPON, 2023).

A prerequisite for making use of public e-services, participating in online interaction opportunities and encouraging digital innovation is access to the internet via good broadband connections. In northern Sweden, digital connectivity fares well, but in other rural regions in Europe this does not appear to be the case. Broadband coverage of rural areas remains challenging; 14 % of households are not covered by any fixed network and 42 % are not covered by any next-generation access technology (ESPON, 2021c).

The gap between rural and non-rural regions in relation to fast broadband coverage has also been recognised by the EU. The EU Rural Vision aims at reaching 100 % fast broadband coverage in rural areas by 2025 (European Commission, 2021). This development is supported by European funding

(e.g. EAFRD and ERDF), which should be combined with national and private funding to invest in infrastructure, technology and people. The European Startup Village Forum, for example, facilitates the exchange of knowledge and expertise on how to promote start-up-driven innovation in rural areas (Wojciechowski, 2023).

Research shows that digitalisation in health and social care across the Nordic countries boosts regional development and contributes to economic (e.g. new jobs), social (e.g. spatial justice) and environmental (e.g. reduced transportation) sustainability. For example, general safety, quality of life and health care provision quality have been shown to improve with the introduction of spatially distanced medical consultations, and this has also improved inclusion, with patients more involved in their own treatment. The implementation of digitalisation in health care and social care is, to a large extent, an issue of leadership and management. Important obstacles to implementing digitalisation in health and social care are a lack of change management, a lack of economic resources, a lack of user-friendly solutions, poor data security, delays in the accommodation of laws related to digital tools, and a lack of interest and incentives among doctors and health care ethicists (Lundgren et al., 2020; ESPON, 2023).

At the same time, digitalisation can underpin green industrialisation processes in a direct way. For instance, when developing green industrialisation initiatives in a region, it is important to investigate the possibility of integrating an industrial symbiosis approach to reuse waste and by-products through mutually beneficial transactions. This approach involves using innovative methods to identify business opportunities that capture the value of underutilised resources. Digital cooperation platforms could be established to support cooperation and coordination between the suppliers of production residuals, potential users and the providers of know-how and technology. The services provided by digital cooperation platforms can include support of material scans and matchmaking for small and medium-sized enterprises; industrial symbiosis-related technical training on the valorisation of material streams; and support in securing funding (ESPON, 2019b).

Green industrialisation processes involve planning, and parts of planning processes can be digitalised to improve efficiency, enable innovation, increase transparency and involve citizens in planning matters. For this to take place, planning authorities and planning consultancies need new skills, new technology and new digital routines for digital planning processes (ESPON, 2021d). A first step in this direction is to digitalise planning data, representing planning intentions and regulations. The most common purpose of digital planning data is to provide everyone with easy access to planning data and planning documents and ensure there is a high level of transparency. A second step would be to develop an easy and accessible digital plan portal, a central entry point to find plans, visualise them, combine them and even support hearing processes and increase participation.

4
Conclusions and policy advice

As discussed in previous chapters, green industrialisation requires far-reaching socioeconomic changes not only in the way industries produce and businesses are run. But as industries and businesses need people to work for them and often in regions that are short of workforce, green industrialisation is set to bring about large-scale structural changes in these places. That being the case, green industrialisation forms one building block of a more comprehensive green transition process that is needed to withstand the manifold consequences of the unfolding climate crisis. The territorial diversity of Europe means that different types of territories have different opportunities and challenges in bringing about the required changes. Place-specific policy responses are therefore needed to support European cities and regions in this transition process to ensure that they can cope with disruptive changes and adapt to the needed transformation to be more resilient to future crises. Local administrations have planning authority over their territory and can utilise several means within planning to facilitate such transition processes. However, especially in rural areas, they struggle with limited resources, both human and financial, which is why local administrations need support from higher levels of governance.

Various financial instruments available in the context of EU cohesion policy can assist European municipalities in the transition towards green industrialisation. The European Urban Initiative supports cities' capacity-building for designing sustainable urban development strategies, policies and practices in an integrated and participative manner, and also for improving the strategies' design quality and overall implementation (Haapakka, 2023). This support can take different forms, for instance city-to-city exchanges or peer learning reviews (European Urban Initiative, 2023).

The New European Bauhaus is another initiative that supports towns and cities 'to imagine and build together a sustainable and inclusive future that is beautiful for our eyes, minds and souls', which was strongly advocated by speakers and participants at the ESPON seminar in Luleå (European Union, 2023). There are dedicated calls open to municipal authorities to obtain funding, for example to transform their built environment and the associated lifestyles, to green cities, to develop sustainable tourism or to harness talent in shrinking cities (European Union, 2023; Haapakka, 2023).

The European Commission also offers targeted support for rural areas, for example through the EU long-term vision for rural areas up to 2040. In this context, the Rural Pact provides a framework for cooperation between public authorities and stakeholders at the European, national, regional and local levels (European Commission, 2021). The Rural Pact can be used for networking, collaborating and mutual learning. In addition, the Joint Research Centre's *Handbook of Territorial and Local Development Strategies* offers concrete guidance to interested stakeholders on funding opportunities for rural strategies or projects (Pertoldi et al., 2022). It provides suggestions on how to reduce the administrative burden and an overview of all types of EU funding for non-urban strategies and how to combine them. Finally, the just transition mechanism offers support to specific territories in transition. To access funding, national authorities need to compile territorial just transition plans that detail the specific challenges and opportunities in regions that undergo transition processes.

Territorial governance, as advocated by ESPON, is key to planning and moving through the systemic changes that are triggered by green industrialisation. 'The capacity to connect and interact between actors as well as the development of strategic institutional capacity is necessary to improve local policymaking, and can help smaller municipalities achieving a more equal standing in regional and national contexts' (ESPON, 2017). This also means that planning should not stop at the borders of the municipalities where most of the green industrialisation development takes place. Stakeholders and citizens of neighbouring and

geographically more remote parts of these municipalities need to be involved and consulted to make sure that they can benefit from the developments taking place. Participatory planning across all levels of governance is key, for instance to set up new infrastructure, offer additional services of general interest and, ultimately, make the places where people live, work and play more attractive. If places are not sufficiently attractive, people will not want to live and/or move there.

A very important element of attractive places that was repeatedly brought up during discussions at the ESPON seminar in Luleå is the sense of community, the existing social ties in a place that make life easier and richer. With this in mind, smaller towns can be seen in a new perspective compared with bigger cities, that is, 'they could be perceived as gems where people have a good quality of life' (ESPON, 2023). This issue of perception could be the target of a rebranding strategy, particularly for places that have an unflattering reputation. The narrative around these places needs to be rewritten to change people's mindset in order to make them aware of the qualities of such places. At the same time, the local population needs to be brought on board with any growth development and any change that will have an impact on their lives (ESPON, 2023). In the case of northern Sweden, for instance, taking care of those who are already there could, among other things, translate into specific measures to educate newcomers to the region about Sámi culture, heritage and way of life, and the importance of the Sámi people for the region.

Given the urgency for policymakers to act and to adapt to and mitigate the impacts of climate change, it will be even more crucial in the future to allow for public participation in planning processes. In addition, communication efforts are needed to explain why the different transition processes are necessary, and what the effects of certain choices might be compared with others, to get the greatest possible support and sense of ownership by civic society. Sometimes, tough decisions might need to be made, for instance in relation to how natural resources are being used. For example, there can be a 'not in my backyard' mentality in relation to the location of wind turbines. However, green industrialisation is predicated on using clean energy sources, so wind turbines will have to be erected somewhere. This dilemma needs to be transparently communicated with concerned citizens and other interest groups, who need to be involved in the planning processes, and the opportunity to obtain local tangible benefits should be utilised to avoid public discontent to the greatest degree possible.

Finally, and as the abovementioned ESPON seminar in Luleå underlined, what is probably needed most is imagination and the capacity to develop positive visions for the future. 'We face new realities where maybe resources aren't always readily available. Therefore, we need to be much more imaginative to dare and come up with new solutions for the future to create new realities' (ESPON, 2023). The active engagement of civic society is key to improve the attractiveness of a place. Attractiveness comes from everyone (citizens, interest groups, business representatives, etc.) backing a development strategy and being committed to actively playing a role in (re)creating their living environment. Such involvement can create a sense of empowerment, as it allows people to develop a collective belief in a better future that they can actively shape and contribute to. That is why it is key for any transition process to 'start a process of cultivating longing' to create ideas and visions for the future (Hopkins, 2023). The sense of despondency that is often prevalent today in the face of multiple crises needs to be replaced by confident, forward-looking planners/decision-makers who are daring, audacious, brave and bold, and also like-minded, committed citizens who are willing to play a role.

Many solutions to the development challenges of municipalities and regions in the wake of green industrialisation and the green transition already exist, be it closing streets to cars and planting trees there to make quarters more liveable; introducing (more) bicycle lanes to reduce carbon emissions, foster physical activity and public health; or local farming to help places become more self-sufficient in feeding their inhabitants. Such innovative projects can be implemented at scale, and citizen movements are key to telling the stories of these solutions in other places to instil new ideas in planning and get development going. Likewise, more ambitious and long-term climate targets should be set by policymakers, as

predictability and stability of policies may greatly contribute to the development of new approaches to tackling development challenges. Setting ambitious targets should ideally be accompanied by facilitated consultation processes that allow the development of solutions that can be backed and supported by as many people as possible (Hopkins, 2023).

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ESPON 2030

ESPON EGTC
11 Avenue John F. Kennedy
L-1855 Luxembourg
Grand Duchy of Luxembourg
Phone: +352 20 600 280
Email: info@espon.eu
www.espon.eu

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Editorial team:
Michaela Gensheimer, Marjan van Herwijnen – ESPON EGTC; Nora Sanchez Gassen, Carlos Tapia – Nordregio

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