White Paper: **Promoting Green Living Areas. Landscape of Key Action Areas**

Prepared by:

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Introduction

Climate change represents one of the most pressing challenges of our time, demanding immediate and concerted action from all sectors of society.

The consequences of inaction are dire, with severe impacts on ecosystems, economies and human health. The environmental degradation due to climate change is an existential threat to Europe and implies consequences affecting people's daily quality of life worldwide.

The Mediterranean region is identified as one of the most vulnerable regions to climate change and defined as a significant "hotspot", based on the results of global climate change projections (Giorgi and Lionello, 2008).

Furthermore, its ecological fragility requires a coordinated effort between European and African countries on both shores of the Mediterranean. The EU is actively addressing those issues through ambitious mitigation measures, including a commitment to reduce greenhouse gas emissions by at least 55% by 2030, compared to 1990 levels, as well as a goal to achieve climate neutrality by 2050.[1]

Additionally, the EU is implementing climate change adaptation measures to safeguard against the impacts of a changing climate.[2] Additionally, it is anticipated that these environmental challenges can be offset by the green transition, initiated by the Green Deal, a package of policy initiatives to reach climate neutrality by 2050. As the effects of climate change become increasingly evident, the role of municipalities and local governments has emerged as crucial in driving the necessary mitigation and adaptation initiatives. Local governments are uniquely positioned to implement and promote sustainable practices that can significantly reduce greenhouse gas emissions and build resilience within communities (OECD, 2020a and Salvia et al., 2021).

Local Green Deals are the local response to the European Green Deal. They aim at turning climate and environmental challenges into opportunities. However, the European Green Deal is not immediately applicable at the local level; it needs to be adapted to the local context. This adaptation can be more than a top-down process, which should be used to include and engage a city's residents and empower them as co-creators of a Local Green Deal, which matches their interests, priorities and the local frameworks.[3]

[1] Sources: https://climate.ec.europa.eu/eu-action/climate-strategies-targets/2030-climate-targets_en
[2] Sources: https://climate.ec.europa.eu/eu-action/climate-strategies-targets/2030-climate-targets_en
[3] https://iclei-europe.org/projects/?c=search&uid=vhMWk6gU

A 'deal' is an agreement, not just a plan. Therefore, Local Green Deals[4] are going far beyond the usual 'action planning' approach: With local businesses, stakeholder organisations and civil society initiatives, local governments agree to initiatives supporting the city's sustainability goals.[5] To achieve those goals a profound transformation, new solutions for mobility, green economy development, urban health, liveability, social inclusion and resilient planning are needed. Such solutions are proposed and brought to life by 19 thematic projects, which are part of the Green Living Area Mission (GLA)[6] – one of the four missions of the Interreg Euro MED programme. The Green Living Areas Mission undertakes thematic projects (TP) that bring local communities to life with green development at their epicentre, reducing negative climate impacts on the region's ecosystems and enhancing climate resilience.

The Green Living Areas Mission supports the transformation of Mediterranean territories into resilient Green Living Areas.

The governance of the mission is shared between the C4LA and its twin project, D4LA, to address the existing challenges with an eco-systemic approach through capacity building and knowledge transfer.

The areas of action are:

1. C4LA—Community4LivingAreas—The project builds a community amongst thematic projects and facilitates resource transfers to stakeholders, focussing on technical and strategic content.
2. D4LA—Dialogue4LivingAreas—The project amplifies policy transfer by fostering focussed dialogue amongst policymakers and their stakeholders.

Figure 1: Green Living Area Mission visual representation

The choice of the thematic projects was done by the Interreg Euro MED programme based on the Programme priorities:

[4] Green Deal Going Local is a flagship initiative of the European Committee of the Regions that aims to place cities and regions at the heart of the EU's transition to climate neutrality. (...)

[5] https://sustainablecities.eu/local-green-deals/about-lgds/

[6] See Annexe A for a detailed presentation of each solution.

Priority 1: A Smarter Mediterranean & Priority 2: A Greener Mediterranean
and their specific objectives for the Green Living Areas Thematic Community (GLA-TC): **promoting climate change adaptation and risk prevention**[7]

This White Paper describes a "state of art" in five thematic areas, focussing on the challenges that can be resolved by the solutions proposed by the thematic project of the GLA, which will finally be adopted by local and regional authorities, entities and organisations that:

- Adopt an holistic and strategic approach that responds to the challenges of various sectors during the green transition process.
- Are updating or developing their climate adaptation plans (SEAP, SECAP, SUMP...)
- Want to increase its citizens' quality of life whilst increasing a sense of community for a more cohesive atmosphere.
- Wish to promote a project or initiative linked to green and ecological transition in their territory.

This white paper explores the essential role of municipalities in promoting green living areas through a comprehensive and multifaceted approach. The discussion is structured into five key chapters, each focussing on a critical component of sustainable urban development. Each chapter examines past trends and current situations, key figures and indicators, challenges and vulnerabilities, adaptation and mitigation measures, relevant EU schemes and policy frameworks, as well as examples of successful initiatives. These elements provide a detailed understanding of the opportunities and obstacles local governments face in their sustainability efforts.

1. **Green Energy Systems:** Transitioning to renewable energy sources is crucial for reducing carbon emissions and combatting climate change. This chapter examines the historical context and current status of green energy initiatives, highlighting key metrics and figures. It also addresses the challenges and vulnerabilities that municipalities face, outlining effective adaptation and mitigation measures. Additionally, it reviews EU policies and showcases successful municipal projects that have embraced renewable energy.

2. **Green & Climate Change Resilient Spatial Planning:** Integrating resilience into urban planning is essential for sustainable development. This section explores past and present trends in resilient planning, providing key indicators and statistics. It discusses the specific challenges and vulnerabilities that municipalities encounter and proposes strategies for adaptive infrastructure and sustainable land use. The chapter also examines EU frameworks and features examples of municipalities successfully implementing resilient planning initiatives.

3. **Green Community Engagement:** Engaging citizens in decision-making processes is vital for the success of green initiatives. This chapter covers the evolution and current practices of citizen participation in sustainability efforts. It presents key figures and indicators, identifies common challenges and suggests measures for enhancing community involvement. The chapter also reviews relevant EU schemes and policies and highlights successful examples of citizen-driven sustainability projects.

4. **Green Mobility:** Sustainable transportation options are key to reducing the carbon footprint of urban areas. This segment analyses the past trends and current state of green mobility, providing relevant data and indicators. It addresses the challenges that municipalities face in promoting sustainable transportation and outlines effective measures. The chapter also explores EU policy frameworks and features successful examples of green mobility initiatives implemented by municipalities.

[7] https://interreg-euro-med.eu/en/call-5-strategic-territorial-projects/

5. **Financing Green Transition:** Financing green initiatives requires innovative approaches and access to funding. This final chapter examines green finance's historical context and current landscape, presenting key figures and statistics. It discusses municipalities' financial challenges and vulnerabilities and proposes strategies for securing funding. The chapter also reviews EU schemes and policy frameworks and showcases successful examples of municipal green finance initiatives.

Through these chapters, the white paper aims to provide a comprehensive guide for municipalities and local governments to implement effective and sustainable practices, which not only mitigate climate change but also enhance the quality of life for their residents.

The document was written in collaboration with the partners of the Community of Green Living Area project. The partners, based on the desk research, provided information that was analysed and integrated by the PP2, Euro-Mediterranean Economists Association (EMEA).

1. Green Energy Systems

The transition to green energy has gained significant momentum in recent years, driven by the urgent need to reduce greenhouse gas emissions and combat climate change. Renewable energy sources—defined as wind power, solar power, hydropower, tidal power, geothermal energy, ambient heat captured by heat pumps, biofuels and the renewable part of waste—offer sustainable and increasingly cost-effective alternatives to traditional fossil fuels. Green energy planning encompasses various strategies, including boosting renewable energy production, enhancing consumption efficiency and minimising energy over-consumption, to create a sustainable and balanced energy ecosystem.

Local and regional authorities, particularly municipalities, play a pivotal role in spearheading the adoption and integration of these renewable energy sources within their jurisdictions. Municipalities are uniquely positioned to influence and accelerate the green energy transition. They can develop comprehensive energy plans that align with both national and European climate objectives, ensuring a cohesive and strategic approach to sustainable energy. By implementing localised green energy initiatives, municipalities can address the specific needs and capacities of their communities, fostering resilience and sustainability.

In 2021, in the framework of the European Green Deal, the European Union adopted its first European Climate Law, setting ambitious targets to achieve climate neutrality by 2050 and a 55% reduction in emissions by 2030, in addition to a 90% reduction by 2024, compared to 1990 levels. These targets necessitate proactive and strategic planning at the municipal level. Municipalities in the Interreg Euro-MED programme area, which includes diverse regions of the Mediterranean, are particularly crucial in this endeavour. Their role involves not only planning and implementing green energy projects but also engaging with local stakeholders, securing funding and ensuring regulatory compliance.

Municipal green energy planning encompasses several key activities:

- Development of Local Energy Strategies: Municipalities are responsible for crafting tailored energy strategies that incorporate renewable energy targets, energy efficiency measures and long-term sustainability goals.
- Implementation of Renewable Energy Projects: Municipalities can facilitate the installation of renewable energy systems, such as solar panels, wind turbines and geothermal systems, on public buildings and land.
- Regulatory and Policy Support: Municipalities play a role in ensuring that local policies and regulations support the development and integration of renewable energy infrastructure.

This chapter will delve into the specific role of municipalities in green energy planning within the Interreg Euro-MED area. It will provide an overview of past trends and the current situation, highlight key figures and indicators, examine the environmental challenges and vulnerabilities of the area, and discuss adaptation and mitigation measures. By focussing on the concrete actions and strategies employed by municipalities, this chapter aims to illustrate the critical impact of local governance in driving the green energy transition.

1.1 Past trends and current situation

The landscape of green energy planning in Europe has evolved significantly over the past few decades, shaped by various economic, political and environmental imperatives. According to the latest report by the International Renewable Energy Agency, in spite of the fact that 2023 saw the largest increase in renewable energy capacity to date, by the end of 2023, renewables accounted for only 43% of global installed power capacity - with solar power alone accounting for nearly three-quarters of renewable additions (IRENA, 2024). The European Union (EU) has been at the forefront of these efforts, driven by the need to address climate change, ensure energy security and foster economic competitiveness.

In the early 2000s, the EU began to emphasise renewable energy through directives and targets aimed at increasing the share of renewable energy in the overall energy mix. The Renewable Energy Directive (2009)[8] set the initial framework for member states to follow, establishing binding targets for renewable energy consumption.

The establishment of the European Energy Union in 2015 marked a significant milestone in EU energy policy. This initiative aimed to integrate member states' energy policies into a single coherent framework, focussing on energy security, sustainability and competitiveness. It sought to reduce dependency on external energy suppliers, which in 2020 accounted for 58% of the EU's energy imports. (Ayadi et al., 2024)

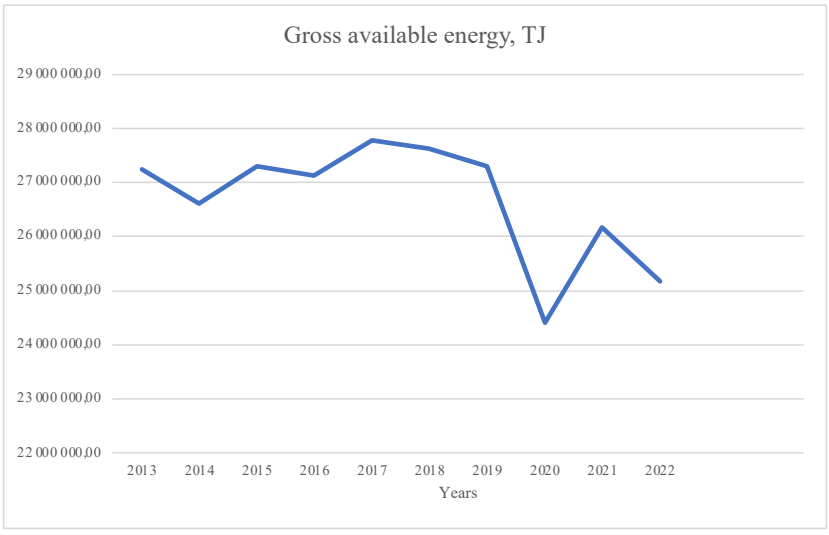
The European Green Deal, introduced in 2019, set an ambitious roadmap for making the EU's economy sustainable. It aims to achieve climate neutrality by 2050, with intermediate targets such as a 55% reduction in greenhouse gas emissions by 2030 compared to 1990 levels. This policy framework has accelerated the adoption of renewable energy and energy efficiency measures across Europe.

Municipalities are one of the key actors in paving the way towards clean energy by developing and implementing localised energy strategies, promoting renewable energy projects, engaging communities and leveraging various EU funding mechanisms, as well as forging partnerships with private sector entities to finance green energy projects. This collaborative approach enhances the feasibility and scalability of renewable energy initiatives and secures funding. Thus, municipalities contribute significantly to the EU's overarching goals of energy security, sustainability and competitiveness. As Europe continues to navigate global challenges and geopolitical uncertainties, the efforts of local authorities will remain vital in achieving a resilient and sustainable energy future.

1.2 Key figures and indicators

There is a significant disparity amongst European countries in terms of production and availability of energy. Overall, the gross available energy[9] in the cooperation area of the Interreg Euro MED programme, in 2022 decreased compared with 2021 (-3.77 %), whilst within the same timeframe final energy consumption in the cooperation area of the Interreg Euro MED programme in 2022 decreased compared with 2021 (-1.28 %), see Figure 2. One should also note the country differences, as within this total gross available energy, 38% is from France alone.

Figure 2: Gross available energy in the cooperation area of the Interreg Euro MED programme

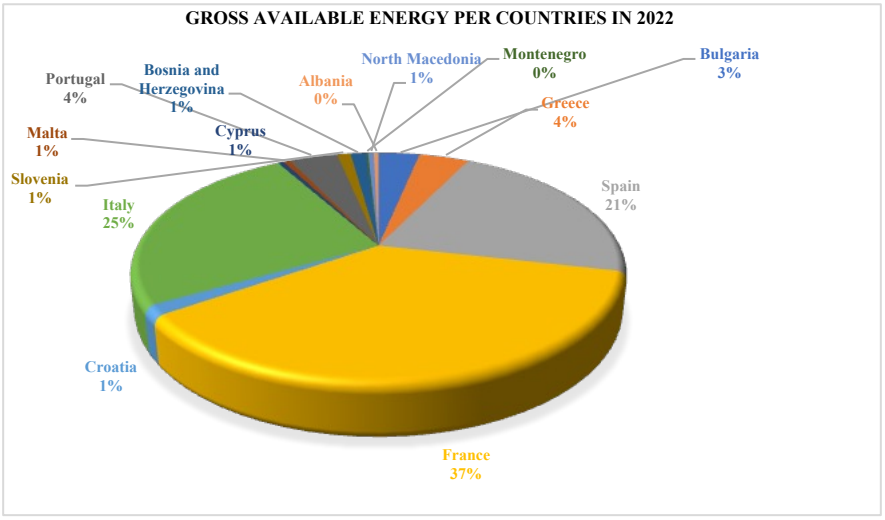


Sources: Eurostat

[8] https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=celex%3A32009L0028

[9] Gross available energy: solid fossil fuels, manufactured gases, peat and peat products, oil shale and oil sands, natural gas, oil and petroleum products (excluding biofuel portion), renewables and biofuels, non-renewable waste, electricity, heat and nuclear heat

Figure 3 Gross available energy per country in the cooperation area of the Interreg Euro MED programme in 2022

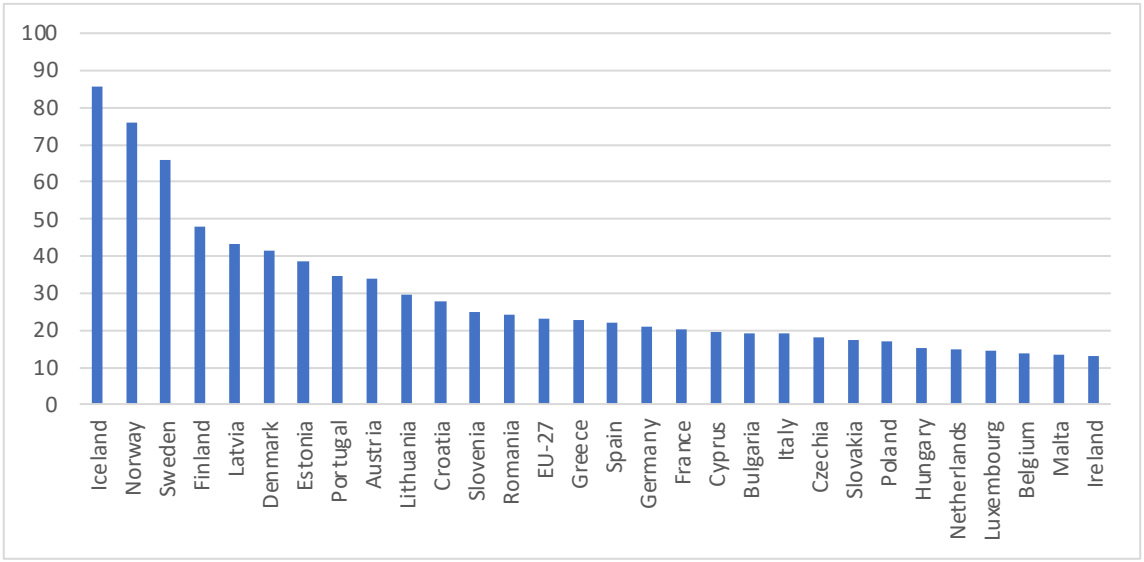


Sources: Eurostat

In 2021, the EU adopted its first European Climate Law. It set in stone Europe's goals to become climate–neutral by 2050, as well as a target of 55% less emissions by 2030, in comparison to 1990.[10]

Figure 4 provides recent statistics on the share of energy from renewable sources overall and in three consumption sectors (electricity, heating and cooling and transport) in the cooperation area of the Interreg Euro MED programme. Renewable energy sources include wind power, solar power, hydro power, tidal power, geothermal energy, ambient heat captured by heat pumps, biofuels and the renewable part of waste. Different EU countries are at various stages of this journey towards renewables, with Iceland having over 85% of its energy from renewable sources, whilst it is below 15% for Luxembourg, Belgium, Malta and Ireland.

Figure 4 Share of energy from renewable sources in 2022

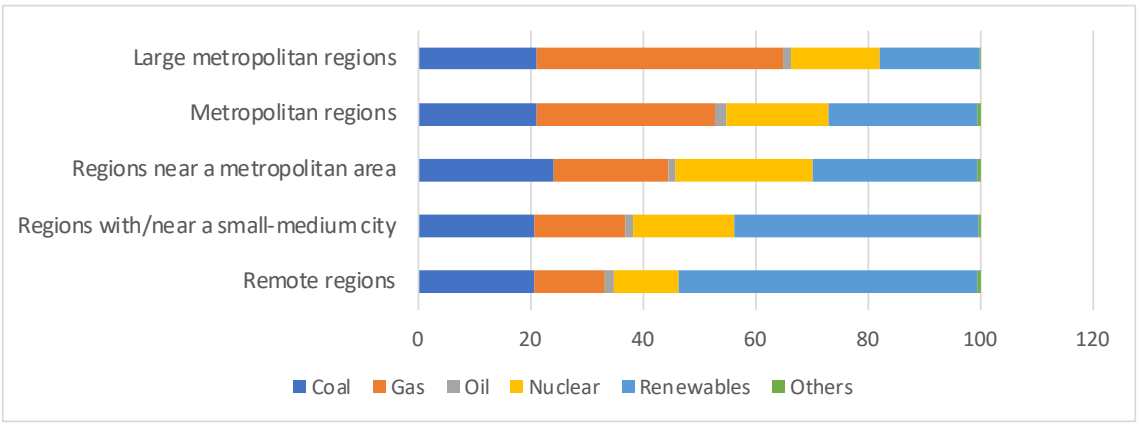


Source: Statistical Office of the European Union (Eurostat)

[10] European Green Deal, website: https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/story-von-der-leyen-commission/european-green-deal_en

It is also worth mentioning that, in general, remote regions and smaller municipalities tend to generate cleaner electricity than bigger regions (see Figure 5).

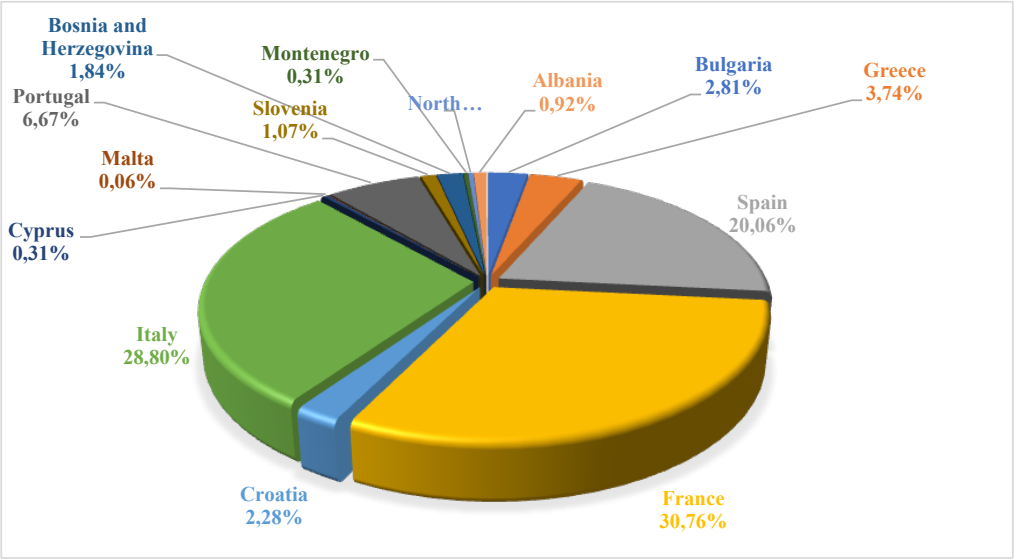
Figure 5 - Share of electricity by source and by type of small regions (%) - in 2019 OECD average



Source: OECD, in the framework of Managing Environmental and Energy Transitions for Regions and Cities workshop in 2019, retrieved from here.

In 2022, in the Interreg Euro MED area, countries with a high share of renewables and biofuel in their overall gross available energy are France (30.76%) and Spain.

Figure 6: Gross available energy in the cooperation area of the Interreg Euro MED programme in 2022 – Renewables and Biofuels. This is linked to their available natural resources and their national energy consumption needs.



Sources: Eurostat

1.3 Challenges and vulnerabilities of green energy planning

Green energy planning faces several significant challenges. These challenges range from the degradation of facilities, due to climate change impacts, to community opposition, funding constraints and environmental backlashes. Understanding these challenges is crucial for developing effective strategies to overcome them.

Degradation of Facilities Due to Climate Change

Extreme temperatures can cause damage to the renewable energy infrastructure. Prolonged periods of high or low temperatures can place an increased load on heating and cooling systems, leading to higher energy consumption and frequent maintenance needs. This strain can reduce the lifespan of energy infrastructure and increase operational costs.

Additionally, extreme wind can cause physical damage to energy facilities, such as wind turbines and solar panels. Structural damage can lead to costly repairs and disrupt energy supply, posing a significant challenge for maintaining consistent energy production.

Moreover, flooding and heavy precipitation and flash floods can damage power plants, substations and other energy infrastructure. Flooding can also disrupt the distribution of energy, leading to outages and requiring extensive repairs. Droughts can affect water-dependent energy systems, such as hydroelectric plants, reducing their efficiency. Fires, often exacerbated by drought conditions, can cause extensive damage to energy infrastructure and pose severe safety risks.

Community Opposition and Delays

Local communities may oppose the development of green energy projects, due to concerns about visual impacts, noise pollution and changes in land use.[11] This opposition can lead to significant delays and increased project costs. Misunderstanding or misinformation about the benefits and impacts of green energy projects can fuel resistance. Effective community engagement and education are necessary to address these concerns and build support.

Funding Constraints

The significant upfront costs of green energy projects, such as installing solar panels or wind turbines, can be prohibitive for many municipalities, especially those with limited budgets. Securing funding from financial institutions or investors can be challenging, particularly for smaller municipalities without a strong credit rating. This constraint can delay or prevent the implementation of green energy projects.

Environmental Backlashes

Whilst renewable energy projects are environmentally beneficial, they can sometimes disrupt local ecosystems. For example, wind farms can impact bird and bat populations, whilst hydroelectric projects can alter aquatic habitats. Furthermore, the development of large-scale renewable energy projects can lead to land use conflicts, particularly in areas with valuable natural habitats or agricultural land. Balancing energy production with environmental conservation is a key challenge.

[11] This phenomenon is also referred to, as NIMBY (Not In My Backyard) Syndrome

Regulatory and Policy Barriers

The process of obtaining permits and regulatory approvals for green energy projects can be lengthy and complex, leading to delays and increased costs. Additionally, inconsistent policies at local, regional and national levels can create uncertainties and hinder the development of green energy projects. Clear and supportive policy frameworks are essential for fostering growth in the sector.

Technological and Infrastructure Limitations

Integrating renewable energy sources into the existing power grid can be challenging, due to differences in energy generation and consumption patterns. Upgrading grid infrastructure to accommodate variable renewable energy sources is necessary but costly. Other challenges emerge due to energy storage. The intermittent nature of renewable energy sources, such as solar and wind, requires effective energy storage solutions to ensure a reliable energy supply. Current storage technologies can be expensive and have limitations in capacity and efficiency.

1.4 Adaptation and Mitigation Measures

Several mitigation measures are introduced to overcome the challenges highlighted in the previous section:

- **Enhanced Maintenance Protocols for Renewable Energy Facilities:** Implementing proactive and predictive maintenance programmes can help identify potential issues before they lead to significant damage. Regular inspections and maintenance schedules can reduce the likelihood of failures and extend the lifespan of energy infrastructure.
- **Diversified Energy Sources:** Integrating a mix of renewable energy sources, such as solar, wind, hydro and geothermal, can distribute the risk and reduce the impact of localisd extreme weather events on the overall energy supply.
- **Advanced Monitoring Systems:** Utilising IoT and AI-driven monitoring systems can provide real-time data on infrastructure health and environmental conditions, enabling timely interventions and reducing downtime.
- **Community Engagement and Education:** Conducting comprehensive outreach and education programmes can address misconceptions and highlight the benefits of green energy projects. Transparent communication and involving community members in the planning process can build trust and support.
- **Incorporating Local Preferences:** Adjusting project plans to accommodate local concerns, such as visual and noise impacts, can help alleviate opposition. This might include designing visually appealing installations or implementing noise reduction technologies.
- **Innovative Financing Models:** Exploring alternative financing options, such as public-private partnerships, green bonds and community funding models, can alleviate financial constraints. These models can attract investment by spreading risk and offering attractive returns.
- **Government Grants and Subsidies:** Leveraging available government grants and subsidies for renewable energy projects can reduce the financial burden on municipalities. Keeping abreast of funding opportunities and application processes is essential.
- **Environmental Impact Assessments:** Conducting thorough environmental impact assessments (EIAs) prior to project initiation can identify potential ecological impacts and inform mitigation strategies. This process ensures that projects are designed to minimise environmental disruption.
- **Sustainable Land Use Planning:** Prioritising the use of degraded or non-agricultural land for renewable energy projects can minimise conflicts with natural habitats and agricultural activities.
- **Policy Advocacy and Alignment:** Working with regional and national authorities to align policies and regulations can create a more supportive environment for green energy projects. Consistent and clear policy frameworks reduce uncertainties and foster investor confidence.

- **Capacity Building:** Enhancing the capacity of local government officials and stakeholders to navigate regulatory landscapes and implement green energy projects effectively can ensure smoother project execution.
- **Research and Development:** Supporting research and development efforts to improve renewable energy technologies and storage solutions can drive innovation and reduce costs over time. Collaborative initiatives with academic and industry partners can accelerate technological advancements.

Addressing challenges in green energy planning requires a multifaceted approach, including community engagement, securing diverse funding sources, implementing resilient infrastructure and navigating complex regulatory environments. By understanding and strategically addressing these challenges, municipalities can effectively promote the transition to sustainable energy systems, contributing to a greener and more resilient future.

1.5 EU schemes and policy framework

1.5.1 Sustainable Energy Action Plan by Covenant of Mayors

Signatories of the **former Covenant of Mayors**, which only addressed energy and climate change mitigation, committed to prepare and implement a Sustainable Energy Action Plan (Hereinafter: SEAP) before 2030.

Signatories of the **new Covenant of Mayors for Climate and Energy** now commit to adopting an integrated approach to climate change mitigation and adaptation. They are required to develop, within the first two years of adhesion, a Sustainable Energy and Climate Action Plan (Hereinafter: SECAP) with the aims of cutting CO2 emissions by at least 40% by 2030 and increasing resilience to climate change[12]. SECAP is the key document that shows how a Covenant signatory will reach its commitments by 2030. The development of the SECAP primarily draws on the findings from the Baseline Emission Inventory (Hereinafter: BEI) and the Climate Change Risk and Vulnerability Assessment (Hereinafter: RVA)[13]. Through the development of the BEI, the signatory is able to develop an overview of its greenhouse gas (Hereinafter: GHG) emissions and set appropriate strategies to reach its reduction target (of at least 40% by 2030 compared to the baseline).[14] Similarly, the RVA identifies the most relevant climate hazards and vulnerabilities affecting the local authority, facilitating the process of addressing such risks through the development of an adaptation strategy and identification of appropriate adaptation actions.[15] Through the combination of these aspects, the SECAP defines concrete measures for both climate mitigation and adaptation, with timeframes and assigned responsibilities, translating the long-term strategy into action. Signatories commit themselves to submitting their SECAPs within two years following adhesion.[16]

The Covenant also defines the concrete obligations of signatories:

- Development of the BEI as a basis for the development of SECAP
- Development and implementation of the SECAP
- Control and monitoring of the implementation of the SECAP
- Submission of the report on the realisation of the SECAP regularly
- Harmonisation of the structure of the local administration with the aim of providing necessary expert potential for implementation of the SECAP
- Regular informing of local media on the results of implementation of the SECAP
- Informing of citizens on the possibilities and advantages of using energy effectively
- Organising Days of Energy events in cooperation with stakeholders
- Exchange of experiences and knowledge with other signatories.

[12] Official Covenant of Mayors – Europe website: https://eu-mayors.ec.europa.eu/en/signatories
[13] Guidebook 'How to develop a Sustainable Energy and Climate Action Plan (SECAP)', page 13
[14] Guidebook 'How to develop a Sustainable Energy and Climate Action Plan (SECAP)', page 13
[15] Guidebook 'How to develop a Sustainable Energy and Climate Action Plan (SECAP)', page 13
[16] Guidebook 'How to develop a Sustainable Energy and Climate Action Plan (SECAP)', page 13

By the beginning of March 2024, The Covenant had received 11,954 signatories (cities and municipalities) and the interest amongst other signatories in joining is extremely high. It is interesting to note that the initiative spread beyond European borders and expanded to the entire world. Apart from more than 5,000 European cities, the Covenant was also signed by the mayors of municipalities of Argentina, New Zealand, Armenia, Palestinian Territories, Morocco, etc. Amongst the total number of Covenant of Mayors signatories in the MED area, 67% of signatories have prepared and submitted a Sustainable Energy Action plan or Sustainable Energy Action and Climate plan, with the remaining 33% preparing and submitting a monitoring report on Action plan implementation.

Bearing in mind the large gap between the signatories that have not prepared monitoring reports, this could be a good opportunity for the Community4living Areas project.

1.5.2 Energy Efficiency Directive

The Energy Efficiency Directive came into effect on October 10, 2023 and must be incorporated into national legislation by the end of 2025. This Directive mandates that the public sector achieves an annual energy consumption reduction of 1.9% (Article 5). Public entities are required to renovate at least 3% of the total floor area of their buildings each year, if they own buildings with a usable floor area exceeding 250 square metres, including those owned by local governments, to transform them into nearly zero-energy buildings (Article 6). For buildings not owned by public bodies, there should be negotiations with the property oner for energy improvements at key moments, such as lease renewals. Social housing may be exempted from these requirements if renovations are not cost-effective or if they would result in rent increases not offset by energy savings. Additionally, member states must ensure that municipalities with populations of over 45,000 develop local heating and cooling plans, providing them with financial and technical support (Eurocities and Energy Cities, 2024).

1.5.3 Renewable Energy Directive

The directive came into effect on November 20, 2023, and must be incorporated into national legislation by November 20, 2025. Cities and regions are required to integrate renewables into their planning, encouraging the development of renewable-powered heating and cooling infrastructures, consulting with network operators, as well as participating in energy communities and self-consumption initiatives (Article 15). To set an example, the public sector must allow third parties to use the roofs of public and mixed public-private buildings, including those owned by local and regional authorities, for renewable energy production. Member states should also map out the deployment of renewable energy by February 21, 2026, and designate ‘renewables acceleration areas’ in coordination with local and regional authorities (Article 15b). Additionally, since February 21, 2024, all activities related to the planning, construction, and operation of renewable energy plants, as well as their connection to the grid, are considered to be of ‘overriding public interest’ (Eurocities and Energy Cities, 2024).

2 Green mobility

More than 70% of EU citizens live in urban areas—cities, towns, and suburbs—which produce 23% of all greenhouse gas emissions from transportation.[17] This highlights the critical need for innovative approaches to urban transportation. Sustainable mobility refers to the development and implementation of transportation systems that meet current mobility needs, without compromising the ability of future generations to meet their own needs. It encompasses a variety of strategies and solutions designed to reduce the environmental impact of transportation, promote social equity and enhance economic efficiency. Key components of sustainable mobility include public transit systems, cycling and walking infrastructure, electric and low-emission vehicles, and integrated urban planning that reduces the need for long commutes.

According to the European Commission (2020), sustainable mobility aims to improve accessibility, reduce greenhouse gas emissions and enhance the overall quality of urban life. It seeks to balance the environmental, social and economic aspects of transportation to create a more sustainable and resilient urban environment.

Local governments play a pivotal role in promoting sustainable mobility, as they are uniquely positioned to implement policies and initiatives tailored to the specific needs and contexts of their communities. Their responsibilities and actions in this area can significantly contribute to addressing the climate urgency.

This section provides a comprehensive overview and actionable insights into transforming urban transportation. It begins with an examination of past trends and the current situation, highlighting key figures and indicators that illustrate the state of urban mobility and its environmental impact. Following this, the chapter delves into the challenges and vulnerabilities faced by urban areas. It then outlines various adaptation and mitigation strategies, focussing on practical approaches municipalities can adopt to foster sustainable mobility. The chapter also reviews EU schemes and policy frameworks that support sustainable transportation. It concludes with examples of successful initiatives from various cities, showcasing innovative solutions and best practices in sustainable urban mobility.

2.1 Introduction to the context and main trends

Sustainable mobility may be approached through a very wide range of priorities and concepts, but for the Mediterranean region there are some specificities that help narrow the scope of the debate. Notably, we need to consider the following factors in the region:

- First, **resilience and adaptation to climate change is an overarching topic** and must absolutely be considered in the most exposed regions to climate change. Indeed, our cities are vulnerable to the impacts of climate change, so transport and mobility need to be planned in consideration. Climate change is going to increase the severity and frequency of the most pronounced hazards faced by Mediterranean cities, such as flooding, heat waves, heavy precipitations, extreme hot days and droughts.

- Second, the Mediterranean is defined by its location on the shores of the Mediterranean Sea and this determines that a great part of its economic activity is focussed on **tourism and seasonality**. Mobility plays a great role in how tourism is organised and coped with by territories. This must be considered in any analysis about sustainable mobility in the Mediterranean region.

[17] https://transport.ec.europa.eu/transport-themes/urban-transport/sustainable-urban-mobility_en

- Third, **technological global trends** are impacting sustainable mobility and its transition to lower-carbon or zero-carbon modes. This is also touching base in the Mediterranean and must be considered: namely, electrification, micro-mobility or shared schemes to lower single-use-vehicles.

- Fourth, sustainable mobility is not only about moving people, it also includes the transportation of goods, as is the case for the massive food industry and delivery needs across the Mediterranean area. **Freight transportation and logistics** have also entered the public debate concerning all forms of transport contribution that can decrease greenhouse emissions and, for this, specific solutions are being tested in cities and rural areas.

Mediterranean cities and regions are currently testing and implementing far-reaching solutions and approaches to step out of a car-centred model, promoting active mobility, public low-carbon transport and the creation of friendlier urban spaces, often facing opposition from various actors. As a matter of fact, there are some behavioural changes supporting or responding to such measures: as of December 2021, passenger car registrations across the European Union declined by 22.8% to 795,295 units (-2,4% in 2021), marking the sixth consecutive month of decline (ACEA Auto).

City councils hold a key role in advancing a change in perspective regarding mobility, in favour of cleaner, more active and shared modes, which will benefit not only daily commuters, but also the well-being and social cohesion of all citizens.
At a European scale and regarding the policy frameworks that embrace and support the transition of the mobility sector, the SUMP's model for planning has consolidated as a reference point for any city looking to step in or rethink its own targets in terms of the sustainable mobility agenda. The SUMP's is also important as a model for integration into SECAPs or Agenda 2030, which may be a priority at local policy- making level.

2.2 Trends' deep analysis and key figures

2.2.1 Resilience and adaptation to climate change

Over recent years, the focus on the transport sector had to do mostly with decarbonisation and making mobility more sustainable. Sustainability has been, and is still, the golden word for any debate around mobility. Climate change mitigation is generally seen as the priority strategy for preventing or at least minimising the impact of climate change but one must, nevertheless, be aware that its effects are already impacting our everyday life. Consequently, urban planners should be aware of this evolution and include adaptation measures into their mobility plans. Furthermore, transport infrastructures will be exposed, in the following decades, to an increasing number of new challenges from climate impacts, which are already partly visible. Planning today for the construction of new, together with the management of existing infrastructures, will require the consideration of new environmental, climatic and socio-economic parameters and conditions with respect to those used in the past.

Both the “First Mediterranean Assessment Report” (MedECC, 2020) and the IPCC Sixth Assessment Report “Climate Change 2022: Impacts, Adaptation and Vulnerability” (IPCC, 2022a) agree that the Mediterranean area is the most threatened region on the European continent, as it is warming up 20% faster than other regions. Back in 2013, The Intergovernmental Panel on Climate Change (IPCC) had already considered the Mediterranean Region to be “highly vulnerable to climate change” due to the influence of multiple stressors (Urban Transports Community 4th Policy Paper). Since the beginning of the industrial era, the mean annual temperature for the Mediterranean Basin has constantly risen over the years, along with extreme temperatures, heatwaves and tropical nights, which have increased in intensity, number and length during recent decades, particularly in summer and which are projected to continue increasing (IPCC, 2022a). The sea surface temperature in the Mediterranean has also already warmed by around 0.4°C per decade during the period between 1985 and 2006 and is expected to reach between + 1.8°C and + 3.5°C compared to the 1961 - 1990 period by 2100. Marine heatwaves have become longer and more intense and both parameters are projected to continue increasing in the future (IPCC, 2022a). The increase in heat in the atmosphere, due to global warming, causes more frequent and severe extreme weather events, like cyclones or Medicanes, windstorms and hailstorms.

Understanding and estimating the impact of climatic hazards on the urban transport system is essential to identify and implement efficient adaptation measures. These may be long term trends, such as sea level rise, or extreme events such as floods, heavy precipitation, extreme winds, heatwaves and wildfires. On the one hand, sea level rise is a slow and inexorable phenomenon, to which coastal cities must adapt by implementing long-term measures. On the other hand, extreme weather events cause disruptions to transport system infrastructures and services (both critical and not critical) and generate emergency situations and evacuation needs.

Policy makers must think ahead and identify adaptation measures to face such phenomena. Adaptation measures may be focussed on infrastructures (e.g., roads, railways, stations etc.), services (e.g., emergency plans, real time information systems, etc.) and behaviours, which can be generally divided into planning, retrofitting and management. Most solutions consist of extreme weather event impact prevention measures and are applicable at different levels - from local to regional at the EU level.

2.2.2 Electrification and the use of data for sustainable mobility in the Mediterranean

A range of measures and solutions, including innovative technologies, are being employed across the EU and in Mediterranean cities to reduce emissions in the transportation sector. These include investing in better data and management systems to better plan and deliver green transport services and electrifying mobility.

The use of big data is growing more than ever in the sustainable mobility sector, as for others. The generation, exploitation, use, and protection of data coming from users, operators, or sensors are growing in relevance when it comes to mobility planning, delivery of mobility services, or demonstrating the decarbonization of certain modes, to name a few. The main trends defining how big data technologies can help in the sustainable mobility transition are as follows:

- **Data-driven urban and mobility planning:** city planners and transportation agencies increasingly rely on big data analytics generated by smart sensors and cameras, amongst others, to collect real-time data on traffic flow, pedestrian movement and public transportation usage. This data is then analysed to optimise public transportation or plan for green mobility infrastructures when cross-compared with demographic data and models.

- **Upgrade public transport offer:** Big data is particularly useful for enhancing public transport service when looking into flows and user experiences. Bus routes can be better optimised and tram schedules can be designed based on passenger demand and patterns.

- **Multimodal Integration:** Mediterranean cities are increasingly promoting multimodal transportation options, such as integrating public transport with bike-sharing schemes or carpooling services. Big data facilitates the seamless integration of these services by providing insights into user preferences, travel behaviour and intermodal transfer points.

- **Monitoring environmental impact:** Big data analytics help monitor the reduction of transport sector CO_2 emissions, such as air pollution and greenhouse gas emissions.

Big data usage in the field of transport is not limited to urban mobility. It is also leveraging important issues affecting rural and low-dense areas, where distance between populated areas and to and from key mobility hubs generates specific challenges. On-demand services, for instance, based on phone-generated calls and the adaptation to real-time needs are offering a new range of solutions for these areas.

The second main technological trend analysed in this paper concerns **electric vehicles and the electrification of transport**. Electric vehicles (hereby also spelt as e-vehicles and EVs) are a key part of reducing the levels of and effects of pollution, produced by the transport sector. There is no doubt, though, that electric vehicles must be regarded as a means, rather than an end, in the pursuit of the decarbonisation of urban mobility in our cities. In this regard, sustainable mobility policies must promote, combine and balance investment between active mobility (cycling and walking), including cycle lanes and the pedestrianisation of urban spaces; also, public transport and infrastructure required for electric vehicles, such as recharging points. Investment in this specific area is key to properly supporting the shift from private car usage to the mentioned sustainable mobility options.

Mediterranean countries are far from their Northern European neighbours over concerns about the deployment of electrification in their territories. But some of these countries have experienced a strong increase in the sales of battery electric passenger cars. Italy went from 55,307 vehicles sold (2020) to 122,669 (2021), an increase of +120%, whilst France and Spain reached 60% growth rates. Moreover, they are setting very ambitious targets to deploy electric charging infrastructure in the medium term and to meet the known EU goals: in particular, Italy has set a target of 32,000 fast and ultra-fast chargers by 2030 and Spain expects to have 100,000 public e-charging stations by 2033. Some factors may help Mediterranean countries reach these targets, such as the greater accessibility to electric charging in medium-sized and large cities, the existence of a greater commercial offer on vehicles (extended range, larger size, etc.) that now cover a greater spectrum of the demand needs and the lower energy costs of electric cars compared to combustion cars, in a scenario of increasing fuel prices. Indeed, the main barrier to electric car adoption is still the lack of electric charging infrastructure. At present nearly half of potential EV buyers in the Mediterranean are holding back plans to purchase an EV because they are uncertain where and how they would charge their vehicles.

But electric cars are just one type of EV that could and should be prioritised in cities, amongst many. Electric buses, for example, are already playing a fundamental role in decarbonising public transport in Europe and raising awareness of the benefits of e-mobility. Their presence in some Mediterranean countries is limited, due to a lack of sufficient subsidies and investment in infrastructure required to support the electrification of bus fleets or the absence of public transport electrification plans. Nonetheless, there are solid commitments to minimum procurement targets of electric buses for the coming years, such as 38% in 2025 and 57% in 2030 in the case of Greece and 50% and 75% in the case of Malta.

The electrification of transport beyond urban areas has gone a long way in recent years, with numerous rural and low-dense areas in the Mediterranean region now deploying or testing on-demand mobility services, together with freight and logistics networks being influenced by electric vehicles.

2.2.3 The Mediterranean economic activity, tourism and seasonality

In the Mediterranean area, tourism accounts for over 70% of Production Value and Gross Value Added (UNEP/MAP, 2017). The sector has shaped the socio-economic context of the region. Beyond that, in 2015, employment generated by tourism reached 11.5% in the Mediterranean economies overall (Plan Bleu, 2022).

According to UNWTO2, transport represents 73% of the total CO_2 emissions of overall tourism-related activities – 40% air transport, 30% cars, 3% other transport systems, with a critical forecast of doubling total emissions from 2016 to 2030. In turn, tourism can affect the mobility systems of urban destinations in different ways and intensities. These should be considered in the planning and management process if we want to promote more sustainable scenarios. The impacts of the touristic activity on mobility include:

- The spatial concentration of flows in certain areas or around specific spots or attractions. i.e., the overcrowding issues surrounding heritage sites or beaches or the proximity of ports to their referenced cities.
- Overuse of regular lines or stations of the public transport system which have not been properly dimensioned properly. i.e., a regular bus line climbing to a top-of-the-hill attraction.
- Different temporary use of infrastructure and services. From tourism seasonality to daily or weekly specific patterns. i.e., mobility-related to some events or venue schedules.
- Disruption due to lack of knowledge of regulations or lack of expertise or tacit knowledge about mobility practices. i.e., e-scooter free-floating parking regulation.

Moreover, one should consider the network, modes and operators related to tourist-specific modes and services, which are those targeted and used mainly by visitors and tourists, such as guided groups and coaches, sightseeing buses, active mobility day rentals, etc. Whilst some of these services are historically embedded in cities' mobility networks – i.e., coaches – others have disrupted the urban scene – i.e., day rental of e-scooters. These modes may generate disruptions such as road congestion, air and noise pollution and parking-related issues by discretionary coaches for inner journeys or day-trippers, also including noise and gas emissions, friction and congestion of soft-mobility infrastructure and roads by visitor groups.

On the other hand, there are specific tourism flows that are regular in time and frequencies and easily predictable, such as those related to arrivals and departures from high-capacity transport infrastructures (airport and cruise-port terminals) or tourist sights. The connections offered by the public transport system, however, can be poor or undeveloped. Often the trips are covered either by shuttle buses, discretionary coaches, or taxi services. Some of these are not well integrated and connected to the public network and this may generate road congestion and overcrowding due to the high volume and intensity of flows of in-transit visitors coming from the cruise-line terminals.

The INCIRCLE project (modular project under the Sustainable Tourism Community of the Interreg MED Programme) is a good source of evidence, the lessons learnt and policy recommendations on the topic of sustainable mobility and tourist management integrated in the Mediterranean. The project tested a new methodology, which applied the principles of circular economy to the tourism sector, with a focus on the needs of islands and low-density areas. It tailored policies to address mobility, energy efficiency and use of limited resources, such as water and waste production, whilst enhancing community prosperity and quality of life. It applies circular economy principles in the tourism sector, whilst building capacities amongst local communities and key stakeholders ("State of play of tourism in the Mediterranean: A Roadmap for a Greener, Inclusive & Resilient Tourism in the Mediterranean" November 2022).

Green freight and logistics for cities and rural areas

Cities are implementing innovative last-mile delivery solutions, including electric cargo bikes or creating micro-distribution hubs, to improve efficiency and reduce congestion and pollution caused by traditional delivery vehicles. Indeed, logistics and freight transportation are part of the crucial chain that needs to engage in and contribute to the transition towards sustainable mobility.

Mobility planners need nowadays to integrate multiple modes of freight transport and enhance green modes as part of their plans, be it in urban or rural areas. The adoption of smart technologies, mentioned above, related to the use of big data, can also contribute to such improvement by helping optimise supply chain management, enhance route planning and minimise waste in freight transportation. On the other hand, the collaboration between public and private bodies is key to promoting shared logistics facilities, consolidated freight deliveries and collaborative distribution networks, leading to more efficient use of resources and reduced carbon emissions. This is particularly important in low-density areas.

In the case of the Mediterranean, **several challenges must be considered** when it comes to the upscaling of green freight and logistics transportation schemes:

- Inadequate infrastructure, including insufficient charging stations for electric vehicles and limited intermodal freight terminals, poses a challenge to the widespread adoption of sustainable freight transportation in the region (echoing the challenges raised in the section above).
- Even more than people's transport networks, freight routes may transcend national borders and put added pressure on regional cooperation, to enhance regulatory and policy coherence across the region in favour of the development of sustainable logistics solutions. Such regional cooperation is ever more needed when it comes to sharing data amongst different supply chain partners and stakeholders.
- The upfront costs of adopting green freight technologies and implementing sustainable logistics practices can be prohibitive for some businesses. These practices require significant investment, long-term financial planning and innovative and collaborative schemes.
- Behavioural change is, as always, key in the intake of new measures and models. Thus, encouraging behavioural change amongst stakeholders, including shippers, carriers and consumers, is important in order to embrace sustainable freight practices and support environmentally friendly transportation options.

2.3 Challenges and vulnerabilities for sustainable mobility

Municipalities and local authorities in Europe face a complex array of challenges and vulnerabilities in advancing sustainable mobility. One of the foremost challenges is air pollution, which remains a critical public health issue in many urban areas. High levels of vehicular emissions contribute significantly to poor air quality, affecting the health of residents and increasing healthcare costs.

Congestion is another persistent problem. As urban populations grow, the number of vehicles on the road increases, leading to traffic jams, longer commute times and reduced productivity. This not only frustrates residents but also hampers economic efficiency and increases the carbon footprint of transportation systems.

Accessibility is a major concern, particularly for those in underserved or peripheral areas. Ensuring that all residents have equal access to reliable and affordable public transportation is crucial for social equity. Without adequate infrastructure, marginalised communities may find themselves isolated and unable to participate fully in economic and social activities.

Urban road safety is another significant vulnerability. The high density of vehicles, pedestrians and cyclists in urban areas can lead to increased accidents and fatalities. Municipalities must find ways to design safer roads and intersections, promote responsible driving behaviour and protect vulnerable road users.

The growth of e-commerce has further complicated urban mobility. The rise in online shopping has led to a surge in delivery vehicles, contributing to congestion, emissions and wear and tear on urban infrastructure. Local authorities must balance the demands of this growing sector with the need to maintain efficient and sustainable transportation networks.

Moreover, municipalities often face financial and technical constraints that hinder the implementation of sustainable mobility solutions. Budget limitations can restrict investment in new infrastructure and technologies, whilst a lack of technical expertise can slow down the adoption of innovative transportation models.

Lastly, the need for integrated urban planning poses a challenge. Effective sustainable mobility requires coordination across different sectors and levels of government. Local authorities must align their transportation plans with broader urban development strategies, which can be difficult given the varying priorities and resources of different stakeholders.

2.4 Adaptation and mitigation measures

Municipalities can implement a variety of mitigation measures to address the challenges of sustainable mobility, enhancing both efficiency and sustainability in urban transportation systems. Here are several key measures:

Modernisation of Multimodal Hubs

Modernising multimodal hubs is crucial for creating seamless connections between different modes of transportation, such as buses, trains, cycling and walking. Upgrading infrastructure at these hubs can include:

- Improved Facilities: Enhancing amenities like shelters, seating and real-time information systems, to make transfers more convenient and comfortable.
- Integrated Ticketing Systems: Implementing unified ticketing solutions that allow passengers to use a single ticket for multiple modes of transport, facilitating easier transitions.
- Accessibility Enhancements: Ensuring that all facilities are accessible to people with disabilities, older adults and other vulnerable groups.

New Digital Solutions and Services

- Digital technologies offer innovative solutions for improving urban mobility. Municipalities can leverage these technologies in various ways:
- Smart Traffic Management: Using data analytics and IoT sensors to monitor traffic patterns and manage congestion in real-time.
- Mobility-as-a-Service (MaaS): Developing platforms that integrate various transport services into a single accessible interface, allowing users to plan, bookand pay for multiple types of transportation in one place.
- Electric Vehicle (EV) Charging Infrastructure: Expanding networks of charging stations to support the adoption of electric vehicles, thereby reducing emissions from urban fleets.

Increasing the Share of Sustainable Transport Modes

Promoting public transport and active mobility options like cycling and walking can significantly reduce the environmental impact of urban transportation:

- Enhanced Public Transport: Investing in reliable, frequent and affordable public transit options to encourage more residents to choose buses, trams and trains over personal vehicles.
- Active Mobility Infrastructure: Expanding networks of bike lanes, pedestrian paths and bike-sharing programmes to promote cycling and walking as viable alternatives to driving.
- Car-Free Zones: Establishing pedestrian-only areas in city centres to reduce traffic, lower emissions and create more liveable urban spaces.

Zero-Emission Urban Logistics

Transitioning to zero-emission logistics can address the growing impact of e-commerce on urban traffic and pollution:

- Electric Delivery Vehicles: Encouraging or mandating the use of electric vehicles for last-mile deliveries to reduce emissions from delivery trucks and vans.
- Urban Consolidation Centres: Creating central hubs where goods are transferred from larger vehicles to smaller, more efficient vehicles for final delivery, reducing the number of delivery trips into dense urban areas.
- Cargo Bikes: Promoting the use of cargo bikes for small deliveries in congested areas, which can navigate traffic more easily and emit no pollutants.

2.5 EU schemes and policy framework for GREEN MOBILITY

- **European Sustainable Mobility Strategy (2020):** The European Sustainable and Smart Mobility Strategy was adopted in December 2020 by the European Commission as part of the European Green Deal. It emphasises the importance of reducing emissions, improving efficiency and promoting multimodal and sustainable transport solutions. Green freight transportation initiatives should align with the goals and principles outlined in this strategy.
- **European Strategy for Low-Emission Mobility (2016):** The European Strategy for Low-Emission Mobility was introduced in July 2016 by the European Commission as part of the Energy Union package. It aims to accelerate the transition towards low-emission and alternative fuel vehicles, including those used in freight transportation. It includes measures to promote the deployment of clean vehicles, improve infrastructure and support research and innovation in green transport technologies.
- **European Union Transport Infrastructure Policy:** The EU's transport infrastructure policies have evolved over time, with various initiatives and directives introduced since the establishment of the European Union. These policies focus on developing efficient, sustainable and interconnected transportation networks across Europe. Investments in infrastructure projects, such as the development of rail, inland waterways and multimodal hubs, can support green freight transportation and improve logistics efficiency.
- **Clean Vehicles Directive (2009, revised in 2021):** The Clean Vehicles Directive was initially adopted in 2009 and revised in 2021 to strengthen the requirements for clean and energy-efficient vehicles. It sets targets for the procurement of clean and energy-efficient vehicles by public authorities, encouraging the deployment of low-emission and alternative fuel vehicles, including electric and hydrogen-powered trucks, in public sector fleets. Green freight transportation initiatives can benefit from the incentives and support provided by this directive.
- **The "Transition Pathway for Tourism" (2022):** issued by the CE, advocates for setting plans to reduce transport emissions, also for tourist and leisure and professional visitors. At the regional and local level, the goal is to foster sustainable mobility modes for visitors, backed up by slow and active mobility infrastructures – biking, pedestrian and green areas – promoting the shift towards public transport and low-carbon and electric modes by both visitors and residents. Instead of considering tourism mobility as isolated, external, or alienated from the transport and mobility agenda, the document makes it very clear: there must be an integrated approach to consider tourism and visitor mobility as a constituent of the whole system. And the best instrument to do this are the Sustainable Urban Mobility Plans (SUMPs), which cities and regions have been working on for the past decade, promoted by the Directorate-General of Transport and Mobility of the European Commission, which is fully embedded in European political action and funding programmes.

Regarding the EU regulatory framework relative to mobility, we have identified:

- EURO 7 REGULATION:
  Depending on the type of vehicles and their emission level, entry will come into force during the period between 2026 and 2029.
  Cities will be able to apply these new standards, to plan their air pollution trajectory better and conduct modelling exercises. In addition, they will be able to employ the new standards as a basis for defining a new criterion of low emission zones. The Euro 7 regulation will tackle pollutants from traffic that so far remain unaddressed, such as tyre or brake wear particles. This will constitute the highest volume of air pollution emitted by zero-emission vehicles in the future (Article 4 and Annexe I)
  Based on: CitiesInEUGreenDeal_online_EnergyCIties_Eurocities.pdf (energy-cities.eu)

- Regulation on CO2 emission performance standards for cars & vans:
  The Regulation will come into force in 2024. New CO_2 emission reduction targets applicable for carmakers will be introduced in 2025, 2030 and 2035.
  Whilst transport and road transport represent a large share of the total volume of CO_2 emissions in the EU (transport represents 25% of the total volume of CO_2 emissions), the regulation is expected to drastically reduce the emissions in the sector, contributing to the EU climate neutrality targets (Article 1). Besides reducing $CO_2$2 emissions, the market boost of zero-emission vehicles underpinned by the new regulation will also drastically reduce traffic air pollution in cities and noise pollution to some extent.
  Based on: CitiesInEUGreenDeal_online_EnergyCIties_Eurocities.pdf (energy-cities.eu)

- Regulation on CO_2 emission standards for heavy-duty vehicles:
  The regulation will contribute to the deployment of zero-emission heavy-duty vehicles, providing significant CO_2 and air pollutant emissions reduction in cities (Article 3a). The new regulation also includes a phase-out date in 2035 for the sale of new internal combustion engine buses in the EU, thus allowing only local public transport authorities to procure zero-emission vehicles after that date (Art 3b).
  Based on: CitiesInEUGreenDeal_online_EnergyCIties_Eurocities.pdf (energy-cities.eu)

- Alternative fuels infrastructure regulation (AFIR):
  The regulation came into force in 2023. Deployment targets will become enforceable in 2025, 2027, 2030 and 2035
  The targets set in the regulation are expected to boost the demand for electric vehicles, thus reducing CO_2 and air pollutant emission in cities (Articles, 3, 4, 6). It is also expected that the targets are implemented at the local level, depending on the content of national deployment plans, for which national authorities may consult local authorities (Article 14).
  Based on: CitiesInEUGreenDeal_online_EnergyCIties_Eurocities.pdf (energy-cities.eu)

- TEN-T regulation:
  The regulation defines several obligations for the urban nodes: • to develop Sustainable Urban Mobility Plans (SUMPs) by December 2027; • for authorities (cities and their functional urban areas) to report on the collection of sustainable mobility indicators by 2027; • for authorities to equip their territory with a multimodal passenger hub in 2030 and a multimodal freight hub by 2040. The status of urban nodes may also lead to improved involvement of urban authorities in the development of the transport infrastructure in Europe, whilst offering potentially better access to certain funding instruments, such as the TEN-T regulation (Art 40)
  Based on: CitiesInEUGreenDeal_online_EnergyCIties_Eurocities.pdf (energy-cities.eu)

2.6 Examples of existing successful initiatives in Green Mobility

- **CIVITAS Initiative: Cleaner and Better Transport in Cities**[18] CIVITAS is a network of cities for cities dedicated to cleaner, better transport in Europe and beyond. Since it was launched by the European Commission in 2002, the CIVITAS Initiative has tested and implemented over 800 measures and urban transport solutions, as part of demonstration projects in more than 80 Living Lab cities Europe-wide.

- **EcoMobility SHIFT scheme**[19] is a total quality management tool created by academia, non-governmental organisations and cities for use and implementation in cities. The tool enables cities to measure the performance of urban mobility, to establish a baseline and to identify areas for further development, ultimately helping cities to change their urban transport development trajectory and mobility plans.

- **Eltis – The Urban Mobility Observatory**[20] facilitates the exchange of information, knowledge and experience in the field of sustainable urban mobility in Europe. It addresses individuals working in transport, as well as in related disciplines, including urban and regional development, health, energy and environmental sciences.

[18] http://civitas.eu/
[19] https://sustainablemobility.iclei.org/ecomobility-shift/
[20] https://urban-mobility-observatory.transport.ec.europa.eu/index_en

3 Green Community Engagement

Green community engagement refers to the active participation and collaboration of community members in initiatives and activities aimed at promoting environmental sustainability and addressing climate change. This engagement encompasses a wide range of actions, from grassroots activism and local clean-up projects to participation in policy-making processes and adoption of sustainable practices. The goal is to foster a sense of collective responsibility and action towards creating a sustainable and resilient environment. Key elements of green community engagement include:

Education and Awareness (Informing community members about environmental issues and sustainable practices); Participation and Involvement (Encouraging active involvement in local green initiatives and decision-making processes.); Collaboration and Partnership (Fostering partnerships between local governments, businesses, NGOs and community groups.); Empowerment and Ownership (Empowering citizens to take ownership of their environment and the changes needed to protect it.)

Local governments in the European Union (EU) play a pivotal role in enhancing citizen involvement in the green transition. As the urgency of climate change becomes more pronounced, local governments are increasingly recognised as crucial actors in implementing effective and inclusive environmental policies. Their proximity to citizens and communities allows them to tailor initiatives to local needs and contexts, thereby maximising impact and fostering greater community buy-in.

3.1 Past trends and current situation

3.1.1 Is green transition targeted within the Citizens' Programmes?

Over the past fifteen to twenty years, sustainability has evolved significantly, encompassing environmental, social and governance (ESG) dimensions that were previously underexplored. Initially, the dominant approach to sustainability was top-down, where political leaders made decisions, with little to no input from citizens. This often led to policies that did not fully address or satisfy the needs of the populace. However, growing awareness and the pressing need for more inclusive and effective solutions have driven significant changes in this approach.

One of the earliest and most prominent trends has been **climate action**. Public consciousness around environmental issues, particularly the "ozone hole," heightened the focus on mitigating climate change. International agreements, like the Kyoto Protocol and the Paris Agreement, brought nations together to commit to reducing greenhouse gas emissions, reflecting a global acknowledgment of the urgent need to address climate issues.

Responsible production and consumption have also become critical over the past two decades. Consumers have grown more aware of the environmental impact of their purchases, leading to increased demand for sustainable products and ethical practices. This shift has driven companies to adopt more sustainable methods, reduce waste and consider the full lifecycle impact of their products. The zero-waste movement has gained momentum, encouraging both producers and consumers to minimise waste and embrace sustainability.

Corporations have increasingly embraced **environmental and social commitments** as part of their core strategies. The rise of ESG reporting has made it standard practice for companies to disclose their sustainability efforts, helping investors make informed decisions. This transparency has fostered a more responsible corporate culture, where businesses engage with a wide range of stakeholders to address social and environmental issues, ultimately integrating sustainability into their business models.

The transition to **clean energy** has been another major trend. Advances in renewable energy technologies, such as solar and wind power, have significantly reduced costs and increased adoption rates. Governments have supported this transition through policies and incentives, promoting a shift away from fossil fuels towards renewable energy sources. This has not only helped reduce carbon emissions but also fostered innovation and job creation in the green energy sector.

Technological advancements have driven the development of **clean technologies** aimed at reducing environmental impacts. Innovations in energy efficiency, waste reduction and sustainable materials have enabled industries to adopt cleaner production processes. These technologies support a more rational use of natural resources and contribute to the overall sustainability of industrial practices.

The rise of **electric vehicles (EVs) and clean mobility** solutions has revolutionised the transportation sector. Significant investments from automakers and governments have led to rapid market expansion and infrastructure development for EVs. Public transportation systems and shared mobility options, such as bike-sharing and electric scooters, are becoming more prevalent in urban areas, reducing reliance on fossil fuels and improving air quality.

The **sharing economy** has emerged as a sustainable alternative to traditional ownership models. Platforms facilitating the sharing of resources, such as car-sharing services and short-term rentals, promote more efficient use of assets and reduce overall consumption. This model not only supports environmental sustainability but also fosters community engagement and economic savings.
Efforts to create a **plastic-free world** have intensified, with governments and companies taking action to reduce plastic waste. Bans on single-use plastics and the development of sustainable packaging alternatives are part of this global movement. Public awareness campaigns have educated consumers about the harmful impacts of plastic pollution, driving demand for plastic-free products.

Carbon-neutral and carbon-net-zero actions have become key goals for many organisations and governments. Companies are setting ambitious targets to achieve net-zero carbon emissions by investing in renewable energy, improving energy efficiency and supporting carbon offset projects. National policies are aligning with these goals, reflecting a broader commitment to mitigating climate change.

Sustainable finance and ESG ratings have gained importance as investors seek to align their portfolios with their values. The rise of green bonds, social impact bonds and other sustainable financial instruments reflect this trend. ESG ratings help investors assess the sustainability performance of companies, driving improvements in corporate ESG practices.

The concept of **sustainable cities** has gained traction, with urban areas implementing practices that promote eco-friendly living. Innovations in smart city technologies, green building designs and public transportation improvements contribute to urban sustainability. These efforts create healthier, more liveable environments and play a crucial role in combatting global climate change.

Finally, the introduction of the **Sustainable Development Goals (SDGs)** in 2015 has provided a comprehensive framework for addressing global challenges. The SDGs have influenced policies, initiatives and funding priorities at all levels, fostering cross-sector collaboration for sustainable development. This framework guides efforts to create a more equitable and sustainable world for future generations.

In general, in recent decades there has been a more marked environment and social sensitivity. Other aspects were already present before the beginning of the new millennium: environmental awareness, nature protection, care of the ecosystems, biodiversity and deforestation (also in the interest of future generations).

3.1.2 Current situation

A perspective of bottom-up is developed. Legislations: governments have started implementing regulations to facilitate public participation in the decision-making process, led also by EU directives. Citizen engagement in the green transition within the European Union (EU) is facilitated by various policies, legal frameworks, advocating that aim to empower citizens to participate in environmental decision-making and contribute to sustainable development.

This paradigm shift is reflected in the increasing implementation of regulations and frameworks designed to facilitate public participation in decision-making processes, driven largely by EU directives. This new approach aims to empower citizens, ensuring that environmental policies and actions reflect the collective will and knowledge of the populace.

Legislative Frameworks and Strategies

Several key documents and strategies have been pivotal in promoting citizen engagement in the EU. The **Aarhus Convention** is one such international treaty, which grants the public rights regarding access to information, public participation in decision-making and access to justice in environmental matters. Adopted in 1998 and brought into force in 2001, the Convention stands as a landmark in environmental democracy. It obliges its signatories to guarantee the rights of access to information, public participation and access to justice in environmental matters, ensuring that citizens have a significant voice in environmental governance, thereby promoting transparency and accountability (United Nations Economic Commission for Europe, 1998).
The **European Green Deal**, as presented in previous chapters, introduced in December 2019, represents the EU's ambitious strategy to make Europe climate-neutral by 2050. It encompasses a broad array of initiatives and policies designed to reduce greenhouse gas emissions, promote clean energy and enhance biodiversity. Crucially, the Green Deal emphasises the importance of citizen engagement through public consultations and participatory processes, aimed at mobilising citizens, communities and local authorities in the fight against climate change (European Commission, 2019).

Complementing this is the **European Climate Pact**, which encourages individuals, communities and organisations to take climate action. Launched in December 2020, the Climate Pact provides a platform for sharing information, fostering collaboration and mobilising efforts across Europe. It supports grassroots movements and local projects that contribute to climate goals, offering a space for citizens to engage actively with the EU's climate initiatives and share their ideas and solutions (European Commission, 2020).

Renewable Energy EU Directives have also been crucial in promoting sustainable energy use within member states. The Renewable Energy Directive, first adopted in 2009 and subsequently revised, sets binding targets for renewable energy consumption. It includes provisions for public consultation and participation in the planning and implementation of renewable energy projects, ensuring that citizens are involved in the transition to sustainable energy sources (European Union, 2018).

The **Circular Economy Action Plan**, part of the European Green Deal, focusses on reducing waste and promoting sustainable resource use. Adopted in March 2020, this plan encourages citizens to participate in recycling and reuse initiatives, fostering a culture of sustainability at the community level. It highlights the role of consumers in driving the transition to a circular economy, emphasising the importance of informed consumer choices and active citizen involvement in waste reduction efforts (European Commission, 2020).

Another significant initiative is **Local Agenda 21**, which emerged from the Earth Summit held in Rio de Janeiro in 1992. This programme encourages local authorities to engage with citizens in developing and implementing sustainable development plans. It emphasiss the importance of community involvement in addressing local environmental challenges, ensuring that sustainability efforts are grounded in local realities and needs. Local Agenda 21 promotes a participatory approach to sustainable development, enabling communities to take ownership of their environmental futures (United Nations, 1992).

Advocacy by Green Movements

Green movements within the EU are driven by both political entities and civil society organisations. **Green Parties and Members of the European Parliament (MEPs)** are notable advocates for robust environmental policies. These parties and their representatives push for ambitious climate action, biodiversity conservation and green economic reforms, ensuring that environmental issues remain high on the political agenda. Their efforts have been instrumental in shaping EU policies towards greater sustainability and environmental protection (European Parliament, 2021).

Moreover, **Environmental NGOs and Civil Society Organisations**, such as Greenpeace, the World Wildlife Fund, Friends of the Earth Europe and BirdLife Europe, are key advocates for sustainability. These organisations conduct campaigns, lobby policymakers and raise public awareness about environmental issues, driving collective action and ensuring that citizens' voices are heard in the policy-making process. They play a critical role in monitoring and holding governments and corporations accountable for their environmental impact (WWF, 2021).

Integration of Green Transition in Citizens' Programmes

The integration of the green transition into citizens' programmes is multifaceted, encompassing a range of initiatives and approaches. **Environmental education** is a cornerstone of these programmes, often including initiatives aimed at raising awareness about environmental issues, climate change and the importance of sustainability. Educational campaigns, workshops and school programmes help foster a culture of environmental responsibility amongst citizens (European Environment Agency, 2020).

Community engagement is another crucial aspect, with programmes frequently involving community-based projects, which promote environmental stewardship and sustainable living. Local initiatives, such as community gardens and recycling programmes, encourage collective action and community involvement, making sustainability a shared responsibility (ICLEI Europe, 2021).

Many citizens' programmes include **policy advocacy** efforts to influence policies and decision-making processes. Grassroots movements and advocacy campaigns empower citizens to voice their concerns and propose solutions at local, national and international levels, ensuring that environmental policies are responsive to public needs and priorities (European Environmental Bureau, 2021).

Support for **green entrepreneurship** and innovation is also a key component of many citizens' programmes. These initiatives provide training, mentorship and funding opportunities for eco-friendly startups and social enterprises, fostering economic growth whilst promoting sustainability. This not only drives the green economy but also encourages innovative solutions to environmental challenges (European Commission, 2020).

Furthermore, **partnerships and collaboration** with government agencies, NGOs, businesses and other stakeholders are crucial for implementing green initiatives. Such partnerships leverage collective expertise and resources, accelerating the green transition and ensuring that sustainability efforts are comprehensive and effective (C40 Cities, 2021).

Digital Tools and E-Participation

The rise of digital tools has significantly enhanced citizen participation in environmental governance. Governments at all levels are increasingly using websites, blogs and social media to inform and engage citizens. Countries like Greece, Estonia, Lithuania, Sweden and the Czech Republic have adopted national programmes promoting open government, e-governance and digital convergence between citizens and state institutions. These digital platforms facilitate dialogue with citizens, enabling real participation in decision-making processes and fostering a more inclusive approach to governance (European Commission, 2021).

Citizen Science and Co-Creation

Citizen science has become a popular trend, allowing the public to contribute to scientific research and environmental monitoring. By designing experiments, collecting data and analysing results, citizen scientists play a crucial role in advancing environmental knowledge and solutions. This collaborative approach enhances the scientific community's capacity to address environmental challenges, whilst engaging the public in meaningful scientific endeavours (European Citizen Science Association, 2020).

Similarly, **co-creation** practices involve collaborating with diverse stakeholders to guide the design and implementation of green solutions. These practices ensure that various perspectives are considered, leading to more inclusive and effective environmental policies. By involving citizens in the creation of green solutions, co-creation fosters a sense of ownership and commitment to sustainability (European Commission, 2020).

Integrating the green transition into citizens' programmes empowers individuals and communities to take action towards a more sustainable future. By fostering a sense of environmental responsibility and collective ownership, these programmes enhance the effectiveness of sustainability initiatives and ensure that environmental policies reflect the needs and aspirations of the public. The combination of legislative frameworks, advocacy efforts, educational initiatives and digital tools underscores the commitment to a participatory approach in the EU's green transition.

3.2 Key figures and indicators

There are some indicators to represent the different dimensions of Participatory Citizenship.

Political participation in National elections

The political landscape in Europe has seen a significant shift, particularly with the rise of Green parties. The 2019 elections for the European Parliament underscored this trend, showcasing the growing influence and relevance of Green parties within national party systems. Across various European countries, Green parties have not only increased their share of the vote but have also secured prominent roles in government coalitions and leadership positions.

Green Parties' Ascendancy in Northern and Western Europe

The Green parties have demonstrated particularly strong performances in Northern and Western Europe. In countries like Austria, Denmark, Iceland, Lithuania, Luxembourg and Sweden, Green parties have become key players in national politics, often participating in government coalitions. For instance, the Austrian Green Party entered a coalition government in 2020, securing the vice-chancellorship and several ministerial positions. Similarly, in Denmark, the Socialist People's Party, which is part of the broader, green-left alliance, has been influential in the current government coalition since 2019.

These successes are not limited to coalition participation; Green parties have also achieved significant leadership roles. Finland has been a notable example, with the Finnish Green League holding key ministerial positions and significantly influencing national policy. The election of two Green Presidents and two Prime Ministers in Europe further highlights the growing political clout of Green parties in the region. This rise is attributed to increasing public awareness and concern over environmental issues, climate change and sustainable development, which align closely with the core agenda of Green parties.

Varied Performance Across European Regions

Despite their successes in the North and West, Green parties' performances vary significantly across Europe. In the Southern and Eastern regions, Green parties have generally been weaker and more marginal. For instance, in Southern Europe, countries like Italy and Spain have seen Green parties struggle to gain significant traction compared to their Northern counterparts. This disparity is often linked to differing political cultures, economic priorities and levels of environmental awareness amongst the electorate. In Eastern Europe, Green parties face additional challenges, including political landscapes dominated by more traditional and populist parties. In countries like Hungary and Poland, the political environment has been less conducive to the rise of Green parties, which often find themselves marginalised or excluded from mainstream political discourse. The historical, economic and social contexts in these regions have also played a role, with less emphasis on environmental issues compared to the economic and social challenges that dominate the political agenda.

Emerging Green Movements

Despite these regional disparities, there have been notable instances of emerging Green movements and successes in national and European parliaments. Minor Green parties have made their debuts, reflecting a broader trend of increasing environmental consciousness across the continent. For example, in the 2019 European Parliament elections, new Green parties from countries like Portugal and Ireland made significant gains, highlighting a growing voter base receptive to green policies. These emerging movements indicate that whilst Green parties may currently be stronger in certain regions, there is potential for growth and increased influence across Europe. The increasing visibility and success of Green parties in national elections suggests a shifting political landscape, where environmental sustainability is becoming a central issue. The last decade has witnessed a significant rise in the political participation and influence of Green parties across Europe. The 2019 European Parliament elections marked a pivotal moment, demonstrating the growing relevance of Green parties in national party systems. Whilst their performances vary across different regions, with stronger presence in the North and West and weaker influence in the East and South, the overall trend points towards an increasing prominence of green politics in Europe. This shift reflects broader societal changes, with increasing public concern over environmental issues driving support for Green parties. As these trends continue, the role of Green parties in shaping national and European policies is likely to grow, contributing to a more sustainable and environmentally conscious political landscape.

Civil society and community participation

Volunteering in environmental organisations is a crucial aspect of civil society and community participation in the green transition. This participation varies significantly across Europe, reflecting different cultural, historical and socio-economic contexts. The Nordic countries and the Netherlands are particularly notable for their high levels of engagement, with about 5%–15% of adults actively involved in environmental organisations. This robust participation is indicative of strong environmental awareness and a well-established tradition of civil society activism in these regions (European Environmental Agency, 2020).

High Engagement in Nordic Countries and the Netherlands

In the Nordic countries—Denmark, Finland, Norway and Sweden—as well as in the Netherlands, environmental volunteering is a common and respected activity. These countries benefit from strong institutional support for civil society organisations, comprehensive environmental education and a culture that values community involvement. For example, Denmark has seen a significant increase in the percentage of people volunteering in environmental organisations, rising by 13% over the past decade. This surge can be attributed to growing public awareness of climate change issues and the supportive role of government policies that encourage civic engagement (Statista, 2021).

The Netherlands similarly boasts a high rate of environmental volunteering, driven by its extensive network of environmental NGOs and community groups. The Dutch government's proactive stance on environmental issues, coupled with widespread public support for sustainability initiatives, has fostered an environment where volunteering is both valued and impactful. This high level of engagement has tangible benefits, including improved local environmental quality and stronger community bonds (Volunteering Netherlands, 2019).

Low Engagement in Southern and Eastern Europe

In contrast, many newer democracies in southern and eastern Europe exhibit much lower levels of participation in environmental organisations, with less than 1% of the adult population engaged. Countries like Greece, Bulgaria and Romania have historically lower levels of civic engagement and environmental activism. Economic challenges, political instability and less established traditions of volunteerism contribute to this lower participation rate (Eurostat, 2020).

For instance, Greece has experienced a decline in environmental volunteering, with figures dropping by 8% over the past decade. This decline may be attributed to the severe economic crisis that has plagued the country, diverting public attention and resources away from environmental concerns. Additionally, a lack of strong institutional support for civil society organisations has hindered the growth of environmental volunteering (Hellenic Statistical Authority, 2019).

Increasing Engagement in Central and Eastern Europe

Despite the overall lower participation rates in some southern and eastern European countries, there has been a notable increase in engagement over the last ten years, particularly in central and eastern Europe. Countries like Poland, Hungary and the Czech Republic have seen significant rises in the number of people volunteering in environmental organisations. This trend reflects a growing public awareness of environmental issues and the increasing influence of EU environmental policies and funding (European Commission, 2020).

In Poland, for example, the percentage of adults involved in environmental volunteering has steadily increased, driven by successful public awareness campaigns and the active role of local NGOs. These organisations have been effective in mobilisng communities and fostering a culture of environmental stewardship (Polish Statistical Office, 2021).

Declining Youth Engagement in Nordic Countries

Interestingly, while overall engagement in environmental volunteering remains high in Nordic countries, there has been a decline in youth participation over the last decade. This trend is concerning, as it suggests a potential future gap in environmental activism and leadership. Several factors may contribute to this decline, including changing social dynamics, increased digital engagement and shifting priorities amongst younger generations (Nordic Council of Ministers, 2020).

Efforts to reverse this trend include targeted outreach programmes aimed at engaging young people in environmental activities, incorporating environmental education into school curricula and leveraging digital platforms to connect with young people. These initiatives aim to reignite interest and involvement in environmental issues amongst younger populations, ensuring the continuity of strong civic engagement in the future (Youth and Environment Europe, 2021).

The landscape of environmental volunteering in Europe is diverse, reflecting various regional trends and challenges. High engagement in Nordic countries and the Netherlands highlights the importance of strong institutional support and a culture of civic participation. Meanwhile, lower engagement in southern and eastern Europe points to the need for increased support and awareness campaigns to foster environmental activism. The rising participation in central and eastern Europe is a positive trend, driven by greater public awareness and EU support. Addressing the decline in youth engagement in Nordic countries is crucial for sustaining long-term environmental activism. Overall, these trends underscore the dynamic and evolving nature of civil society participation in environmental sustainability across Europe.

Signing a petition/collecting signatures

The Nordic and other western European countries, including France and the UK, have high levels of engagement in petitions, with about 60% or more of citizens engaged. In contrast, there are low levels of engagement in Eastern Europe, with around 15% of the population engaged. Citizens residing in the European Union predominantly filed petitions in 2022 on the environment, human rights and foreign policy themes. A total of 1,217 petitions were received by the European Parliament in 2022. The most common themes of petitions were the environment (21.2% of all received petitions), fundamental rights (17.4%), justice (15.6%) and external relations (10.4%). Petitions for climate causes vary in frequency and impact, depending on factors such as public awareness, political context and the specific issues being addressed. Whilst climate change petitions can be an effective tool for raising awareness, mobilising public support and influencing decision-makers, their prevalence and effectiveness may vary across different regions and time periods.

In recent years, there has been a notable increase in the number of petitions related to climate change, as public concern about environmental issues grows. These petitions may focus on a wide range of climate-related issues, including: Policy Advocacy; Environmental Protection (calling for the protection of specific ecosystems, wildlife habitats, or natural resources threatened by climate change, deforestation or pollution); Climate Justice (advocating for climate justice and equity, particularly for communities disproportionately affected by climate change impacts, such as indigenous peoples, marginalised groups); Fossil Fuel Divestment (calling on institutions, universities and financial organisations to divest from fossil fuel investments and support the transition to renewable energy and sustainable alternatives; Corporate Accountability (targetting corporations and industries responsible for significant greenhouse gas emissions or environmental degradation); Public Awareness and Education (aimed at raising public awareness about climate change, promoting environmental education in schools and encouraging sustainable lifestyle changes). Overall, petitions for climate causes serve as a tool for civic engagement, allowing individuals and communities to voice their concerns, demand action and hold decision-makers accountable for addressing the urgent challenges posed by climate change.

Votes for green parties and how it has been evolved at the EU parliament:

The growth of green seats in the European Parliament (EP) is indicative of the increasing importance and awareness of environmental issues within the European Union (EU). This evolution can be traced through several election cycles, reflecting broader societal changes and shifting priorities amongst European citizens. Below is an overview of how green seats have evolved over time:

Early Years: 1980s to 1990s

The Green movement began to gain political traction in Europe during the 1980s. The first significant milestone was the 1984 European Parliament elections, where Green parties won 11 seats. This initial success marked the entry of environmental issues into the mainstream political arena, laying the groundwork for future growth. Throughout the late 1980s and into the 1990s, the number of green seats gradually increased, reflecting a growing constituency concerned with environmental sustainability, nuclear disarmament and social justice.

Expansion and Consolidation: 2000s

The early 2000s saw further consolidation and expansion of Green representation in the European Parliament. In the 2004 elections, Green parties, under the umbrella of the European Green Party (EGP) and the European Free Alliance (EFA), secured 42 seats. This period was characterised by heightened public awareness of climate change and environmental degradation, driven by scientific reports and media coverage. The 2009 European Parliament elections continued this trend, with Green parties increasing their seats to 55. The Greens/European Free Alliance (Greens/EFA) group became a formidable force, advocating for stronger EU climate policies, renewable energy and biodiversity conservation.

Recent Surge: 2010s to Present

The most dramatic increase in green seats occurred in the 2019 European Parliament elections. Green parties achieved their best-ever results, securing 74 seats, up from 52 in 2014. This surge was driven by widespread public concern over climate change, as evidenced by youth-led movements like Fridays for Future and widespread environmental protests. Key countries contributing to this rise included Germany, France and the United Kingdom, where Green parties made significant gains.

The 2019 results positioned the Greens/EFA group as a critical player in the European Parliament, enabling them to exert substantial influence on EU policies. This influence was evident in the shaping of the European Green Deal, a comprehensive strategy aimed at making the EU climate-neutral by 2050.

Below is a general overview of how green seats have evolved over time:

1. Early Years (1979-1994):
   a. In the early years of the European Parliament (EP), environmental concerns were not as prominent with only a few MEPs (Members of the European Parliament) specifically focussed on green policies. The Green movement began to gain traction during this period and, in 1984, the European Greens was formed as a political party at the European level.
2. Rise of Green Parties (1994-2004):
   a. The 1990s saw a significant rise in the number of MEPs representing Green parties across Europe. These MEPs advocated for stronger environmental protections, sustainability and climate action. In 1999, the European Greens formed a political group in the European Parliament called the Greens/European Free Alliance (Greens/EFA) group, which brought together MEPs from various Green and regional parties.

3. Increased Influence (2004-2014):
   a. During this period, the green movement gained more visibility and influence within the EU Parliament. The Greens/EFA group expanded as more Green MEPs were elected. Environmental issues, such as climate change, renewable energy and biodiversity conservation, became more prominent on the EU agenda, partly due to the advocacy of Green MEPs.

4. Impact and Growth (2014-Present):
   a. In recent years, Green parties have experienced further growth and success in European Parliament elections. The Greens/EFA group has continued to advocate for ambitious climate policies, including the European Green Deal—a comprehensive plan to make the EU carbon-neutral by 2050. The 2019 European Parliament elections saw a significant increase in green seats, with Green parties making gains in several EU countries.

5. Overall, the evolution of green seats in the European Parliament reflects a broader societal shift towards prioritisng environmental sustainability and climate action. Votes for Green parties in the European Parliament have evolved over time, reflecting changing attitudes towards environmental issues, climate change and sustainability across Europe. Green parties advocate for policies that prioritise environmental protection, renewable energy, biodiversity conservation and sustainable development.

3.3 How many green causes are mentioned in the parties' political platforms before the election?

Green causes have become increasingly prevalent in the political platforms of parties across Europe, especially in the lead-up to elections. These parties often prioritise key environmental and sustainability issues, to appeal to a growing segment of voters who are deeply concerned about climate change and environmental degradation. The inclusion of green causes in political agendas typically encompasses a range of topics, including environmental protection, climate action, sustainability and green job creation.

One of the central focusses in these platforms is environmental protection, which involves policies aimed at preserving natural habitats, conserving biodiversity and reducing pollution levels. Parties advocate for stricter regulations on emissions, improved waste management practices and the protection of endangered species. Climate action is also a key pillar, with parties committing to reducing greenhouse gas emissions, transitioning to renewable energy sources and promoting energy efficiency measures. Climate targets, such as achieving carbon neutrality by specific dates, are commonly featured in green party platforms.

Sustainability is another critical aspect highlighted in these political agendas. This includes sustainable practices in agriculture, forestry, fisheries and urban planning. Parties propose initiatives to promote circular economy practices, reduce resource consumption and encourage sustainable consumption and production patterns. Moreover, there is a strong emphasis on creating green jobs and investments in sectors such as renewable energy, energy efficiency, sustainable transportation and environmental conservation.

The evolution of votes for green parties in the European Parliament reflects a broader societal shift towards environmental awareness and a desire for political representation that prioritises sustainability and climate action. Green parties have played a significant role in driving ambitious decarbonisation policies across Europe. However, their success has sometimes faced opposition from sectors, like rural and agricultural interests, who may view green policies as disruptive or costly.

To navigate these challenges, policymakers are increasingly focussing on strategies that balance environmental goals with economic considerations. This includes initiatives to boost green investment, support green industries and create job opportunities in environmentally friendly sectors. Governments are also leveraging EU funds to promote popular green policies, recognising the importance of addressing environmental concerns, whilst addressing the interests of various stakeholders.

Despite the progress, challenges remain. Climate change may not yet be a top voting issue for all segments of the population - and there may be varying levels of awareness about climate risks. Balancing the transition to a greener economy with the concerns of traditionally influential groups, like coal or farming communities, remains a complex task for policymakers. However, the overall trend indicates a growing consensus on the importance of addressing environmental challenges and promoting sustainability across European political platforms.

3.4 Challenges and vulnerabilities of citizen participation for green transition

Engaging citizens effectively for the green transition is fraught with challenges and vulnerabilities. These challenges can be broadly categorised into structural, socio-economic, political and behavioural dimensions.

Structural Challenges

- Financial Limitations: Many municipalities face budget constraints, limiting their ability to fund green initiatives or support citizen engagement programmes.
- Human Resources: A shortage of skilled personnel to design and implement green policies and engagement strategies can hinder efforts.
- Insufficient Green Infrastructure: Lack of green spaces, public transportation options and renewable energy facilities can impede citizen participation in sustainable practices.
- Digital Divide: Limited access to digital technologies and the internet in some areas can restrict the reach and effectiveness of online engagement platforms.

Socio-Economic Challenges

- Disparities in Income and Education: Lower-income and less-educated populations may have less access to information about green initiatives and fewer resources to participate.
- Urban Renewal Projects: Whilst intended to improve sustainability, these projects can sometimes lead to the displacement of low-income communities, causing resistance and reducing trust in local authorities.

Political and Institutional Challenges

- Fragmented Governance: Multiple layers of government and overlapping jurisdictions can lead to inconsistent policies and confusion amongst citizens.
- Political Will and Leadership: Lack of strong political commitment to the green transition at the local level can undermine engagement efforts.
- Electoral Cycles: Changing political leadership can result in shifts in priorities and discontinuity in green policies, discouraging long-term citizen engagement.

Behavioural and Cultural Challenges

- Perceived Ineffectiveness: If citizens believe their efforts will not make a significant difference, they may be less likely to participate.
- Behavioural Inertia: Established habits and lifestyles can be hard to change, even when sustainable alternatives are available.
- Cultural Norms: In some communities, traditional practices and values may conflict with modern environmental initiatives.

3.5 Adaptation and Mitigation Measures

Across the EU, climate change adaptation measures are being taken to decrease specific risks and impacts. In February 2021, the European Commission adopted the EU Adaptation Strategy. The Strategy outlines a long-term vision for the EU to become climate-resilient by 2050. In 2024, the Commission has published a Communication on **Managing climate risks - protecting people and prosperity**.

All EU Member States have also adopted adaptation strategies and/or plans specific to their **country's needs and risks**.

Examples of adaptation projects include:

- Less than a third of non-human losses were covered by insurance. Closing the climate protection gap by **increasing insurance coverage can help increase societies' ability** to recover from disasters, reduce vulnerability and promote resilience.
- Building infrastructure that is resistant to hazards and using nature-based solutions, like floodplains, are examples of adaptation measures. Preventing flooding through urban adaptation measures, like new locks in Albert Kanaal in Flanders, Belgium.
- Saving energy and reducing emissions with nature-based solutions, like green roofs.

Climate change adaptation measures are critical to increase our resilience and reduce disaster risks for all people in the EU.

For more adaptation projects: Climate Adapt 10 case studies - online.pdf (europa.eu).

Mitigating climate change means reducing the flow of heat-trapping greenhouse gases into the atmosphere. This involves cutting greenhouse gases from main sources, such as power plants, factories, cars and farms. Forests, oceans and soil also absorb and store these gases. This is an important part of the solution. Reducing and avoiding our emissions requires us to reshape everything we do — from how we power our economy and grow our food, to how we travel and live and the products we consume. It is a problem felt locally and globally.

Strategies to Overcome Challenges

- Participatory Approaches: Involving a diverse range of community members in the policy-making process can help ensure that initiatives are equitable and broadly supported.
- Tailored Communication: Developing targetted outreach strategies that address the specific needs and contexts of different community groups.
- Education and Training: Offering workshops and educational programmes to raise awareness and build skills for sustainable living.
- Support Networks: Creating platforms for community members to share knowledge, resources and experiences.
- Leveraging External Funding: Seeking grants and funding from EU programmes and international organisations to supplement local budgets.
- Feedback Mechanisms: Establishing systems to gather and respond to citizen feedback, ensuring that initiatives remain relevant and effective.
- Adaptive Management: Continuously evaluating and adjusting policies and programmes based on outcomes and changing conditions.

3.6 EU schemes and policy framework

A deep transformation of our economies and societies towards climate-neutrality and sustainability requires setting up meaningful and effective processes for participatory and deliberative policymaking.

Public participation in environmental decision-making is a legal right in Europe. This principle was established two decades ago by the Aarhus Convention. Since then, it has been increasingly recognised that participation is not only a matter of justice and democracy but also a practical necessity for transitioning into sustainability.

The European Green Deal is the European Union's ambitious plan to make the continent climate-neutral by 2050. The EU's strategy to achieve climate neutrality by 2050, foresees some instruments for the participation of citizens and civil society organisations, including stakeholder consultations, as well as more structured tools, such as the Just Transition Platform and the European Climate Pact.

The Just Transition Platform (JTP) is the key tool to help EU Member States and regions unlock support available through the Just Transition Mechanism (JTM). It ensures that all stakeholders have the guidance, information and knowledge they need to support Europe's just transition to a sustainable, climate-neutral economy.

The JTF represents EUR 19.2 billion in EU financing and is one of three funding pillars of the JTM. The second pillar is a just transition scheme for private investments under the InvestEU programme, with investment guidelines set out by Regulation (EU) 2021/1078. Its third pillar is a public sector loan facility backed by the EU budget, established by Regulation (EU) 2021/1229.

THE EUROPEAN CLIMATE PACT is a movement of people united in the transition towards climate neutrality. It is open to all individuals, as well as organisations such as associations or cities. Cities can engage in the European Climate Pact by joining as members, together with other partners such as engaged citizens or organisations throughout Europe. The Climate Pact offers resources to learn and exchange about climate change, develop and implement collective solutions and to take inspiration from local examples. Policymakers and local leaders, such as mayors, can become Ambassadors of the Climate Pact.

In addition, for the 2021-2027 European Budget, the European Commission proposed five objectives to guide Cohesion Policy: A Smarter, Greener, Connected, Social and Democratic Europe.

In this context, citizen participation in cohesion policy can also directly and indirectly support the European Commission's policy objectives:

- Smarter Europe: through innovation, digitisation, economic transformation and support to small and medium-sized businesses.
- **Greener Europe:** implementing the Paris Agreement and investing in energy transition, renewables and the fight against climate change.
- Connected Europe: with strategic transport and digital networks.
- Social Europe: delivering on the European Pillar of Social Rights and supporting quality employment, education, skills, social inclusion and equal access to healthcare.
- Europe closer to citizens: by supporting locally led development strategies and sustainable urban development across the EU.

3.7 Examples of existing successful initiatives

- Citizens' Convention on Climate - Representative panel of French citizens, directly involved in the preparation of the law.
- Austrian 'Klimarat' - Citizen Assembly on climate change-related issues.
- Conference on the Future of Europe - Citizen led series of debates on a supra-national level.
- Extinction Rebellion - International bottom-up activist movement focussing on climate change and democracy.
- Initiative of the Congress of Region's - collection of best practices into how local and regional communities are transforming their way of living, working, producing and consuming, and how they are trying to achieve environmentally sustainable and socially just economic growth
- Homepage - The European Community Power Coalition - The European Community Power Coalition promotes the development of citizen and community ownership of energy in the urgent transformation towards 100% renewable energy.

4 Green & Climate Change Resilient Spatial Planning

Green territorial resilient planning is an holistic approach to urban and regional development, which integrates sustainable practices with resilience measures to mitigate and adapt to the impacts of climate change. This concept encompasses the strategic use of land, resources and infrastructure to create environments that are not only ecologically sustainable but also capable of withstanding and recovering from climate-related shocks and stresses. The planning process involves a combination of green infrastructure, biodiversity conservation, sustainable urban design and community engagement to build resilience across various scales of human settlements.

Local governments within the European Union (EU) are pivotal in advancing green territorial resilient planning, due to their proximity to communities and direct influence over land use and development policies. The EU's legislative and policy framework supports and guides local governments in implementing these strategies effectively. Local governments are responsible for zoning and land use regulations that prioritise green spaces, promote sustainable urban development and protect natural habitats. By incorporating climate resilience into land use planning, municipalities can ensure that new developments are designed to withstand climate impacts, such as flooding, heatwaves and sea-level rise.

4.1 Past trends and current situation

With the rapid progression of urbanisation, cities are increasingly confronted with multifaceted challenges encompassing climate change, population expansion and resource constraints. Consequently, fostering the development of resilient cities has emerged as a pivotal imperative within future territorial spatial planning.

According to INTERNATIONAL GUIDELINES ON URBAN AND TERRITORIAL PLANNING, territorial planning is considered as a decision-making process aimed at facilitating economic, social, cultural and environmental goals through the development of spatial visions, strategies and plans and the application of a set of policy principles, tools, institutional and participatory mechanisms and regulatory procedures. For the needs of the current paper, however, we are dealing with the notion of green resilient territorial planning, which incorporates the additional parameter of environment in planning to ensure the durability of living areas, in front of upcoming environment coupled with related socio-economic shocks. Although the definition of resilient territorial planning is still missing consensus, since it is a complex concept integrating multiple disciplines connected with territorial management, for the needs of the current document, we consider the resilience of a territorial system as the process of reducing vulnerability, the pursuit of social and institutional learning capacity and the achievement of better territorial governance, which increase the adaptation ability to external shocks and risks associated with socio-natural disasters and climate change.

Territorial planning for green living areas may refer to both urban and rural areas and coastal or mountainous areas covering territories of various geographical characteristics. At the urban level, it may cover the whole spectrum - from the neighbourhood level to the whole city - including the functional areas around the city or even the regional level. As described in International Guidelines on Urban and Territorial Planning, regardless the geographical coverage of the territorial plans, three elements remain crucial: the space, the legal framework and the financial plan.

Space: The territory that we consider a shared space is the one that the plans, accompanying tools and legal framework should cover to aim at territorial cohesion and target CC.

Legal Framework: A Legal Framework working at all territorial and governmental levels is a crucial pillar for the effective application of Territorial Planning. Plans and Strategies must be in place to cover the needs of mitigation and adaptation across national, transnational, regional and local levels.

Financial Plan: A Financial plan is a core element of Territorial Planning, in order to estimate the necessary investment needed, but also the expected benefit to local communities and stakeholders. Territorial Planning for CC also needs to be combined with sound financial mechanisms, which are able to support the amendments in developed environments and support change in human practices, in order to be aligned with the need for mitigation and adaptation to CC.

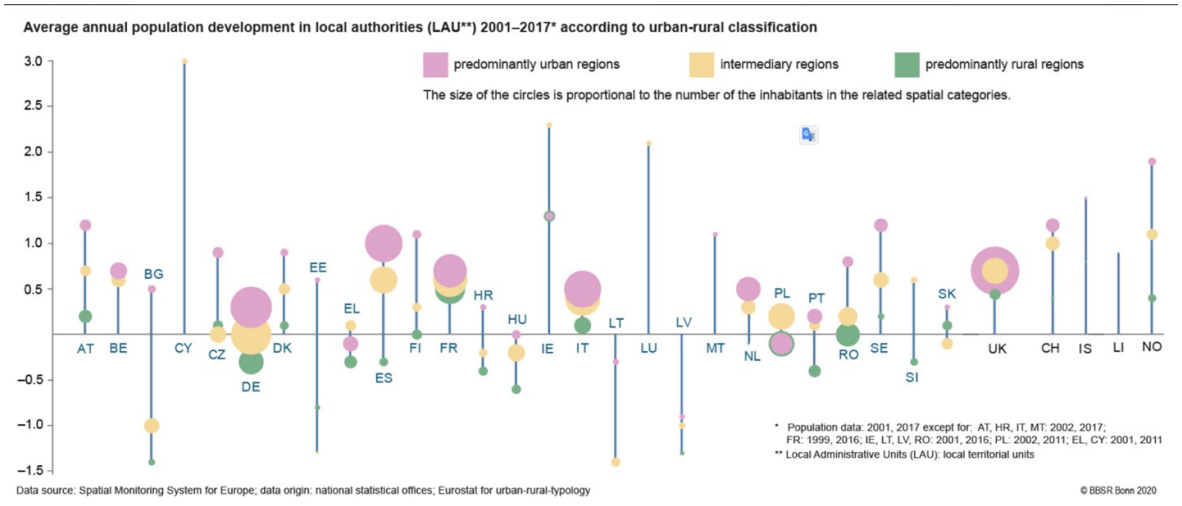
4.2 Key figures and indicators

Today, across the EU area, more people live in urbanised settings than not. And this figure has actually been growing in recent decades.

Urbanisation creates multiple challenges for the environment and quality of life, starting from the content limitation of green areas. The European territory is dominated by cities in which green areas have remained stable (central and North-Western Europe and Alpine countries) or have decreased (Eastern and Southern Europe). The reasons for this development are mainly urbanisation and economic development, either after accession to the EU or for touristic purposes in Southern Europe.

Drawing upon Atlas for the Territorial Agenda 2030, the population of the EU27 member states grew by 3.8% from 2001 to 2017. It is noteworthy to mention that in all the member states, population development was more positive in the urban and intermediary regions than in rural regions. The following graph shows the distribution of the European population in the EU27 across the different kinds of territories (urban, rural and intermediary).

Figure 7: Average annual population development in local authorities 2001 -2017 according to urban-rural classification



63% of the EU's total population lives in the so-called Functional Urban Areas, meaning the cities plus the urban fringe areas, which together share mutual benefits improving their functionality, underpinning economic and social development by becoming the places where investment, work, life and leisure activities come together.

The increasing trend of Urbanisation results in the need for more infrastructure and coverage of land of urban function-elated use. From 2000 to 2018, some 1.27 million hectares of land were developed as settlement areas in the 27 member states of the European Union. This roughly corresponds to the area of the region of Granada, Spain or the province of Tyrol, Austria. The change of use for buildings, streets and industry is declining. From 2000 to 2006, 29% of land-use changes were to urban use, i.e. building construction and sealing of corresponding surfaces. After this period, , this figure reduced to only 16%. Land-use changes to industrial and commercial use increased to 36% from 19%. This change likely reflects positive economic growth, at least in some EU member states. Almost half of land-use changes involve fertile arable land. Grassland and other agricultural areas account for some 30% and forests 20%.

Increasing land use for urban purpose has resulted in the expansion of the built-up environment and consequently to less imperviousness inside the city fabric. This has resulted in surface temperatures increasing significantly, resulting in the so-called phenomenon of urban heat island. Urban heat island may have a negative impact on human health, with more frequent cases of heat exhaustion and heat stroke.

One possible remedy for Urban Heat Island is the integration of Green Infrastructure (GI) into spatial planning and territorial development. The Green Infrastructure Strategy of the EU defines GI as a strategically planned network of natural and semi-natural areas, with other environmental features designed and managed to deliver a wide range of ecosystem services in both rural and urban settings. The European territory is dominated by cities in which green areas have remained stable (central and north-western Europe and Alpine countries) or have decreased (eastern and southern Europe).

However, densely populated areas have many more challenges to face. One is the air quality that directly affects human health and quality of life. Nitrogen oxide levels are one of the characteristic air quality indicators inside the urban fabric. The largest producer of nitrogen oxide emissions seems to be motor vehicles, responsible for about 40% of the total emissions, followed by industry, accounting for more than 25% of the total. In 2015, over 50% of the 8.5 million tonnes of NOx was emitted in cities and surrounding areas throughout the 27 EU member states.

4.3 Environmental challenges and vulnerabilities of the area in the context of CC

The JRC PESETA IV study shows that ecosystems, people and economies in the EU will face major impacts from climate change if greenhouse gas emissions are not sufficiently contained or adaptation to climate change is not put in place. The Study shows a clear north-south divide of the climate change burden, with southern regions in Europe being significantly more impacted by the effects of extreme heat, water scarcity, drought, forest fires and agriculture losses. Climate change has already put additional stress on both natural and human systems, making some weather and climate extremes more frequent and severe. Due to climate change over the impending decades, the intensity and frequency of extreme weather events are projected to increase substantially. Once-in-100-year extreme events may become, for example, once-in-20-year events.

Focussing on South Europe, it is expected to suffer relatively more than other parts of Europe due to increasing global warming, primarily because of changes in extreme temperatures and the spatial and temporal availability of water.

- The frequency of heatwaves is projected to rise more dramatically. Human exposure to severe heatwaves could increase around 30 times in higher latitudes, whilst in southern European countries (e.g., Spain and Greece), this exposure could be 40 to 50 times greater. This exposure may result in an increase in human mortality. Assuming present vulnerability and no additional adaptation, it was estimated that annual fatalities from extreme heat could rise from 2,700 deaths/year now to between approximately 30,000 and 50,000 by 2050 with 1.5°C and 2°C global warming, respectively. If the ageing population increase is taken into account, combined with the increasing urbanisation trends that could amplify the urban heat island effect, resulting in urban and metropolitan areas becoming significantly warmer than their surrounding rural areas, then it can be assumed that mortality rates could rise even higher.

- During the summer, water availability is expected to nearly halve in southern European regions that already experience the highest water stress, whilst water resources in northern Europe are anticipated to increase. The duration and intensity of water scarcity will grow in already existing water scarce areas in southern Europe. The number of people living with severe water stress, now around 3.3 million, would become fourfold with unmitigated climate. In parts of southern Europe, during summer months practically all available water will be used, with the majority of people and economic activities in these regions faced with water scarcity.

- Electricity production from hydropower is predicted to rise in northern Europe, whereas both hydro and nuclear power generation would decrease in southern Europe, due to reduced water availability for direct production and river cooling. It is estimated that by 2050, the power system that is in line with a 2°C mitigation scenario, wind and solar capacity would increase in southern regions to compensate for the lost hydropower and nuclear power production.

- Wheat and maize yields in southern Europe are expected to decline by more than 10% on average. Within an under 2°C warming scenario, in the absence of irrigation, declines in yield of over 20% are projected for all EU countries, with crop losses of up to 80% in some southern European countries (Portugal, Bulgaria, Greece and Spain). This implies that grain maize production may no longer be viable in areas where irrigation is restricted, due to water scarcity and precipitation significantly decreasing.

- Under high warming scenarios, nearly half of the total drought losses in the EU and UK would occur in Mediterranean EU countries, compared to the current 40%.

- The upward tree-line shift rate in southern mountain ranges is predicted to be double that at higher latitudes, whilst the alpine tundra is expected to almost entirely disappear with high warming. Continued warming is likely to result in further upward shifts in tree-line elevation, with implications for carbon cycling, biodiversity and hydrological processes in mountainous environments (Hartley et al., 2012).

- The rise in fire danger and exposure to wildfires for people living near wildland areas is anticipated to be greater at lower latitudes.

- Welfare losses from the climate impacts, monetised in PESETA IV, show a distinct north-south divide, with welfare losses in southern regions several times larger than those in northern Europe.

4.4 Adaptation and mitigation measures

Balanced territorial development is crucial for addressing climate change. It is essential to minimise regional vulnerabilities to climate change and enhance capacities for mitigating and adapting to its impacts. Climate change will impact urban life, cultural landscapes, agricultural regions and semi-natural areas - both individually and in their interconnected entirety. Climate-induced changes in vegetation zones and crop viability, along with the warming of urban environments, will transform regional working and living conditions.

To efficiently deal with the above, resilient territorial planning must align with the significant challenges posed by climate change. Integrating climate change mitigation and adaptation measures into spatial plans is crucial for local authorities to achieve climate resilience. At the policy design level, alignment between policies across different governmental levels can lead to selecting the best fit mitigation and adaptation measures that work for all territories, thereby enhancing resilience.

Starting with a place-based approach, it is essential to measure and monitor greenhouse gas (GHG) emissions, climate risks and impacts at various territorial levels. Standardised indicator frameworks can quantify GHG emissions and measure city and regional progress towards local, national and global targets. Climate risk and vulnerability assessments should be conducted at granular geographical scales, including cross-sectoral impacts, to better address territorial disparities. Developing subnational, consumption-based emissions estimates can help cities and regions understand emissions embedded in consumption, providing a metric to gauge the efficacy of demand-side mitigation policies.

Incorporating local actions into national climate plans and strategies is vital. Whilst most national governments have integrated local perspectives into their climate strategies, the extent varies across countries. Subnational climate goals and targets should reflect specific local needs and align with the Paris Agreement.

'Climate-proofing' regional development policy at all territorial levels involves mainstreaming climate objectives in national urban, ruraland regional policies. Regional policies can accelerate and incentivise locally specific pathways to net-zero emissions. Promoting climate action and resilience at the appropriate territorial scale, such as through a functional-urban area approach, can facilitate coordination amongst local authorities over land use and transport infrastructure to promote low-emission spatial structures. Supporting neighbourhood projects, which generate co-benefits and synergies beyond climate objectives, can address multiple local goals, experiment with innovative decarbonisation solutions and better target vulnerable communities through participatory approaches.

Enabling and scaling up local climate action and resilience requires strengthening the legal and institutional environment for local climate action, clarifying roles and responsibilities, creating alignment and coordination mechanisms across government levels, as well as building local capacity. Enhancing funding and financing mechanisms for local climate action, such as green municipal bonds and loans, green budgeting and green public procurement, can help subnational governments align their expenditures and revenues with climate goals. Engaging local actors, building partnerships and sharing knowledge can make climate action more inclusive, effective and innovative.

Key mitigation measures for resilient territorial planning include reducing GHG emissions, implementing policies to limit global warming to 1.5°C or 2°C and promoting energy efficiency and renewable energy sources. Adaptation measures should focus on building robust civil protection mechanisms, early warning systems and financial management mechanisms for climate-related risks. Improving infrastructure resilience to extreme heat events, enhancing urban planning to reduce urban heat island effects and implementing proper river flood adaptation measures are essential components. Measures, such as increasing tree and vegetative cover, installing green roofs and using cool pavements - despite a lack of extensive quantitative data - provide co-benefits, like reduced energy demand and improved mental health.

Addressing imbalanced water demand sustainably involves lowering water dependency in water-intensive sectors. Water pricing can incentivise users to adopt water-saving practices and technologies, ensuring long-term water sustainability. Combining various measures in synergy maximises benefits and minimises drawbacks, considering local geographical, climate and socioeconomic conditions.

4.5 EU schemes and policy framework of TRP

A series of EU schemes and policy frameworks have been developed so far, to support Green Resilient Territorial Planning. These initiatives aim to promote sustainable development and resilience in the face of climate change and other environmental challenges.

A climate-resilient Europe:
It is the Mission that aims to prepare Europe for climate disruptions and accelerate the transformation to a climate resilient and just Europe by 2030.

Precisely, the Mission by 2030 aims to:

1. Prepare Europe to deal with climate disruptions
2. Accelerate the transition to a climate resilient future
3. Build deep resilience, scaling up actionable solutions triggering societal transformations
4. To achieve these goals, the Mission will mobilise all societal and economic actors in a co- design process, in order to build:

a. Resilience of environmental systems
b. Resilience of social and economic systems
c. Resilience of political systems

More details on the structure of the Mission can be found at https://op.europa.eu/s/zK7A

Territorial Agenda 2030
The Territorial Agenda is a policy document for spatial planning in Europe, its regions and communities. The Territorial Agenda underlines the importance of and provides orientation for strategic spatial planning and calls for strengthening the territorial dimension of sector policies at all governance levels. It seeks to promote an inclusive and sustainable future for all places and to help achieve Sustainable Development Goals in Europe.

This must be based on a common understanding that development needs and impacts of future developments differ between places in Europe; and cooperation and coordination between places, levels of governments, policy sectors and societal groups to address complex issues and utilise diverse potential.

Urban Agenda for the EU:
The **Urban Agenda for the EU** is an integrated and coordinated approach to deal with the urban dimension of EU and national policies and legislation. By focussing on concrete priority themes within dedicated Partnerships, the Urban Agenda seeks to improve the quality of life in urban areas. The Urban Agenda for the EU aims to realise the full potential and contribution of urban areas towards achieving the objectives of the Union and related national priorities, in full respect of subsidiarity and proportionality principles and competences. The Urban Agenda for the EU strives to establish a more effective integrated and coordinated approach to EU policies and legislation with a potential impact on urban areas and also to contribute to territorial cohesion by reducing the socioeconomic gaps observed in urban areas and regions. The Urban Agenda for the EU strives to involve urban authorities in the design of policies, to mobilise urban authorities for the implementation of EU policies, and to strengthen the urban dimension in these policies. https://ec.europa.eu/regional_policy/policy/themes/urban-development/agenda_en

The New European Bauhaus
The New European Bauhaus initiative calls on all of us to imagine and build together a sustainable and inclusive future that is beautiful for our eyes, minds and souls.

Beautiful are the places, practices, and experiences that are:

- Enriching - inspired by art and culture, responding to needs beyond functionality.
- Sustainable - in harmony with nature, the environment and our planet.
- Inclusive - encouraging a dialogue across cultures, disciplines, genders and ages.

The New European Bauhaus brings citizens, experts, businesses and institutions together to reimagine sustainable living in Europe and beyond. In addition to creating a platform for experimentation and connection, the initiative also supports positive change by providing access to EU funding for beautiful, sustainable and inclusive projects.

Urban Agenda for the EU
The Urban Agenda enhances urban life by improving coordination between different policy areas, such as air quality, circular economy and urban mobility, amongst others. It leverages various EU funding sources to help cities develop strategies that are resilient and sustainable, aiming to significantly improve urban living conditions.

Integrated Coastal Zone Management Protocol
The Protocol on Integrated Coastal Zone Management in the Mediterranean, (ICZM Protocol) was adopted in 2008 and came into force in 2011.

The ICZM Protocol provides the legal framework for the integrated management of the Mediterranean coastal zone. Under the Protocol, Parties are called on to take the necessary measures to strengthen regional cooperation, in order to meet the objectives of integrated coastal zone management. Such measures include those aimed at protecting the characteristics of certain specific coastal ecosystems (e.g. wetlands and estuaries, marine habitats, coastal forests and woods and dunes), those aimed at ensuring the sustainable use of the coastal zone and those aimed at ensuring that the coastal and maritime economy is adapted to the fragile nature of coastal zones.

4.6 Examples of existing successful initiatives of the TRP

European Urban Initiative (EUI)[21]: The EUI, funded with a €450 million ERDF budget for 2021-2027, supports cities in developing and implementing innovative urban strategies. This initiative focusses on testing new solutions, enhancing capacities and disseminating knowledge in sustainable urban development, underscoring the EU's commitment to involve cities in shaping policies that address their unique challenges.

URBACT:[22] Active since 2002, URBACT fosters urban development across Europe by promoting cooperation and sharing ideas amongst cities through thematic networks. It helps build the capacities of local stakeholders in creating integrated and participatory policies. URBACT IV, running from 2021-2027, incorporates EU priorities such as digital innovation, environmental sustainability and gender equality into its activities, with a budget of approximately €87 million from various EU funds.

[21] https://www.urban-initiative.eu/what-european-urban-initiative
[22] https://urbact.eu/

CLIMATE-ADAPT (European Climate Adaptation Platform): The European Climate Adaptation Platform Climate-ADAPT is a partnership between the European Commission and the European Environment Agency (EEA) with the main purpose to support Europe in adapting to climate change, by providing a platform for sharing information, tools and best practices. Within its core service are knowledge dissemination, policy support and case study sharing on climate adaptation and resilience. The Platform ultimately aims at improving access to adaptation knowledge, enhanced regional and local resilience to climate impacts, along with informed policy-making.

LIFE programme:[23] EU's funding instrument for the environment and climate action. The Programme aims to fund actions that prevent or alleviate environmental and climate problems, which will affect future EU generations. These problems impact on citizens' health and quality of life, as well as the availability and status of natural resources, implying social and economic costs. Life Programme brings together private, public and third sectors of the economy to co-design solutions to big environmental problems underpinning the ecosystemic approach to territorial planning.

European Regional Development Fund:[24] The European Regional Development Fund (ERDF) aims to strengthen economic, social and territorial cohesion in the European Union by correcting imbalances between its regions. It enables investments in a smarter, greener, more connected and more social Europe that is closer to its citizens.

EU Solidarity Fund (EUSF): It has been active since 2020, and it aims to provide financial support to EU member states and regions affected by major natural disasters. It supports the funding of reconstruction efforts, supporting disaster response and promoting preventive measures to enhance resilience. The expected outcome is the swift recovery of affected regions, strengthened resilience to future disasters and increased capacity for disaster management.

These initiatives demonstrate the diverse approaches to Territorial Resilient Planning within the EU, encompassing community engagement, policy development, inter-regional cooperation and climate adaptation efforts.

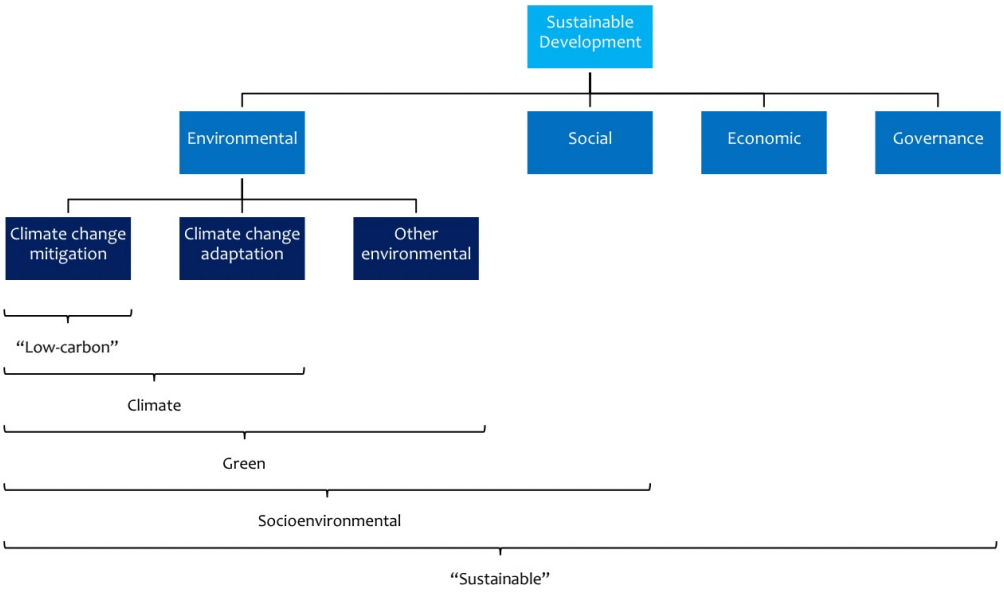
[23] https://social-economy-gateway.ec.europa.eu/eu-funding-programmes/life-programme_en
[24] https://ec.europa.eu/regional_policy/funding/erdf_en

5 Finance for Green Transition in the EU Mediterranean Region

Sustainable finance has emerged as a pivotal component in the transition towards a more resilient and inclusive global economy. At its core, **green finance**—defined as **financing investments that provide environmental benefits**—aims to support projects and initiatives that address climate change, enhance biodiversity and foster the circular economy. However, within the broader framework of sustainable finance, it encompasses a wider range of considerations beyond environmental impact alone.

Sustainable finance integrates environmental, social and **governance** (ESG) criteria into investment decision-making processes, driving long-term investments that support sustainable economic activities and projects. This holistic approach not only considers environmental factors, such as climate change mitigation and adaptation, biodiversity preservation and pollution prevention, but also social elements, including inequality, inclusiveness, labour relations and community investment. Governance, including management structures, employee relations and executive remuneration, is essential for ensuring that social and environmental factors are embedded in decision-making processes.[25]

Figure 8: Sustainable finance and its components



Source: UNEP (2016)

In the European Union, **sustainable finance is a cornerstone** of the European Green Deal, which aims to foster economic growth, whilst minimising environmental pressures and achieving climate and environmental objectives. The EU's approach emphasises transparency regarding ESG-related risks and advocates for robust governance mechanisms to mitigate these risks, thereby ensuring the stability and sustainability of the financial system.

[25] Refer to the EU definition of Sustainable finance: https://finance.ec.europa.eu/sustainable-finance/overview-sustainable-finance_en

Municipalities play a crucial role in advancing sustainable finance at the regional level. As the entities closest to citizens, local governments are uniquely positioned to drive environmental and energy transitions. From 2000 to 2016, subnational governments in 30 OECD countries accounted for 55% of public spending and 64% of public investment in sectors directly impacting climate change and the environment. Despite this, climate-related expenditures and investments at the subnational level represented only 1.3% and 0.4% of GDP, on average, underscoring the need for increased efforts and financial support for green projects. (OECD, 2020a)

A key focus for municipalities should be on **promoting and investing in nature-based solutions**. Reducing financing for activities that harm nature is as critical as increasing investment in environmentally positive projects. Without a concerted effort to balance these aspects, initiatives aimed at addressing climate change, biodiversity loss and environmental degradation will fall short. (UNEP, 2023)

The cost of inaction in sustainable finance is significant (NGFS, 2023). Failing to incorporate ESG factors into financial decisions can lead to environmental degradation, social inequality and poor governance, ultimately impacting economic stability and growth. Thus, it is imperative to engage all stakeholders, including local governments and municipalities, in sustainable finance initiatives. By doing so, we can ensure a comprehensive and inclusive approach to tackling the pressing environmental and social challenges of our time.

In this chapter, we will explore **the current status of sustainable finance in Europe** with a particular focus on municipalities. We will examine the role of local governments in enhancing green finance, facilitating access to funds for green projects and scaling up green investment. We also highlight some of the key challenges and mitigation plans within the green finance framework. The chapter will also map EU green finance schemes, policy frameworks and green finance initiatives at the EU level. Through this analysis, we aim to highlight the critical need for **coordinated action and the involvement of all stakeholders** to foster a sustainable future.

5.1 Past trends and current situation

The market for climate finance has experienced remarkable growth over the past few years, reflecting a global shift towards more sustainable investment practices. In 2021/2022, average annual climate finance flows nearly doubled to almost USD 1.3 trillion, compared to 2019/2020 levels. This surge was largely driven by a significant increase in mitigation finance, which saw an upsurge of USD 439 billion from the previous period (CPI, 2023). Within the euro area, the issuance of sustainable debt securities has more than doubled in the last three years, further indicating a robust expansion in the market for sustainable finance (European Central Bank Website).

Despite these positive trends, there remains **a substantial finance gap in climate finance**. In 2022, the Intergovernmental Panel on Climate Change (IPCC) highlighted that investments in mitigation **need to increase** by a factor of three to six times, in order to meet global climate targets, with significant disparities across sectors and regions IPCC (2022). The renewable energy sector has been the primary recipient of this financing, driven by proven business models, rapidly declining technology costs and the competitive edge of solar photovoltaic and onshore wind energy These investments align with the initial generation of Nationally Determined Contributions (NDCs), which heavily emphasised mitigation opportunities in the renewable energy sector. However, despite the steady flow of investment into this sector, the overall investment gap has not shown signs of narrowing.

Key sectors, such as **energy and transport**, which are the largest emitters of greenhouse gases, continue to attract the majority of climate finance flows. In 2021/2022, the energy sector accounted for 44% of total mitigation finance, whilst the transport sector received 29%. This period also witnessed exponential growth in the sale of electric vehicles (EVs), particularly in China, Western Europe and the United States. The renewable energy sector continues to lead in attracting financing, bolstered by decreasing costs and proven business models for generation technologies, like solar and wind.

Conversely, **the agriculture and industry sectors**, which are the next largest sources of emissions, receive disproportionately little climate finance, accounting for less than 4% of total mitigation and dual benefits finance These sectors have a combined mitigation potential of 20 gigatonnes of CO_2 by 2030, which is higher than that of the energy and transport sectors, underscoring a significant missed opportunity for emissions reduction.

On a global scale, **sustainable finance levels are rising**, with Europe contributing a significant share of these investments. Despite this overall upward trend, 2022 saw a decline in sustainable finance, due to global financial market disruptions. This decline was mainly in the building sector, whilst sustainable finance in other sectors still enjoyed a positive growth rate. This fluctuation highlights the vulnerability of sustainable finance to broader market conditions and **the need for sustained and resilient investment strategies** to achieve long-term climate goals.

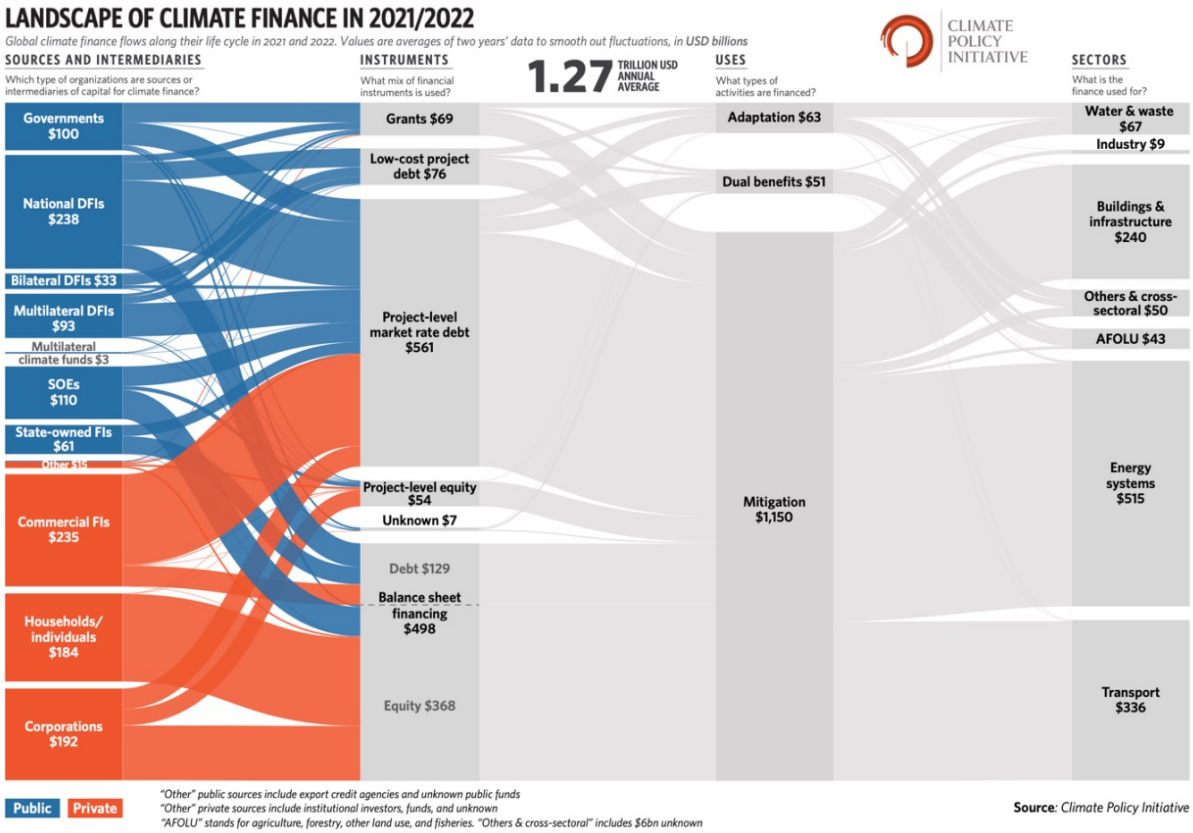
Whilst the market for climate finance is growing rapidly, significant **gaps** remain **in achieving the necessary scale of investment**, particularly in underfunded sectors like agriculture and industry. Addressing these gaps requires a concerted effort to mobilise finance more effectively across all sectors and regions, ensuring a comprehensive approach to meeting global climate objectives.

5.2 Key figures and indicators

In 2021 and 2022, the global climate finance landscape saw an average annual investment of $1.27 trillion USD. This substantial flow of funds reflects the growing urgency and commitment to combat climate change. Notably, $1.15 trillion of this total was dedicated to mitigation measures, underscoring a decisive shift towards strategies aimed at reducing greenhouse gas emissions and curbing the progression of climate change.

A significant portion of climate finance was channelled into the energy sector, which emerged as the primary recipient of these funds. Following the energy sector, the transport sector received significant climate finance allocations. Transportation is another major emitter of greenhouse gases, primarily due to the reliance on fossil fuels for road, air and maritime travel. Climate finance is characterised by a balanced contribution from both public and private sectors, with each accounting for roughly half of the total funds. This dual-source financing is crucial for scaling up climate action efforts, leveraging the strengths and capacities of different stakeholders (see Figure below).

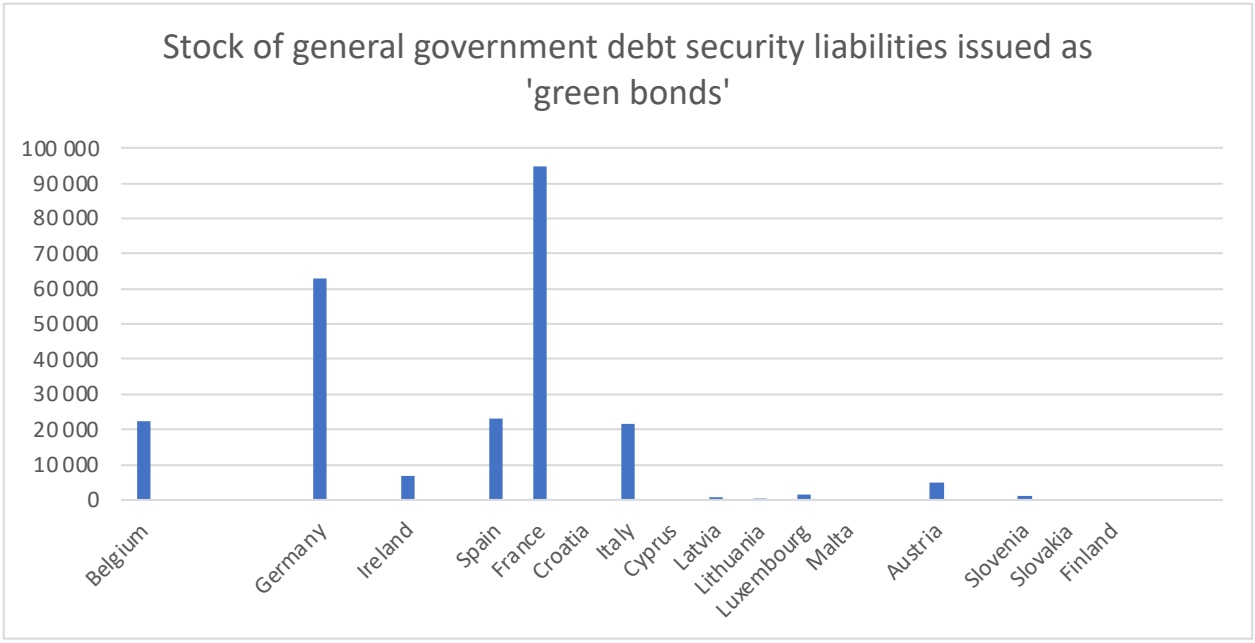
Figure 9: Landscape of climate finance in 2021/2022



Source: Global Landscape of Climate Finance (2023)

In recent years, green bonds have emerged as a pivotal financial instrument in the global effort to combat climate change. These bonds, specifically earmarked for environmental and climate-related projects, have seen a significant increase in issuance, particularly within the European Union (EU). In 2022, France and Germany stood out as leading issuers of green bonds, reflecting their commitment to sustainable finance and climate action. In 2022, the EU increased its issuance of green bonds, demonstrating a strong commitment to funding climate action. France has been a pioneer in the green bond market, consistently ranking amongst the top issuers globally. In 2022, France issued green bonds worth €94,731.5 million, reflecting a significant increase in its commitment to sustainable finance. Germany is another major player in the green bond market, with issuances reaching €63,085 million in 2022.

Figure 10: Stock of general government debt security liabilities issued as "green bonds"



Source: ECB website

Municipalities play a crucial role in green finance. The bulk of environmental and climate investment is undertaken by subnational governments, with central governments contributing to a lesser extent. According to the OECD (2019), in OECD countries from 2000 to 2016, 64% of environmental and climate investment was carried out by subnational governments, whilst only 36% was managed by central governments.

The European market for carbon credits is expanding rapidly, due to international efforts to combat climate change, reduce carbon emissions and achieve sustainability goals. Each carbon credit typically represents a reduction of one metric ton of carbon dioxide or its equivalent in greenhouse gases. Businesses, governments and organisations purchase these credits to offset their emissions, thereby funding initiatives such as reforestation, renewable energy projects and other carbon reduction activities. As countries across Europe commit to carbon neutrality and implement carbon pricing schemes, the demand for carbon credits is rising. This trend is expected to continue as environmental stewardship and corporate accountability gain increasing importance.

5.3 Challenges and vulnerabilities for green finance

Despite the burgeoning interest and significant growth in green finance, several challenges continue to impede **the accessibility and scalability of funding** for green projects. These obstacles not only make it difficult for green initiatives to secure financing but also underscore the critical need for government intervention, particularly at the local level, to provide necessary support.

5.3.1 Challenges within Green Projects

Green projects often face a unique set of challenges that hinder their access to financial markets:

- **New Market Entrants:** Many green projects are relatively new and lack a track record, making investors wary of their viability and profitability.
- **Information Asymmetry:** There is often a lack of sufficient information about green projects, leading to uncertainty and higher perceived risks amongst investors.
- **Technology Risk:** The innovative technologies employed in green projects carry inherent risks, including the potential for technological failure or obsolescence.
- **Uncertainty:** Green projects are frequently subject to regulatory and market uncertainties, which can deter investment.
- **Long-term Investment Horizon:** Many green projects require long-term investments, which may not align with investors' shorter-term return expectations.

These factors collectively make green projects less attractive to traditional financial markets. This situation justifies the intervention of government entities, such as municipalities, which can play a pivotal role in bridging the financing gap. Municipalities are particularly well-positioned to support green projects, due to their close relationships with local initiatives and reduced susceptibility to information asymmetry.

5.3.2 Global Challenges for the Growth of Green Finance

In addition to project-specific challenges, green finance faces broader global obstacles that hinder its growth and effectiveness:

- **Lack of Consistent Definitions:** The absence of universally accepted definitions and taxonomies for what constitutes "green" or "sustainable" investments creates confusion and inconsistency in the market. Appropriately designed sustainable finance definitions can enhance market clarity, boost investor confidence and facilitate easier tracking and measurement of sustainable finance flows. (OECD, 2020b)
- **Measurement and Assessment Difficulties:** Implementing frameworks like the EU taxonomy and ESG (Environmental, Social and Governance) criteria is crucial, but these frameworks are still evolving. More robust methods are needed to measure and assess the impact of green finance effectively.
- **Regulatory and Policy Guidance Gaps:** Insufficient policy and regulatory guidance at national and international levels can lead to fragmented markets and inconsistent practices, hampering the growth of green finance.
- **Greenwashing:** The practice of greenwashing—misleading claims about the environmental benefits of products or investments—undermines investor trust. The EU has taken steps to address this issue, including efforts by the European Banking Authority and European Supervisory Authorities to combat greenwashing. (EBA, 2023)
- **Financing and Investment Gaps:** Whilst government budgets are crucial in supporting green finance, they are often insufficient to meet the required investment levels. Municipalities, in particular, face capacity constraints and issues of creditworthiness, limiting their ability to finance green projects independently. This financing and investment gap highlights the necessity for private sector involvement and innovative financing mechanisms to complement public funds. (OECD, 2022a)

5.4 Adaptation and Mitigation Measures

To overcome the challenges in green finance, a multifaceted approach is essential, combining innovative financial instruments and increased financial support:

- **Mobilising Private Finance:** One promising avenue for mobilising private finance involves the use of green bonds and equity funds. These instruments can attract private investment by offering structured opportunities for returns on sustainable projects. The application of these instruments will vary depending on regional and sectoral specifics. For instance, green bonds might be more suitable for large-scale infrastructure projects in urban areas, whilst equity funds could support innovative startups and smaller green initiatives. (OECD, 2020a)
- **Enhancing Financial Support and Revenue Mobilisation:** Subnational governments need more financial support from international and national entities and must enhance their revenue mobilisation through taxes, user charges and property income. However, government budgets alone are insufficient. Private capital from banks, pension funds and insurance companies is crucial to bridge the investment gap and support the transition to climate-neutral economies.
- **Addressing the Cost of Inaction:** Investors must also be made aware of the significant costs of inaction. Failing to address climate change not only threatens environmental and social stability but also poses substantial financial risks. Highlighting potential future losses can motivate investors to prioritise green finance, as proactive investment in sustainable projects can safeguard against these risks.
- **Combatting Greenwashing:** To ensure the integrity of green finance, the European Union has undertaken significant efforts to establish frameworks that limit the risk of greenwashing. These frameworks aim to provide clear and consistent definitions of what constitutes “green” investments, enhancing transparency and investor confidence. By curbing misleading claims and ensuring that investments genuinely contribute to sustainability, these measures support the credibility and effectiveness of green finance initiatives (EBA, 2023).

5.5 EU schemes and policy framework for green finance

The European Union offers a variety of schemes and policy frameworks to support green finance. Here is a non-exhaustive list of these initiatives:

1. **EU Green Deal:** The European Green Deal is the EU’s flagship initiative to make the European economy sustainable and carbon-neutral by 2050. It encompasses a wide range of policy measures and initiatives aimed at decarbonising the economy, enhancing energy efficiency, transitioning to renewable energy sources, promoting circular economy principles and protecting biodiversity.
2. **NextGenerationEU:** The EU launched this €750 billion recovery instrument in response to the COVID-19 pandemic. A significant portion of this funding is allocated to support the green transition and sustainable investments, including renewable energy projects, energy efficiency renovations, sustainable transport infrastructure and nature restoration initiatives.
3. **European Regional Development Fund (ERDF) and Cohesion Policy:** Provide financial support cohesion and sustainable development. Funding is allocated to green infrastructure projects, renewable energy deployment, energy efficiency improvements and other environmentally sustainable initiatives.
4. **European Investment Bank (EIB) and European Investment Fund (EIF):** Provide financing and technical assistance to support sustainable investments in the EU and beyond. They offer loans, guarantees, equity investments and advisory services for renewable energy projects, energy efficiency upgrades, sustainable transport infrastructure and other green initiatives.
5. **European Green Deal Investment Plan:** With the aim to mobilise at least €1 trillion in public and private investment over the next decade to support the green transition. It includes the Just Transition Mechanism, which provides financial assistance to regions and industries most affected by the transition to a low-carbon economy, helping them to diversify their economies and create new jobs in sustainable sectors.

6. **European Structural and Investment Funds (ESIF):** ESIF provide funding to EU member states and regions to address regional disparities and support economic, social and territorial cohesion. A portion of ESIF funding is earmarked for investments in green infrastructure, renewable energy, energy efficiency and sustainable transport projects.
7. **EU Emissions Trading System (EU ETS):** The EU ETS is the world's largest carbon market, covering emissions from sectors such as power generation, industry and aviation. It puts a price on carbon emissions and provides incentives for companies to reduce their greenhouse gas emissions. Revenue generated from the auctioning of emission allowances can be reinvested in green projects and climate mitigation efforts.
8. **Horizon Europe:** Horizon Europe is the EU's research and innovation funding programme, supporting research and innovation activities across various thematic areas, including climate change, energy transition and environmental sustainability. Funding is available for collaborative research projects, technology development and demonstration projects aimed at advancing sustainable solutions.

Various EU funding programmes and financial instruments are accessible to assist municipalities in creating and executing environmental initiatives. Here is a non-exhaustive list:[26]

9. **LIFE programme:** EU's funding instrument for the environment and climate action.
10. **European Regional Development Fund:** designed to strengthen economic, social and territorial cohesion in the European Union.
11. **The Cohesion Fund:** dedicated to Member States with a gross national income (GNI) per capita below 90% EU-27 average. Also supporting investments in the field of environment and trans-European networks in the area, if transport infrastructure.
12. **Urban Innovative Actions (UIA):** provides urban areas throughout Europe with resources to test new and unproven solutions to address urban challenges
13. **URBACT:** provides idea sharing amongst bottom-up initiatives and co-design long-term strategies and urban policies – all at European and local levels.
14. **Interreg Europe:** strengthens cooperation between regions and countries within the EU. As part of the EU's Cohesion Policy.
15. **EU Green Capital & EU Green Leaf Awards:** recognise and reward local action towards a transition to a greener, more sustainable future.

Additionally, there is an online tool developed in the website of the Covenant of Mayors, which allows for identification of financing opportunities: https://eu-mayors.ec.europa.eu/en/resources/funding_guide

5.6 Examples of existing successful initiatives

- Net zero Cities: is an initiative designed to help Europe achieve its climate neutrality goals. Supporting the EU's Mission "100 Climate-Neutral and Smart Cities by 2030," NetZeroCities offers cities expert guidance and services tailored to their specific needs. The initiative helps cities overcome structural, institutional and cultural barriers to reach climate neutrality by 2030.

- The Circular City Funding Guide is an initiative aimed at supporting cities in their transition towards a circular economy. This comprehensive guide provides cities with tailored funding advice and resources to help implement circular projects. It assists cities in identifying and overcoming financial barriers, offering expert guidance on leveraging various funding opportunities to achieve their circular economy goals.

[26] For more details visit: https://environment.ec.europa.eu/topics/urban-environment/green-city-accord/funding-opportunities_en

- Kommunales Divestment & Re-Investment focusses on sustainable investment strategies for municipalities, emphasising the importance of divesting from environmentally harmful industries and reinvesting in climate-friendly alternatives. It explores the relationship between climate protection, ethical and social factors, and municipal investment strategies, offering resources like case studies, strategic guides and tutorials on divestment and re-investment tailored for communities and institutional investors. The project is conducted by adelphi research gGmbH, the Forum for Sustainable Investments and the Climate Alliance, supported by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, as part of the National Climate Protection Initiative.

- Almada's Climate Fund, initiated in 2009 as the "Almada Less Carbon Climate Fund," aims to reduce the city's carbon footprint through financing energy efficiency and renewable energy investments. After seven successful years, the fund evolved into a revolving fund in 2016, having leveraged over €1.5 million for such investments. A key innovation is the 'shared benefits' approach, promoting sustainability and a leverage effect by sharing savings between the fund and the involved department, encouraging more departments to invest in energy efficiency projects. This approach ensures fund replenishment and motivates further investments in clean energy transitions.

- The COOLkit, part of the COMPILE project, serves as a comprehensive guide aimed at supporting the development of energy communities. It offers a repository of reports and dashboards encompassing best practices, financing, engagement and technical tools for those interested in creating and growing energy communities.

- The SOFIGREEN project, co-financed by the EU Commission, aims to green the social economy in Europe by enhancing SMEs and entrepreneurs' investment readiness and access to finance. It focusses on fostering collaborations across different stakeholders and levels, aligning with the EU Green Deal's objectives. SOFIGREEN intends to transform challenges into opportunities for sustainable business model shifts and financial acquisition, contributing to more sustainable value chains and communities.

- The PROSPECT+ project builds on its predecessor, aiming to empower over 300 public authorities and 400 public officers across the EU with innovative financing schemes for sustainable energy projects. Through a Capacity Building Programme and replication activities, it focusses on enhancing local authorities' ability to identify and implement the most appropriate and cost-effective financing instruments for energy efficiency and climate projects. The programme includes thematic learning modules on Public Buildings, Private Buildings, Transport, Public Lighting, and Cross-Sectoral initiatives, combining physical meetings, study visits and webinars for effective peer-to-peer learning. The PROSPECT+ Learning Handbook on Citizen Finance provides comprehensive guidance on citizen financing for sustainable energy and climate action projects in the European Union. It covers the basics of citizen financing, including definitions, characteristics, opportunities and barriers. The handbook offers step-by-step guidelines on project financing and shares insights from best practices and case studies across the EU. Its aim is to serve as practical guidance for local and regional stakeholders, focussing on crowdfunding and financing through cooperatives as the primary mechanisms of citizen finance.

- The CliFiT website offers three training modules and six interactive tools within the CliFiT4SE toolkit, designed to delve into crucial climate finance issues. Available in English, French and Spanish, the toolkit is structured around "Setting the Scene on Climate Finance," "Climate Rationale," and "Implementation Structure." Each module introduces participants to fundamental concepts of climate finance, strategies for project design and implementation, as well as practical tools for enhancing projects fit for climate finance opportunities, supported by sector-specific case studies.

- "Co-creating transformative solutions for cities" details the proceedings and outcomes of the CFFactory event, held in Berlin from November 28 to 30, 2018. Organised by the C40 Cities Finance Facility (CFF), in cooperation with the Senate of Berlin, it aimed to foster collaboration amongst cities, national governments, financial institutions, NGOs and the private sector to develop sustainable infrastructure projects addressing climate change. The document covers keynote insights, project showcases from various cities, discussions on innovative financing instruments and strategies to enhance urban resilience and sustainability through targetted investments in green projects.

- The document outlines the Multi-Region Assistance Project-Revolving Investment for Cities in Europe (MRA-RICE), initiated in October 2018. It describes a collaborative effort amongst four cities—London, Manchester, Milan and The Hague—funded by the European Commission to explore the development of a multi-region, thematically focussed financial instrument for urban development. The document covers the MRA-RICE's objectives, including financing sustainable urban development through the creation of a Blueprint City Fund, detailing experiences, strategies and recommendations for establishing city funds. It emphasises the use of financial instruments to provide long-term sustainable finance, aiming to replicate the model across European cities to support urban development in various sectors.

- The EIB Green Eligibility Checker is a tool designed by the European Investment Bank to help users determine whether their projects align with the EU Taxonomy for sustainable activities. This tool is particularly useful for identifying projects that contribute to environmental objectives and are eligible for green financing. It's an essential resource for stakeholders looking to ensure their investments support the transition to a low-carbon, sustainable economy.

- The Nature-Based Solutions Business Model Canvas, as detailed on Connecting Nature, is a specialised tool designed to assist with visually organising the business model for Nature-Based Solutions (NBS). It focusses on the three main phases of financing NBS: planning, capital investment and ongoing operational costs. The canvas is tailored to ensure that not only capital investment costs are considered but also the creation of sustainable business models for long-term return on investment. This tool has been utilised by cities and by hundreds of other organisations worldwide.

- Business Model Catalogue focussed on urban nature-based solutions. It details various models for implementing and financing nature-based solutions in urban environments, addressing challenges such as risk reduction, urban densification, local stewardship, green health, education and green heritage. Each model outlines the value proposition, delivery, capture mechanisms, enabling conditions and potential risks, providing examples from cities. This catalogue is aimed at supporting cities, businesses, NGOs and community groups in developing strategies for sustainable urban development through nature-based solutions.

- "Investing in Nature: Financing Conservation and Nature-Based Solutions - A Practical Guide for Europe" provides comprehensive guidance on financing conservation and nature-based solutions' (NBS) projects in Europe. It introduces the concept and importance of NBS and conservation for biodiversity and climate adaptation, elaborating on accessing support from the European Investment Bank's Natural Capital Financing Facility (NCFF). It covers the basics of financing, project description, financial analysis, identifying risks and legal structures essential for securing funding and successfully implementing NBS projects.

- Citizenergy explains how individuals can participate in sustainable energy projects across Europe. It outlines a process where users can filter projects based on their interests, support chosen projects by investing through hosting platforms and then share their experiences with the community. The platform emphasises cooperation and crowdfunding as means to fund projects like wind turbines, solar rooftops and biogas plants, involving the community in the energy revolution. It details various types of participation including loans, bonds, equity investments, cooperative memberships, donations and more, aiming to foster community energy initiatives.

- Abundance Investment on council investments focusses on helping local councils in creating greener communities through climate action projects like energy efficiency, EV charging and solar power. It highlights the benefits of investing in local authority securities, which offer low-risk investments, eligibility for the Innovative Finance ISA for tax-free returns and long-term fixed returns from just £5. It emphasises the role of councils in balancing budgets and the importance of community support in achieving a green transition.

- ECrowd platform explains that crowdlending, also known as debt crowdfunding, allows companies to finance themselves through a diverse group of individuals without the need for a bank. In this model, people lend money to a company in return for a financial return, as agreed upon in a loan contract. ECrowd specialises in financing investment projects, offering a quick, transparent and easy way for companies to connect with investors, providing affordable financing to companies and profitable returns to investors, without the involvement of intermediaries like banks.

- Financing Energy Retrofitting Tool Pack aimed at helping cities choose suitable financing models for large-scale energy retrofitting projects. This toolkit includes a self-assessment tool, a comparison tool, a barriers tool, guidance for developing an action plan and a one-stop shop guide - all designed to address challenges and facilitate the planning and implementation of energy efficiency renovations.

- The section on financing within the 2023 EUCENA-Balkan Best Practice Guide highlights the challenges and innovative approaches required to overcome financial barriers for energy communities. Financing for community energy projects typically comes from citizen investments and is often complemented by crowdfunding to directly raise funds from the community. More advanced communities sometimes also resort to bank loans, although access to these loans can be challenging due to the requirement for guarantees. The guide outlines different crowdfunding models, such as peer-to-peer lending (crowdlending), rewards-based crowdfunding, donation-based crowdfunding, profit-sharing/revenue-sharing and hybrid models. It emphasises the importance of good preparation for any crowdfunding activity, including selecting an appropriate online platform and presenting a compelling, transparent story to potential investors. Additionally, it discusses the possibility of using traditional bank loans or debt financing for community energy projects. However, it notes the challenges associated with securing bank loans, including the need for guarantees and the perception of these projects as being more complicated and smaller by traditional banks. It underscores the necessity of innovative financing models to support the development and sustainability of energy communities, highlighting the role of crowdfunding as a key tool for empowering larger community participation and support.

6 Conclusion

The urgent need to address climate change underscores the critical role of municipalities in driving effective mitigation and adaptation efforts. This paper has explored the multi-faceted approach required to promote green living areas, highlighting the importance of collaboration amongst various stakeholders. By focussing on five key areas—green energy, green, resilient planning, citizen participatory processes, green mobility and green finance—municipalities can spearhead initiatives that significantly reduce carbon emissions and enhance community resilience.

- **Green Energy:** Municipalities have the unique capability to implement and scale renewable energy solutions. By understanding past trends, current conditions and the challenges faced, they can develop robust adaptation and mitigation strategies, supported by EU policies and real-world successes.
- **Green & Climate Change Resilient Spatial Planning:** Effective urban planning is essential for sustainability. Municipalities must integrate resilience into their planning processes, leveraging key figures and indicators to address vulnerabilities and capitalise on EU schemes.
- **Green Community Engagement:** Engaging local communities is vital for the success of green initiatives. Municipalities must foster participation and education, ensuring that citizens are informed and supportive of sustainability efforts.
- **Green Mobility:** Sustainable transportation is crucial for reducing urban carbon footprints. Municipalities can implement green mobility solutions that align with EU frameworks and successful case studies, by addressing past trends and current challenges.
- **Financing the Green Transition:** Securing funding is a significant challenge, but innovative financing models and supportive EU policies can enable municipalities to fund green projects effectively.
- The examples of **existing successful initiatives** throughout the paper illustrate the potential for impactful change when municipalities lead the charge. Collaboration amongst local governments, citizens, businesses and policymakers is essential for creating sustainable, resilient communities. Municipalities, as the closest governmental bodies to citizens, are uniquely positioned to be the driving force behind climate change mitigation and adaptation efforts, ensuring a greener, more sustainable future for all.

Throughout this paper, the central theme is **municipalities' indispensable role as the driving force in climate change mitigation and adaptation**. Local governments are uniquely positioned to implement and promote sustainable practices tailored to their communities' specific needs. Collaboration amongst stakeholders—including citizens, businesses and higher levels of government—is crucial to the success of these initiatives.

By leveraging their close connections with communities, **municipalities** can effectively educate, engage and mobilise local populations towards sustainable practices. Additionally, municipalities' ability to pilot innovative projects and adapt policies in real time positions them as leaders in the global effort to combat climate change.

In conclusion, **municipalities' collective efforts**, supported by robust EU schemes and policy frameworks, are vital for achieving a sustainable future. The insights and strategies presented in this white paper aim to empower local governments to lead the charge in creating green living areas, ultimately contributing to a healthier planet for future generations. The path to sustainability is collaborative - and municipalities are at the heart of this transformative journey.

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9 Annexe 1: Thematic Projects of the GLA community

Project	Green Energy Systems	Green Mobility	Green Community Engagement	Green and Climate Change Resilient Spatial Planning	Financing the Green Transition
ArtMED					
Bahaus4MED					
BauNOW					
CO2 PACMAN					
E-MED					
EnerCMED					
GARDEN					
GREENMO					
INFIRE					
LOGREENER					
MED COLOURS					
NUDGES					
ProLIGHTmed					
RECinMED					
ReMED					
RENEWPORT					
RuralMED Mobility					
Streets for Citizens					
URWAN					

1. **ART MED** objective - aims to enable PTAs (Public Transport Authorities) in Euro-MED to plan for more accessible, inclusive and sustainable public transport in sparsely populated areas, by assessing the local impact of autonomous mobility on demand. PTAs in ArtMED from the Lisbon area, Postojna, Lombardy region and Palaio Faliro learn how to use the AMOD impact assessment tool to develop 4 vision statements, 4 investment plans and 2 transport model designs to plan for AMOD deployment, which can contribute to ultimately reducing CO2 emissions by 72%.

2. **BAUHAUS4MED** - Each of the 5 testing regions/cities will identify participative green community challenges, use crowdsourcing to co-create solution ideas, run civic crowdfunding campaigns to co-finance solutions and use participative budgets to implement pilot solutions. Pilot solutions will be focussed on circular building materials, regenerated green urban spaces, green products, or green lifestyle. Transferable toolbox will be offered as a solution, including best example catalogue, lessons learned and CROWDVOCACY digital tool. To mainstream NEB principles into the decision-making process and ensure long term sustainability, the regions/cities will develop green transformation action plans, using green, participative and aesthetic principles.

3. **BauNOW** objective: improve the planning and implementing capacities of public and private stakeholders to finance measures supporting the GJT (the Green and Just Transition) to climate-neutral and resilient green living areas. With new, integrated development practices and improved access to finances for GJT, the public and private sectors in the MED project urban and urban-rural areas will recognise the business and development potential of GJT, making it their new 'Business as Usual'.

4. **CO2 Pacman** aims to support Mediterranean islands transitioning to climate neutrality. Three islands are taken as test beds, being supplied by fossil fuels, lacking infrastructures and services and economic diversification: We plan to test and demonstrate a first-of-a-kind comprehensive approach by combining and advancing results of BLUE DEAL and COMPOSE PLUS projects (and others) to co-create roadmaps towards net-zero-carbon communities, involving local authorities, citizens and SMEs.

5. **E-MED** - the project aims to enhance climate change adaptation and disaster risk prevention through ecosystem-based approaches. It focusses on developing, testing and validating 11 co-designed public transport solutions for efficient energy transition, disruption resilience and environmental reduction. These solutions, outlined in 5 action plans, provide evidence for planning and procuring e–bus integration in networks, reducing energy use and increasing the share of renewable energy sources in public transport.

6. **ENERCMED** - Creation of a project joint method - the »Hinterland Renewables Communities Action Plan« - to deliver a new integrated energy-inclusive planning paradigm for marginalised neighbourhoods. It is based on a multicriteria decision-making protocol that interpolates social / technical / economic / climate / digital dimensions to activate one REC. The activation of 6 pilot RECs will take place in conjunction with 6 NBS to balance the thermal budget and mitigate the heat externalities determined by the cooling system. Lastly, the creation of a Common Energy Tracking platform will allow potential inter-consumers and/or inter-communities trading/sharing according to the people's daily energy behaviours.

7. **GARDEN** Project aims to support energy transition of logistics for food supply and management of bio-waste, packaging and used containers in Mediterranean cities, to a carbon-free logistic system. To support the transition, 6 pilot demonstrators will be set up in Spain, France, Italy, Greece and Bulgaria. The results of these demonstrators will be used to formulate recommendations for decision makers, to transform their food and bio-waste logistics, in order to face the climate challenges of tomorrow.

8. **GREENMO** Promoting Green and Inclusive Mobility planning by mobilising citizens and understanding their needs.

9. **InFire** objective: test and roll out a long-lasting support structure in 7 Euro-MED countries that will build up the capacities of local/regional authorities for developing, implementing and monitoring holistic climate adaptation and carbon neutrality solutions (CACN) and policy instruments. This will be done by matching realistic CACN planning with viable innovative financing models and schemes. 9 Action Plans on planning and financing CACN are developed.

10. **LOGREENER** - The project will deliver an optimised toolbox to support the planning and implementation of local energy plans, built on the COMPOSE, PRISMI and LOCAL4GREEN projects' outputs. It will deploy a training process to apply the novel toolbox in new Local Authorities. Furthermore, the project will support key multiplier stakeholders (regional authorities, associations of municipalities, energy agencies, etc.) to integrate the novel toolkit as a tool for the support services they normally provide to local authorities. This transferring process to multiplier stakeholders is a key feature of the project's approach and it will be deployed in close collaboration with the Thematic Community Project. Policy recommendations to improve local sustainable energy transition strategies will be drafted and policy makers properly addressed in partnership with the Thematic Community Project and the Institutional Dialogue Project.

11. **MED Colours** - The project focusses on promoting climate change adaptation and disaster risk prevention resilience, with a specific emphasis on incorporating ecosystem-based approaches. Its primary goal is to diminish the adverse effect of freight transport and logistics activities on the environment and the quality of life in MED urban areas. The objective is to empower logistics communities to strategically plan, embrace resilient measures and adopt sustainable, integrated and collaborative innovation–driven solutions.

12. **NUDGES** is an Interreg Euro-MED study project that aims to demonstrate how Mediterranean countries can utilise behavioural strategies ("nudging") to improve urban climate policies. NUDGES will deliver six proofs of concept, testing and comparing the effectiveness of nudging interventions versus cultural interventions. These interventions will use an innovative approach focussing on how people feel and sense things, including what they see, hear, smell, taste and touch.

13. **PROLIGHT MED** - Improve the quality of identified solutions for optimising public lighting in the EURO-MED region through four Pilot projects by gathering the final recommendations for testing investments. The recommendations for testing investments will give the primary input for the definition of the final version of the EURO-MED solution for optimising public lighting in all programme countries.

14. **RECINMED** - The project will develop a new cooperation forum and coordination activities on a transnational level to strengthen the networks and positive spillovers amongst projects regarding energy communities. In addition, three Working Groups will be established to analyse existing knowledge and design and implement pilot actions in three contexts: urban areas, rural territories and islands. Each WG will face specific challenges and will be able to identify the best way to transfer and upscale validated solutions in new areas. Methodologies and tools, already developed in previous EU projects, have been selected. They will be analysed and integrated according to best practices and available accurate data to make them more effective and transferable in geographical contexts with similar traits and necessities. Testing reports, stakeholder engagement initiatives and a transferability plan will be delivered together with an ongoing quality assessment for technical actions, project management and communication.

15. **REMED** overall objective is to increase the climate risk management and adaptation capacities of Mediterranean cities through the implementation of holistic, integrated, multi-scale and systemic approaches, led by public authorities with the support of research institutes.

16. **RENEWPORT** – Aims to tackle this issue by supporting the clean energy transition of MED ports, turning them from emitters of pollutants and greenhouse gases to clean energy hubs, by exploiting the untapped potential of renewable energy sources (RES).

17. **RURALMED MOBILITY** wants to improve EV infrastructure and facilitate the uptake of sustainable mobility in rural areas out of commercial interest, by helping local authorities to create the conditions for developing adapted joint solutions. Investments in charging points, leased EV and monitoring and ICT tools will be applied, allowing an increase in the number of journeys from and to the pilot municipalities with EV and multimodal solutions, reducing CO_2 and improving the connection of the residents with public services

18. **STREETS FOR CITIZENS**—The overall objective of the project »Streets for Citizens« is to enable the public sector and related entities to effectively involve citizens and increase their commitment to addressing urban mobility problems jointly. Functional urban areas will encourage changes and trigger shifts towards smart/sustainable forms of urban mobility by actively involving citizens in testing innovative solutions, using the tactical urbanism approach to improve the environment and make cities more liveable.

19. **URWAN** objective – to demonstrate how multifunctional Nature-Based Solutions (NBSs) emerging from community-driven design processes are the joint response from decision-makers, technicians and citizens to develop living areas resilient to climate change. NBSs act as amplifiers of beauty and social inclusion and their harmonisation encourages sustainability and optimisation of public investments, whilst solving the critical link between urbanisation, green infrastructures, resource consumption and water scarcity.

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