



● Empowering bioeconomy projects by deploying ●
Technical, Business, Regulatory and Social assistance services

Project title	Empowering bioeconomy projects by deploying Technical, Business, Regulatory and Social assistance services		
Project acronym	ToBeReal		
Project number	101181799		
Project start date	01/11/2024	Duration	60 months

D4.2 - OPEN REPORT: REGULATORY BARRIERS AND ENABLERS, PAYING SPECIAL ATTENTION TO UNDERDEVELOPED BIOECONOMY REGIONS

Due date	30/06/2025	Delivery date	08/05/2025
Work package	WP4		
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Type	Open Report		
Dissemination level	Public (PU)		

VERSION AND AMENDMENTS HISTORY

Version	Date (MM/DD/YYYY)	Created	Changes
1	12/06/2025	Alder BioInsights (NNFCC)	First version
2	19/06/2025	BioFuel Region	Comments



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3	08/07/2025	Alder BioInsights (NNFCC)	Updated to address BFR comments
4	14/07/2026	Alder BioInsights (NNFCC)	Updated following reviewers' comments: Page 1: detail of contributing partners, Page 1: update of dissemination level, Page 10-11: inclusion of Executive Summary Page 16 sec 2.1.1: clarification on ReFuelEU. Page 58-63 sec 24.1: synthesis and inclusion of territorial summary tables and conclusions, Page 64-73 sec 25: harmonised reference list Page 3-6: updated contents pages,





TABLE OF CONTENTS

Executive Summary	10
1 Introduction	12
2 European Union policy framework	15
2.1 European Green Deal	15
2.1.1 Fit-for-55	15
2.2 Key strategic pillars of the European Green Deal.....	16
2.2.1 Agriculture, Farming, Forestry, Fisheries and Aquaculture.....	16
2.2.2 Biodiversity	17
2.2.3 Circularity and Bioeconomy	18
2.2.4 Products and Chemicals	19
2.3 NextGenerationEU.....	20
2.4 Geopolitical drivers	20
2.4.1 RePowerEU	20
2.4.2 Biomethane Action Plan.....	21
2.5 Summary of the European Union policy framework	21
3 Belgium.....	23
3.1 Vision for the future and notable strengths.....	23
3.2 Main objectives and opportunities	23
3.3 Biggest challenges.....	23
4 Bulgaria	25
4.1 Vision for the future and notable strengths.....	25
4.2 Main objectives and opportunities	25
4.3 Biggest challenges.....	25
5 Croatia	27
5.1 Vision for the future and notable strengths.....	27
5.2 Main objectives and opportunities	27
5.3 Biggest challenges.....	27
6 Cyprus	28
6.1 Vision for the future and notable strengths.....	28
6.2 Main objectives and opportunities	28





6.3	Biggest challenges.....	28
7	Czech Republic.....	30
7.1	Vision for the future and notable strengths.....	30
7.2	Main objectives and opportunities.....	30
7.3	Biggest challenges.....	30
8	Estonia.....	32
8.1	Vision for the future and notable strengths.....	32
8.2	Main objectives and opportunities.....	32
8.3	Biggest challenges.....	32
9	France	33
9.1	Vision for the future and notable strengths.....	33
9.2	Main objectives and opportunities.....	33
9.3	Biggest challenges.....	33
10	Greece	35
10.1	Vision for the future and notable strengths	35
10.2	Main objectives and opportunities	35
10.3	Biggest challenges	35
11	Hungary	37
11.1	Vision for the future and notable strengths	37
11.2	Main objectives and opportunities	37
11.3	Biggest challenges	37
12	Italy	38
12.1	Vision for the future and notable strengths	38
12.2	Main objectives and opportunities	38
12.3	Biggest challenges	38
13	Latvia	39
13.1	Vision for the future and notable strengths	39
13.2	Main objectives and opportunities	39
13.3	Biggest challenges	39
14	Lithuania.....	41
14.1	Vision for the future and notable strengths	41





14.2	Main objectives and opportunities	41
14.3	Biggest challenges	41
15	Malta	42
15.1	Vision for the future and notable strengths	42
15.2	Main objectives and opportunities	42
15.3	Biggest challenges	42
16	Poland	43
16.1	Vision for the future and notable strengths	43
16.2	Main objectives and opportunities	43
16.3	Biggest challenges	43
17	Portugal.....	44
17.1	Vision for the future and notable strengths	44
17.2	Main objectives and opportunities	44
17.3	Biggest challenges	44
18	Romania.....	45
18.1	Vision for the future and notable strengths	45
18.2	Main objectives and opportunities	45
18.3	Biggest challenges	45
19	Slovakia	47
19.1	Vision for the future and notable strengths	47
19.2	Main objectives and opportunities	47
19.3	Biggest challenges	47
20	Slovenia	49
20.1	Vision for the future and notable strengths	49
20.2	Main objectives and opportunities	49
20.3	Biggest challenges	49
21	Spain.....	50
21.1	Vision for the future and notable strengths	50
21.2	Main objectives and opportunities	50
21.3	Biggest challenges	50
22	Sweden	52





22.1	Vision for the future and notable strengths	52
22.2	Main objectives and opportunities	52
22.3	Biggest challenges	52
23	The United Kingdom.....	54
23.1	Vision for the future and notable strengths	54
23.2	Main objectives and opportunities	54
23.3	Biggest challenges	55
24	Conclusion	56
24.1	Summary tables	58
25	References.....	64

LIST OF FIGURES

Figure 1: Countries included in the ToBeReaL project. Partner countries are indicated with a blue flag. ‘Underrepresented’ countries – both partners and non-partners - are yellow. Partner countries not considered ‘underrepresented’ are green.....	13
Figure 2: High-level European sustainability and bioeconomy policy overview highlighting the Union’s general aims and objectives to 2050.	22
Figure 3: Countries included in ToBeReaL with national bioeconomy strategies in place (green). Those with no currently enacted strategy or policy are coloured grey.	56

LIST OF TABLES

Table 1: Allocation of target regions to ToBeReaL partners	10
Table 2: Summary of the key drivers and challenges identified in the analysis of the countries assessed: Northern Europe (Estonia, Latvia, Lithuania, Sweden, UK)	59
Table 3: Summary of the key drivers and challenges identified in the analysis of the countries assessed: Southern Europe (Croatia, Cyprus, Greece, Italy, Malta, Portugal, Slovenia, Spain)	61
Table 4: Summary of the key drivers and challenges identified in the analysis of the countries assessed: Eastern Europe (Bulgaria, Czechia, Hungary, Poland, Romania and Slovakia).....	62
Table 5: Summary of the key drivers and challenges identified in the analysis of the countries assessed: Western Europe (Belgium and France)	63





LIST OF ABBREVIATIONS

Abbreviation	Definition
AD	Anaerobic Digestion
AFIR	Alternative Fuel Infrastructure Regulation
CAP	Common Agriculture Policy
CBAM	Carbon Border Adjustment Mechanism
EfW	Energy from Waste
ESR	Effort Sharing Regulation
ETS	European Trading System
EU	European Union
GHG	Greenhouse Gas
LULUCF	Land Use Land Use Change and Forestry
NZIA	Net-Zero Industry Act (EU)
RED	Renewable Energy Directive (EU)
RRF	Recovery and Resilience Facility
SAF	Sustainable Aviation Fuel

GLOSSARY

Item	Definition
Advanced biofuels	Advanced (second and third generation) biofuels are produced from feedstocks that do not compete directly with food and feed crops, such as wastes and agricultural residues (i.e. wheat straw, municipal waste), forest residues, non-food crops (i.e. Miscanthus and short rotation coppice) and algae.
Anaerobic digestion (AD)	AD is a biological process which converts organic waste into biogas and organic fertiliser, captures and reduces fugitive methane emissions, and enables more accurate placement of nutrients to prevent run-off into water courses. As a result, an AD installation improves air, water and soil quality – soil carbon accumulation is also a key benefit of AD, increasing soil carbon stocks, therefore improving soil quality and reducing carbon in the air.
Bioeconomy	The bioeconomy covers all sectors and systems that rely on biological resources (animals, plants, micro-organisms and derived biomass, including organic waste), their functions and principles.
Bioenergy	Energy made available by the combustion of materials derived from biological sources.





Biomass	The biodegradable fraction of products, waste and residues of biological origin from agriculture (including vegetal and animal substances), forestry and related industries, fisheries and aquaculture, as well as the biodegradable fraction of waste, including industrial and municipal waste of biological origin.
Biotechnology	The practical use of living organisms, as well as parts, products and models thereof, for human purposes, and the body of knowledge that pertains to this endeavour.
Circular economy	A circular economy is a system that promotes a model of sustainable production and consumption to which maintains the value of products, materials and resources in the economy for as long as possible, therefore minimising the generation of waste.
Directive	A Directive is a legislative act introduced by the EU Commission which describes specific EU-wide goals that should be achieved. Although Member States are expected to follow said Directive – and achieved the goals set out within it – each nation is responsible for developing the set of laws that will lead to the completion of the Directive's goals.
Greenhouse gas	Greenhouse gases constitute a group of gases contributing to global warming and climate change. The Kyoto Protocol, an environmental agreement adopted by many of the parties to the United Nations Framework Convention on Climate Change (UNFCCC) in 1997 to curb global warming, covers six greenhouse gases: carbon dioxide (CO ₂), methane (CH ₄), nitrous oxide (N ₂ O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF ₆).
Green Hydrogen	Hydrogen which has been produced from renewable sources and via technologies that do not emit greenhouse gases. There are currently two main processes being used for the synthesis of green hydrogen: water electrolysis and biomass gasification.
Industrial biotechnology	The manufacture of liquid fuels and chemical products using enzymes, micro-organisms, fermentation, or biocatalysis at any stage of production, regardless of the type of raw materials used. In this case, the raw materials can be biomass, fossil fuel-based, or inorganic substances.
Net zero	Cutting carbon emissions to a small amount of residual emissions that can be absorbed and durably stored by nature and other carbon dioxide removal measures, leaving zero in the atmosphere.





Regulation	Regulations are legally binding legislative acts. EU regulations are set out by the EU Commission to apply to all Member States in their entirety.
Renewable energy	Energy derived from natural sources that are replenished at a higher rate than they are consumed. Sunlight, biomass, wind and water for example, are such sources that are constantly being replenished.





EXECUTIVE SUMMARY

Context: This report integrates insights obtained through Task 4.3 and documented in Deliverable 4.2. It focusses on the key policies and regulations that drive the bioeconomy across the EU as well as in the 21 individual countries supported by the ToBeReal project. This comprises the partner countries as well as those identified as having been underrepresented through the BBI-JU actions, and those considered ‘underdeveloped’ or ‘transitional’ under the second level of the Nomenclature of Territorial Units for Statistics. Led by Alder BioInsights, in collaboration with the ToBeReal project partners included in Table 1, this task spans Month 1 to Month 9 of the ToBeReal project. Partner countries each took responsibility for identifying relevant policies and regulations across nominated countries as detailed in Table 1.

ToBeReal Partner	Countries mapped to identify EU, national and regional policy and regulatory opportunities.
PNO ES (Spain)	Spain
ŠGZ / CCIS (Slovenia)	Slovenia, Croatia, Hungary
CLUBE (Greece)	Greece, Cyprus, Bulgaria
BFR (Sweden)	Sweden, Latvia
FAB FVG (Italy)	Italy, Poland
B4C (France)	France, Malta
BEC (Slovakia)	Slovakia, Czechia
AINIA (Spain)	Spain, Estonia
EL ILVO (Belgium)	Romania, Lithuania
VITO (Belgium)	Belgium
PNO PT (Portugal)	Portugal
NNFCC (UK)	Europe, United Kingdom

Table 1: Allocation of target regions to ToBeReal partners

Summary: The analysis identifies a clear pattern across EU member states where sustainability and bioeconomy strategies are shaped by local economic strengths, natural resources, and community know-how. In rural and agricultural countries, the priority is to modernise farming and build stronger value chains for agricultural bioeconomy feedstocks. Alternatively, in maritime countries, the focus is on developing a bioeconomy linked to fisheries and aquaculture. Across these cases, the preservation and active use of traditional rural and coastal knowledge is presented as essential to meeting both national goals and wider European objectives.

Forests remain a more contested area of policy. While some member states view forests primarily as sources of renewable materials and energy with some secondary aspects around biodiversity and carbon sinks, others focus more on their role in carbon storage and biodiversity protection. This reflects broader positions over how environmental, economic, and climate objectives should be balanced. The analysis also shows that political change can strongly affect policy continuity. In response, some countries are embedding long-term goals into law through policy safeguards.

A major theme is the growing emphasis on resource efficiency, especially through waste reduction and valorisation. EU-level instruments, including the Renewable Energy Directive and the Waste Framework Directive, have created a policy foundation for recycling, recovery, and reduced





dependence on virgin materials. These principles are now embedded in many national circular economy and bioeconomy strategies. National waste management plans have also helped spread resource-efficiency practices across the Union, showing how waste can be turned into a productive input for bioeconomy development.

Funding remains a major constraint. The financial pressures caused by COVID-19 and geopolitical tensions have reduced the resources available for sustainability initiatives across Europe. Although programmes such as NextGenerationEU and the Recovery and Resilience Facility have supported national objectives, difficulties in claiming funds have impacted payments.

In conclusion, the analysis suggests that Europe's transition to a resilient, inclusive net zero future will depend on three pillars: building on regional strengths, protecting local knowledge and resources, and ensuring stable, long-term financial and policy support.





1 INTRODUCTION

This report presents a comprehensive overview of the key regulatory and policy drivers that impact the development and deployment of bioeconomy activities across the EU. It is a constituent of WP4 of the EU-funded ToBeReal project, which is broadly concerned with the provision of actionable policy recommendations and the identification of opportunities for public-private partnerships and cross-border collaboration.

ToBeReal is a five-year strategic project to catalyse the development of bioeconomy projects towards Flagship Status. The project will support 30 bioeconomy projects over the 5 years of its tenure, with the key objective of 10 of these aiming to reach 'flagship status'. The programme will support projects from partner countries (Belgium, France, Greece, Italy, Portugal, Slovakia, Slovenia, Spain, Sweden, UK), as well as those historically underrepresented through the BBI-JU actions and as those considered 'underdeveloped' or 'transitional' under the second level of the Nomenclature of Territorial Units for Statistics hierarchy (also referred to as NUTS2 regions): Bulgaria, Croatia, Cyprus, Czechia, Estonia, Greece, Hungary, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Slovakia, Slovenia. As a result, a total of 21 different nations are included in the project (Figure 1).

Specifically, this report is D4.2, an output from Task T4.3: 'Inventory of regulatory barriers at EU, national and regional level. Led by Alder BioInsights, partners undertook a policy and regulatory assessment of bioeconomy related policies and overarching strategies at EU, national and where appropriate regional levels. The aim is to assess the current bioeconomy policies extant in the European Union as well as in individual eligible countries. Each country's vision for their future bioeconomy is assessed, along with the key objectives and opportunities, and the biggest challenges that they face. In doing this, the report provides a basis for stakeholders to engage with the regulatory and policy challenges that impact on the successful development and deployment of bioeconomy projects within specific countries.



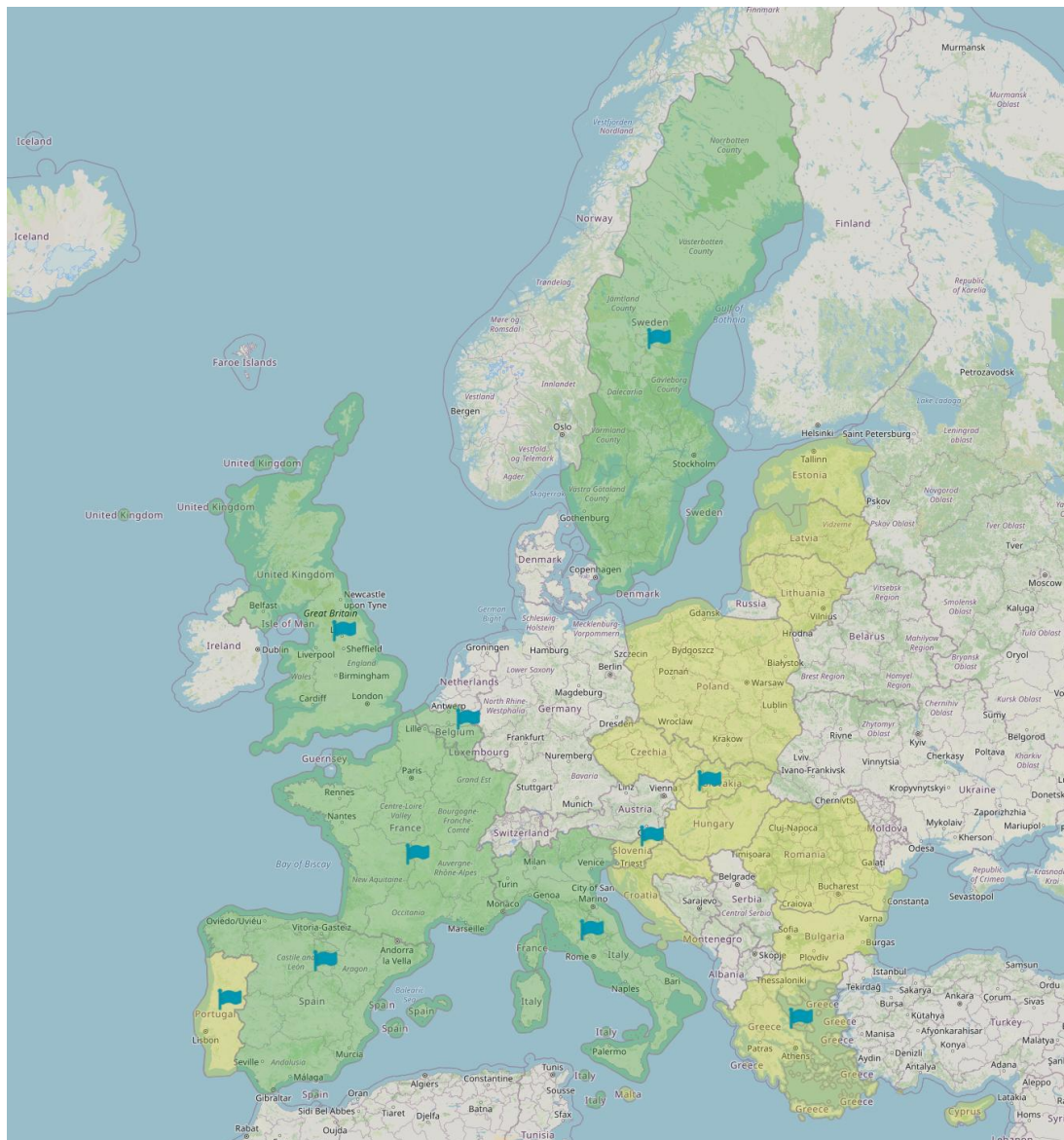


Figure 1: Countries included in the ToBeReaL project. Partner countries are indicated with a blue flag. ‘Underrepresented’ countries – both partners and non-partners - are yellow. Partner countries not considered ‘underrepresented’ are green.

Whilst the EU has overarching policies and frameworks, countries engage with them on an individual basis. As such, it would be challenging in the extreme to comprehensively identify every policy, framework, regulation, or standard that relates to the bioeconomy. In researching the relevant policies and frameworks it was necessary to solely focus on those that have direct relevance to the bioeconomy. However, there are many others that impact indirectly on the success of activities in the bioeconomy such as the developing ‘Smart and Sustainable by Design’ framework which aims to ensure that sustainability is at the heart of projects as they are developed and scaled up.



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The bioeconomy covers all sectors and systems that rely on biological resources (animals, plants, micro-organisms and derived biomass, including organic waste), their functions and principles. It includes and interlinks:

- land and marine ecosystems and the services they provide,
- all primary production sectors that use and produce biological resources (agriculture, forestry, fisheries and aquaculture),
- all economic and industrial sectors that use biological resources and processes to produce food, feed, bio-based products, energy and services.

However, the ToBeReaL project specifically excludes the biomedical and pharmaceutical sectors and so policies and frameworks relating to these sectors have not been included in this review.

The information contained in this report has been compiled in good faith by the authors and associated partners in the ToBeReaL project, collated between February and April 2025.





2 EUROPEAN UNION POLICY FRAMEWORK

In 2011, the European Union declared its ambition to become a low-carbon competitive economy by 2050, and published a roadmap highlighting the key actions that it intended to take to reach 80-95% greenhouse gas emissions reduction¹. By 2019, the Commission had taken that objective further, declaring that the EU would reach full carbon neutrality by 2050, thus becoming “the first continent to do so”². To support this, the EU Commission agreed and published its **European Green Deal**³, setting out the Union’s key commitments and the route it will take to make carbon neutrality a reality.

2.1 EUROPEAN GREEN DEAL

With an agreed funding package reaching the €1 trillion mark, making it the largest sustainability effort in global history, the European Green Deal was designed to transform the European Union into a circular economy powered by domestically produced renewable energy. The Green Deal commits the EU to “real” domestic greenhouse gas (GHG) emissions reductions, signalling a significant move away from practices of the past two decades where European industries (and their resulting carbon footprint) had been moved abroad (outside of the EU), essentially only displacing the emissions. Additionally, the Deal pushes for a Green Digital Transition⁴ that fosters innovation and establishes a fairer European community with equal access to opportunities for all.

The total funding package will aggregate public Union investments as well as private and national funds, with activities supported by the Deal itself expected to provide a large part of the pledged €1 trillion. Additionally, as agreed under the terms of the 2015 Paris Agreement, no EU funding may be spent in a manner that harms people and the environment, further committing the Union to a sustainable future.

2.1.1 Fit-for-55

On the path to full carbon neutrality by 2050, the EU has set an intermediary target of 55% GHG emissions reduction by 2030 (compared to 1990 levels). To that effect, the Commission established a set of proposals and guidelines to achieve the 2030 target. Named **Fit-for-55**⁵, the package is an instrumental part of the European Green Deal which sets guiding principles of fairness and cost-effectiveness, and which proposes to build a competitive European economy rooted in sustainability. Fit-for-55 contains revisions for eight existing regulations – EU ETS, ESR, LULUCF, Energy Taxation Directive, Renewable Energy Directive, Energy Efficiency Directive, Directive on Cars and CO₂, and the Directive on Infrastructure and Alternative Fuels –, as well as four additional new regulations: Carbon Border Adjustment Mechanism, ReFuel Aviation, Fuel Maritime EU, and the Social Climate Fund.

In 2021, the inauguration of the Fit-for-55 package kickstarted the establishment of key industrial action plans which will slash heavily into Europe’s GHG emissions to reach the 2030 goal. However, Member states have faced struggles in achieving the ambitious goals it contains. For instance, this has been the case within the context of the EU’s Land Use, Land Use Change and Forestry (**LULUCF**) Regulation, which has set a target for increasing the EU land use sector’s net carbon





removals by about 15% by 2030 (or 310 million tonnes of carbon dioxide equivalents (MtCO₂e)). According to the European Environment Agency (EEA), LULUCF carbon removals are declining in the majority of EU countries (including several heavily forested countries) and in the EU as a whole, and that current projections indicate that the carbon dioxide removal objective will fall short by a minimum of 70 million tonnes (MtCO₂e)⁶.

ReFuelEU Aviation⁷ (2023), one of the new regulations, was also set up to target one of the Union's most GHG intensive industries. This new measure is designed to significantly increase the uptake of sustainable aviation fuels (SAF) within the EU, significantly reducing emissions from air transport. It mandates that fuel suppliers at EU airports gradually increase the share of SAF blended with conventional aviation fuel, starting with a 2% share in 2025, rising to 6% in 2030, and reaching 70% by 2050⁸.

The **Green Deal Industrial Plan**⁹ (2023) was set up as a direct result of Fit-for-55 with the intention to boost net-zero industries across the Union. To achieve this, the Plan establishes a supportive environment which facilitates the funding of Europe's manufacturing sector for net-zero commodities (including technologies, energy and products). The Deal is also set up to increase job opportunities within the sectors and to boost the integration of a skilled workforce. The 2024 **Net-Zero Industry Act**¹⁰ (NZIA) was set up as part of the Plan to attract investment and facilitate market access and competitiveness for clean technologies. Through these strategies, the EU plans to reach 40% of the required net-zero manufacturing capacity for 2050 by 2030.

2.2 KEY STRATEGIC PILLARS OF THE EUROPEAN GREEN DEAL

The implementation, and ultimate success of the European Green Deal, hinges on a number of sector-specific strategies covering industries across the entire European economy. These strategic pillars represent all aspects of the Union's economy which will work together to form a new circular model (in no particular order of importance): agriculture, farming, forestry, fisheries and aquaculture, biodiversity, circularity and bioeconomy, and products and chemicals.

2.2.1 Agriculture, Farming, Forestry, Fisheries and Aquaculture

Agriculture, farming, forestry and fishing are the foundation of any economy, especially an economy based on a sustainable and circular system. From the production of food and feed to the sourcing of quality biomass feedstocks, it is crucial to establish an industry that continues to grow and thrive, while adopting practices that promote ecosystem services and environmental health.

The **Common Agricultural Policy**¹¹ (CAP) is the EU-wide framework governing key pillars of agricultural practices and outputs. The sets of principles associated with it aim to promote food security and food chain resilience, while protecting the environment and ensuring thriving rural communities with a dynamic workforce and fair wages. It is the foundation of the EU's agricultural sector, on which all other related-policies and regulations are based. In 2023, the latest recast of the CAP aligned itself further with the EU Green Deal to promote a "fairer and greener EU" where





sustainability goals are strengthened and expanded to increase carbon sinks, protect water resources and further regulation of the use of toxic chemicals (i.e. pesticides).

Similarly, the **Common Fisheries Policy**¹² (CFP) sets Union-wide standards for the regulation of all fishing and aquaculture activities from Member States and within EU waters, with measures put in place for regional specificities. The latest updates of the CFP, introduced in 2013 and 2023, highlight the need for the sustainable management of fish stocks and for an energy transition away from fossil marine fuels. The framework pushes for a clear communication of maximum sustainable yields and a heightened protection of marine ecosystems, while solidifying markets, securing jobs and livelihoods and cracking down on illegal and/or unregulated fishing.

At the very centre of the European Green Deal, the **Farm-to-Fork Strategy**¹³ was developed with the objective of accelerating the Union's transition towards sustainable food systems which have a positive impact on the environment and on biodiversity, and which increase resilience against climate change and its impacts. The measures implemented through the Farm-to-Fork Strategy will impact the entire food value chain and are intended to ensure food security and public health, while maintaining affordable access to quality products. By 2030, the Strategy aims to have converted 25% of all European farmland into organic operations where pesticides, synthetic fertilisers, GMOs and ionising radiation are prohibited, and the use of antibiotics is highly regulated.

Within the context of the bioeconomy, policies such as the ones presented above are likely to lead to the reduction of toxic compounds in soils, water bodies, food and the resulting food waste down the line (i.e. pesticides and herbicides for instance), and to the establishment of more organic farming operations, with more opportunities to develop novel circular business models (i.e. anaerobic digestion, regenerative agriculture, sequential cropping etc.).

2.2.2 Biodiversity

The second pillar of the European Green Deal is its strong commitment to restoring and protecting biodiversity, both on land and at sea. This is enshrined in the **EU's Biodiversity Strategy**¹⁴ and its aim to put Europe's biodiversity on a path to recovery by 2030, with the ultimate goal of making the continent more resilient against climate change and natural catastrophes, while fighting food insecurity and risks to public health.

To contribute to this goal, **The Deforestation Regulation** entered into force in June 2023 with the aim to guarantee that the products EU citizens consume do not contribute to deforestation or forest degradation worldwide.. Following criticism from affected industries regarding the lack of conditions for practical implementation, as well as industrial concerns over high administrative burdens, traceability requirements issues and the creation of trade barriers, the European Parliament and the EU Council agreed to postpone its application by one year, to 30 December 2025¹⁵.

The **Nature Restoration Law**¹⁶ was introduced to set legally binding targets for the restoration of degraded ecosystems across all Member States. In addition to crucial biodiversity restoration targets which will be instrumental in promoting important ecosystem services, the new Law includes key





agricultural and forest goals which are likely to have a direct impact on the bioeconomy, primarily for the growing and sourcing of biomass feedstocks (i.e. more stringent species habitat protection and efforts to increase soil carbon stocks).

Building on those principles of ecosystem restoration and management, the **EU Forest Strategy**¹⁷ focusses on the socio-economic potential of forest land and aims to further its status within Europe's future bioeconomy model. Within a clear sustainability framework, the Strategy will promote wood and non-wood products and services, strengthening their place within the bioeconomy, and boosting skills and innovation within the sector. It also shines a light on wood use for bioenergy and aims to ensure the sustainable supply of feedstocks for energy production.

A new **European Oceans Pact**¹⁸ has been in consultation for some time, following an announcement by the President of EU Commission, Ursula von der Leyen, in 2024. A Union-wide call for evidence regarding the proposed guidelines closed in February 2025, and the first draft of the Pact is now expected by the end of the second quarter of 2025. Broadly speaking, the Pact's objectives include the safeguarding of marine ecosystems and habitats across the Union, with a view to protect natural resources and to ensure the continuous and plentiful supply of quality products. The Pact also intends to propose further support for research and innovation, to broaden knowledge of the marine environment. This new initiative is likely to have a significant impact on the EU blue economy going forward.

2.2.3 Circularity and Bioeconomy

In 2020, following the launch of the EU Green Deal, the Commission published its recast of the **Circular Economy Action Plan**¹⁹ (CEAP), making it a central pillar of Europe's sustainability efforts. At its core, the Plan aims to make circularity and sustainable products the norm rather than the exception, targeting the entire lifecycle of products to promote innovative design, efficient processing, waste reduction, and responsible consumption. Such a measure, and the flurry of regulations and legislations that have followed from it, will make a big impact on the bioeconomy sector, by both putting it on the map and facilitating stakeholders access to funding, a skilled workforce and a favourable market.

The **EU Bioeconomy Strategy**²⁰, first published in 2012 (updated in 2018 and 2022), and its associated action plan, incorporate all of the key aspects of the EU Green Deal for the sole purpose of promoting the establishment of an attractive, competitive and functioning European bioeconomy that can thrive alongside healthy ecosystems. The strategy was developed across three main axes: the promotion and acceleration of innovation within the sustainability sector (including the identification of key hurdles and bottlenecks); the rapid deployment of relevant technologies and services across the Union; and the identification of the ecological boundaries of the bioeconomy to maintain sustainability standards alongside a thriving economy. As such, the Bioeconomy Strategy is expected to create a strong and supportive framework within which a new circular economy model can be developed.





2.2.4 Products and Chemicals

Following the introduction of the Green Deal, strategies targeting more specific commodities were also established. These target products which have strong global markets (often projected to increase further in the coming years) and which have a high impact on the lives of European citizens. Each of the following Strategies are likely to have a significant positive impact on the bioeconomy sector. They will open up funding and market opportunities, they help to develop a skilled workforce which will drive production forward and accelerate innovation.

The fashion industry represents a large part of the global economy and industrial infrastructure, it is a well-known and highly significant polluter and producer of GHG emissions. As such, it was imperative that the EU established a framework within which sustainable fashion practices could be promoted. In 2022, the EU Commission introduced its **EU Strategy for Circular and Sustainable Textiles**²¹, showing its strong intent to curb the impact that fashion has been having on the environment for many years. By 2030, the Strategy aims to have established a market where all textiles are made to last longer, with the possibility for fashion items to be repaired, re-used and/or recycled. It also aims for EU citizens to have access to more affordable quality products, which are free of hazardous substances, and which have been manufactured in a way that protects social rights and the environment.

Similarly, the chemicals sector is a ubiquitous part of everyday life, with a myriad of products having a daily impact on humans and the environment. A doubling of global chemical production is expected by 2030, compared to 2017 levels²². As such, the **EU's Chemical Strategy for Sustainability**²³ adopted in 2020 is a much-needed part of Europe's Green Deal and its zero-pollution ambition going forward (as described in the **Zero Pollution Action Plan**²⁴ of 2021). Set up in 2020, it aims to better protect the impact that chemical products have on EU citizens and the environment, while boosting innovation into sustainable and safe alternatives to necessary products. This strategy will tighten the rules on the use and import/export of toxic compounds (such as PFAS), it will increase funding and boost innovation into novel safe alternatives. Additionally it will work towards developing a self-sufficient EU chemical sector which is both resilient and market competitive.

Through its **Plastic Strategy**²⁵, set up in 2018 as a result of the first version of the CEAP, the EU Commission targets another high-profile category of products essential to the economy and responsible for well-documented environmental damages worldwide. The Strategy aims to reduce the sector's dependence on fossil fuels as well as reduce the environmental impact of plastic production processes. It signals a strong intent to reduce plastic waste (and microplastics in particular) by pushing for more efficient waste collection, and by promoting the production and use of recyclable, compostable and biodegradable materials which do not contain harmful chemicals.

Although not a direct result of the EU Green Deal (but still well aligned with its objectives), a proposition was brought forward to the Commission in March 2024 for the drafting of a new





Biotechnology and Biomanufacturing Act^{26,27}. Recent technological advances (such as machine learning and AI) are thought to hold a lot of potential for the development of a strong biotechnology industry in Europe. Such an industry would have the power to modernise and strengthen Europe's agricultural, forestry, energy and food sectors, while reinforcing the guiding principles of the EU Green Deal: sustainability, fairness, health, competitiveness, innovation and resilience.

2.3 NEXTGENERATIONEU

The Covid-19 pandemic triggered the release of emergency investments around the globe, costing countries billions in crisis management actions and all but halting industrial activities across most sectors. As a result, many European nations had to reallocate funds previously dedicated to other uses, including sustainability. Additionally, the scale of the crisis forced many nations to borrow funds, leading to some countries accumulating considerable debts.

In 2021, the EU Commission released its **NextGenerationEU** package²⁸, pledging nearly €750 billion in grants and loans to help Member States recover from the pandemic. The package, primarily delivered via the Recovery and Resilience Fund (RRF), reaches far and wide, providing support to the healthcare, education and entrepreneurial sectors, as well as helping nations to continue on their route towards carbon neutrality by 2050.

2.4 GEOPOLITICAL DRIVERS

Over the past few decades, the primary drive for the introduction of sustainability policies has sat firmly within the context of environmental and health concerns, with evidence for the need for such policies mainly arising from the scientific community. In 2020, the COVID-19 crisis and the global disruption of production and supply value chains that ensued, also brought forth a wave of sustainability and bioeconomy-related policies to mitigate future crises and to lessen their impact on national resilience. However, recent geopolitical events have now also become drivers for sustainability, with the 2022 invasion of Ukraine inciting a major push for green energy in the EU.

2.4.1 RePowerEU

In May 2022, only three months after Russia's invasion of Ukraine, the EU Commission introduced its new **RePowerEU** strategy, outlining its intentions to move away from the import of Russian fossil fuel and to refocus its efforts on saving energy, diversifying energy supplies and producing clean energy²⁹. Through the RePowerEU framework, the EU Commission is proposing a ban on new and existing spot contracts for Russian gas by the end of 2025, and plans to extend the ban further to include long-term contracts by the end of 2027³⁰. Additionally, it proposes to increase the EU's target regarding total renewable energy production from 42.5% (as set in the Union's Renewable Energy Directive) to 45% by 2030³¹. The Union has committed upwards of €300 billion to fund its Plan, with multiple funds being made available to Member States through the EU's Recovery and Resilience Facility (RRF)³².





Although not a direct result of the Fit-for-55 package, the guiding principles of RePowerEU remain well within the ambitions of the European Green Deal, promoting a fairer European society that aims to protect its environment and that thrives without the need for fossil energy sources. The RePowerEU Plan and the Fit-for-55 package are essential to each other's success. As of the start of 2025, around two and a half years since the introduction of RePowerEU, the Union has reduced its total natural gas consumption by 18%. Additionally, the rapidly growing renewable energy infrastructure has led wind and solar to produce more electricity than natural gas for the first time in the Union's history.

2.4.2 Biomethane Action Plan

As part of the ambitions laid out by RePowerEU, biomethane was identified as a crucial aspect of the Union's drive away from imported fossil energy sources. As such, a **Biomethane Action Plan** was set up in 2022, calling for the scale up of Europe's biomethane industry and the annual production of 366 TWh (or 35 billion cubic metre (bcm)) of biomethane by 2030³³. To achieve this objective, the Plan proposes the creation of a Europe-wide alliance of biomethane stakeholders, to reinforce the sector across the entire Union. The proposal was received with optimism across the Member States.

2.5 SUMMARY OF THE EUROPEAN UNION POLICY FRAMEWORK

Over the past few years, the European Union has shown a strong intent to develop a solid sustainability model on which a resilient economy can be built. The policy framework established recently, lays down foundations across the entire value chain of both products and services, while taking into account key market drivers, gaps in knowledge and skills, and the non-negotiable need for the restoration and maintenance of healthy natural systems. Figure 2 provides a visual representation of this set of policies and their relations to each other, showing the structure of the Union's sustainability effort across a wide range of sectors. It is a high-level overview of the European bioeconomy landscape illustrating the Union's sustainability priorities and overarching objectives. The diagram does not include sector-specific regulations which might have direct operational impacts on industries.

Despite the Union's sustainable vision for the future, recent global events such as the war in Ukraine and the Covid-19 pandemic have shown that the EU's environmental commitments are susceptible to suffer financial, infrastructural, trading and political burdens as a result of unforeseen crises. This has, amongst other things, led to Member States having to redirect funds previously dedicated to environmental actions towards emergency aid and recovery packages, delaying and impeding the successful completion of EU directed objectives. Changes in wider global jurisdictions have impacted markets, resulting in commensurate geopolitical and environmental uncertainties and present as an additional obstacle that the EU will need to face in its journey to net zero. As such, and in light of these historical and current factors, it is important to recognise these as some of the challenges faced by the Member States (especially those less financially resilient) as part of their own national route to decarbonisation.



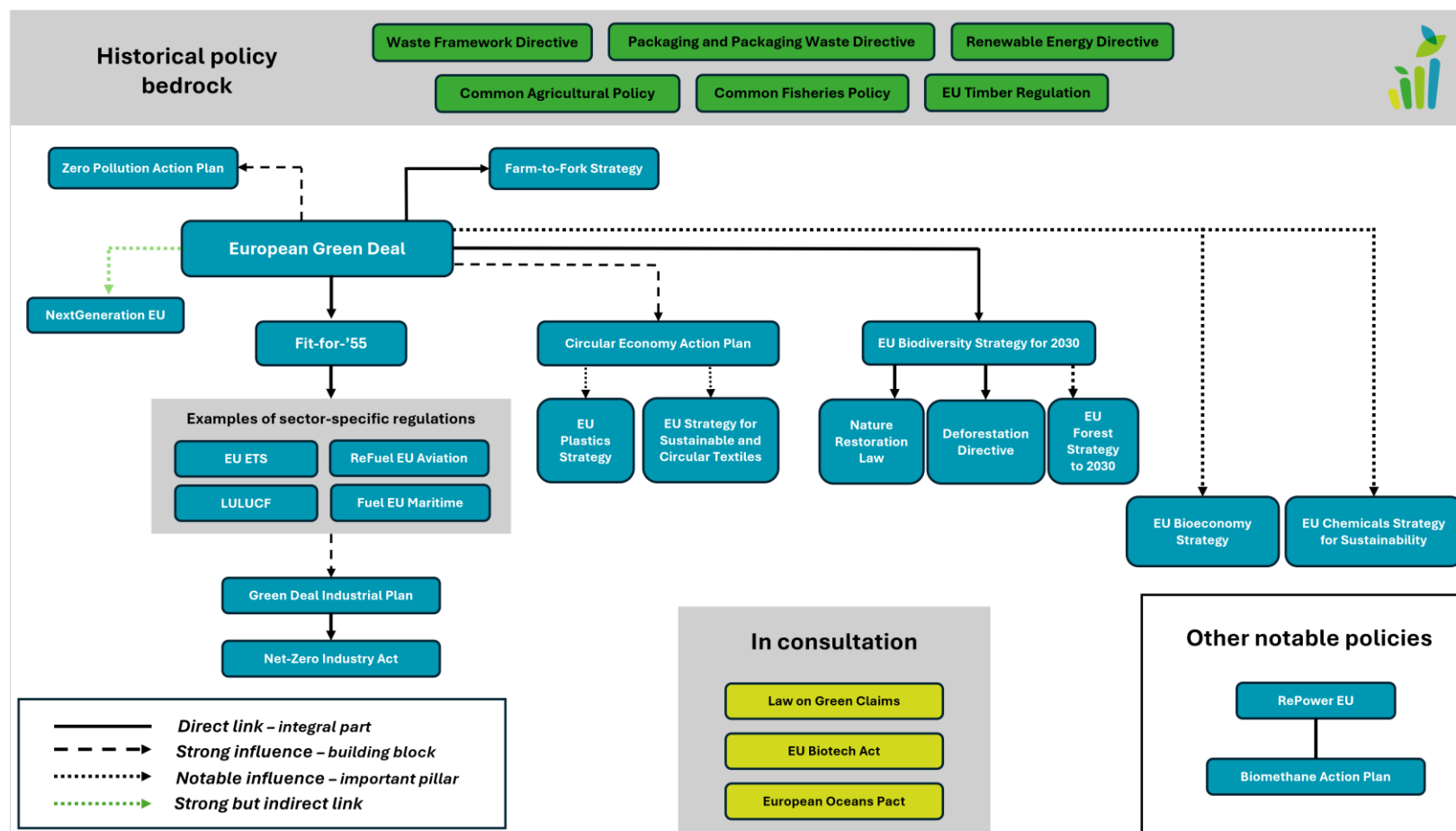


Figure 2: High-level European sustainability and bioeconomy policy overview highlighting the Union's general aims and objectives to 2050.





3 BELGIUM

3.1 VISION FOR THE FUTURE AND NOTABLE STRENGTHS

Belgium has three regional authorities (Flanders, Brussels Capital and Wallonia), which provide separate and equal contributions towards governance in Belgium. This structure is reflected in the policy landscape in Belgium with regional and federal policies in the areas of energy transition, climate planning and bioeconomy strategy. The *Belgium National Energy and Climate Plan 2021-2030*³⁴ is supported by the *Walloon Air Climate Energy Plan 2030*³⁵, the Flanders Climate Strategy 2050³⁶ and the *Flanders Energy and Climate Plan*³⁷ in establishing decarbonisation strategies, such as growing the bioeconomy and developing increased supply of renewable energy, which mitigate against the impact of climate change in solidarity with European policy objectives.

3.2 MAIN OBJECTIVES AND OPPORTUNITIES

Belgian energy policy applied across the regions seeks to accelerate decarbonisation efforts by focusing on flexibility and affordability. By promoting a diverse energy mix whilst boosting grid and interconnection and efficiency measures, Belgium aims to meet targets through pragmatic policy measures to increase Belgian competitiveness. Regulations such as the act laying down product standards for the integration of energy from renewable sources into fossil fuels intended for the transport sector (an unnamed law)³⁸ as well as the *Energy Decree*³⁹, both direct expectations for the blending of biofuels into the transport sector in the country. Additionally, these texts also set efficiency measures for energy use in energy networks and for heating and cooling applications.

Flanders has established regulations such as the *Material Decree*⁴⁰ which establishes a transition towards a circular economy through waste prevention, reuse and recycling and this is further supported by policy such as *Bioeconomy in Flanders*⁴¹ and *Flanders Bioeconomy Policy Plan*⁴² which aim to support and stimulate initiatives across the bioeconomy through innovation in sectors such as biomass production, synthetic biology, technological and chemical transformation of residual streams, and technologies for new biobased value chains.

Another policy, the *Decree of the Flemish Government on organic production and labelling of organic products*⁴³ aims to support the adoption and ensure recognition for organic farming in Flanders building on earlier efforts on the role out of anaerobic digestion in Flanders and Wallonia.

3.3 BIGGEST CHALLENGES

Belgium has been successful at starting to develop a bioeconomy with measures targeted towards the agriculture, and waste management sectors. Belgium has also developed expertise in the biotechnology sector with notable developments regarding fermentation technologies, which can be used to process waste materials into useful products. This development is in contrast to recent large-scale protests in Belgium from farmers objecting to the high cost of environmental measures and perceived excess of intervention which threatened the economics of farming. More recent policies reflect the need for flexibility and affordability in plans as policy makers attempt to balance achieving





environmental targets with public acceptance of environmental and renewable energy measures. There are also challenges for policy makers as they attempt to apply measures across the varied regional government structures within Belgium, ensuring positive local outcomes whilst also ensuring harmony between jurisdictions.





4 BULGARIA

4.1 VISION FOR THE FUTURE AND NOTABLE STRENGTHS

Bulgaria's ambitions for the development of a sustainable economy strongly align with the objectives set by the European Union, particularly within the primary sector of the industry, dedicated to the production of raw materials via agriculture and fishing. Bulgaria intends to lean on its rural potential to lead its sustainable transition.

Through the *Common Agricultural Policy Strategy Plan*⁴⁴, the *Agricultural Strategy of Bulgaria until 2030*⁴⁵, the *National Climate Change Adaptation Strategy*⁴⁶ and the *National Aquaculture Development Plan until 2027*⁴⁷, the country aims to usher in sustainable practices that will enhance agricultural and fishing production while protecting the environment and biodiversity. These policies also emphasise the government's plan to modernise its primary sector, to make Bulgarian goods and services more competitive on the national and international markets. Leaning further on its rural resources, Bulgarian policies also highlight the potential for the development of a stronger bioenergy sector in the country. The *Integrated Energy and Climate Plan of Bulgaria 2021–2030*⁴⁸ and the *Energy Strategy of Bulgaria Until 2050*⁴⁹ both aim to support and strengthen the bioenergy sector to take Bulgaria through its green energy transition. The *Forest Act*⁵⁰ and the *National Plan for the Development of the Wood Processing and Furniture Industry*⁵¹ are also working to redefine forest management and wood use in the region, likely impacting on availability and standards for biomass combustion.

4.2 MAIN OBJECTIVES AND OPPORTUNITIES

Modernisation is at the heart of Bulgaria's journey to a sustainable economy. The country's *Smart Specialization Strategy 2021–2027*⁵² signals a strong intent to invest into innovation, research and digitalisation; an ambition echoed by nearly all bioeconomy- and sustainability-related policies currently in place. The modernisation of primary sector activities is seen as an opportunity to advance sustainable development, while improving production and competitiveness.

Aware of its rural strength, Bulgaria is also keen to protect its resources and to establish activities that can produce more, for longer. All primary sector policies include sector-specific environmental protection objectives, led by the *National Biodiversity Conservation Strategy and Action Plan*⁵³ (with the Plan implemented in 2006, as per agreed during the Convention on Biological Diversity) which sets a high-level common goal to promote the continued sustainable use of natural resources and to protect biodiversity across all economic sectors.

4.3 BIGGEST CHALLENGES

In spite of the strong ambitions set by a number of sustainability and bioeconomy-related policies, Bulgaria's main hurdle is likely to reside in investment difficulties. A large share of the objectives outlined in policy will rely on modernisation efforts while others will strongly rely on investment in research and innovation. Both will require significant funding which Bulgaria cannot provide on its





own. As part of the NextGenerationEU incentive, implemented to support Member States recover from the consequences of the Covid-19 pandemic, the EU Commission introduced its Recovery and Resilience Facility (RRF) with the capacity to allocate a total €723.8 billion in loans and grants. Bulgaria has an agreed €5.5 billion total package – to be delivered in nine instalments by August 2026 – under the condition that the country introduces 321 reforms promised to the Commission. So far, the government has underdelivered on the implementation of the agreed measures, leading its second RRF payment being denied earlier this year, and putting the rest of the grant at risk⁵⁴.





5 CROATIA

5.1 VISION FOR THE FUTURE AND NOTABLE STRENGTHS

To support national climate resilience, Croatia has introduced a number of comprehensive policies designed to promote renewable energies and efficient resource management. These include the *Integrated Energy and Climate Plan for the Republic of Croatia 2021–2030*⁵⁵, the *Energy Development Strategy with an Outlook to 2050*⁵⁶, and the *Waste Management Strategy of the Republic of Croatia for the Period 2023–2028*⁵⁷. Further measures for climate adaption and biodiversity protection are delivered through the *Strategy for Adaptation to Climate Change in the Republic of Croatia for the Period up to 2040 with a View to 2070*⁵⁸ and the *National Biodiversity Strategy and Action Plan of the Republic of Croatia*⁵⁹.

5.2 MAIN OBJECTIVES AND OPPORTUNITIES

Policy has been developed to support growth and modernisation in the primary sector in alignment with EU policies. There is direct support for agriculture through the *Agricultural Strategy Until 2030*⁶⁰, aquaculture through the *National Aquaculture Development Plan Until 2027*⁶¹ and forestry, and forestry products, through *Law on Forests*⁶² and the *National Plan for the Development of Wood Processing and Furniture Production of the Republic of Croatia*⁶³.

Bioeconomy specific policy has also been developed with the Croatian *National Development Strategy 2030*⁶⁴ delivering a long-term vision for economic growth with emphasis on the role of the bioeconomy. The *Low Carbon Development Strategy*⁶⁵ and *Smart Specialization Strategy of the Republic of Croatia for the Period 2016–2020*⁶⁶ give further insight into integrating the bioeconomy into a low-carbon economy and the potential enhancement which can be achieved through research and innovation in the bioeconomy.

5.3 BIGGEST CHALLENGES

Substantial investment is required to deliver the actions laid out in the policy. Strong partnerships and inter-sectoral working will also be necessary to implement the policy especially with regards to balancing economic growth against environmental protections. Existing policies will likely need to be updated and detailed plans included as implementation continues, so that general principles embedded in policy can be effectively deployed into the economy. There are a number of stakeholders in the bioeconomy such as smaller scale food producers who will need specific implementation measures and financial support for modernisation, in order to achieve growth in the bioeconomy.





6 CYPRUS

6.1 VISION FOR THE FUTURE AND NOTABLE STRENGTHS

Cyprus's vision is in alignment with the European Union's bioeconomy ambitions with strong targets for renewable energy development and promotion of a circular bioeconomy. These two strands which look to drive new developments in energy and material circularity are set alongside strategies and plans for conserving and driving biodiversity in Cyprus's existing forests, waters and farmland.

Energy strategies such as the *Integrated Energy and Climate Plan for Cyprus 2021–2030*⁶⁷ and *Cyprus' Energy Strategy of Cyprus Until 2050*⁶⁸ highlight the need for renewable energy sources such as solar and wind to deliver an increasing proportion of Cyprus's energy supply, utilising the natural resources available to the island nation. Other policies including the *National Waste Management Plan 2021–2027*⁶⁹, *Low Carbon Development Strategy*⁷⁰, *Smart Specialization Strategy 2021–2027*⁷¹ and *National Plan for the Development of Wood Processing and Furniture Industry*⁷² seek to make use of circular approaches to waste and resource management, and support the bioeconomy throughout Cyprus, reducing emissions and also supporting resilience and value in the economy.

Policies have been introduced for the support of agriculture, forestry, aquaculture and biodiversity including the *Multi-annual National Strategic Aquaculture Plan 2021-2030*⁷³, *Forest Law of Cyprus*⁷⁴, *Agricultural Strategy of Cyprus Until 2030*⁷⁵ and *National Biodiversity Strategy and Action Plan*⁷⁶. These policies seek to conserve biodiversity and build up the resilience of the ecosystems which make up Cyprus. These ecosystems remain a fundamental part of Cyprus's economy providing employment, food, materials and more.

6.2 MAIN OBJECTIVES AND OPPORTUNITIES

The range of policies outlined shows a clear objective to protect and enhance the environment of Cyprus. The measures seek to mitigate the major threats which Cyprus's ecosystems face – biodiversity loss, deforestation, water shortages – while also preparing Cyprus to continue benefitting long-term from the resources which are key to the people of Cyprus today. Food and tourism are valuable to the Island which benefits from scenic coastlines and hillside forests, but which also faces high temperatures when compared to much of Europe, and at times drought conditions. The environmental policies outlined seek to achieve the dual aims of benefiting Cyprus itself whilst also acting in accord with the other nations of Europe through joint energy transition goals and environmental policy.

6.3 BIGGEST CHALLENGES

Cyprus has a relatively traditional way of life which faces significant modernisation to implement the changes in practice and introduction of infrastructure required for its bioeconomy related policies. High capital investment will be required to replace existing outdated infrastructure with modern technologies and there may be cultural challenges which could lead to lifestyle changes. Balancing





the use of natural resources with conservation is likely to be challenging as will the high dependence on imported fossil fuels which will be difficult to reduce without the introduction of significant electrification, bringing further cost and disruption.





7 CZECH REPUBLIC

7.1 VISION FOR THE FUTURE AND NOTABLE STRENGTHS

*The Strategic Framework of the Czech Republic 2030*⁷⁷ and *The Czech Republic's Innovation Strategy for 2019–2030*⁷⁸ lay the strategic groundwork for sustainable and innovative development of the Czech Republic with an aim to place the nation as a leader in European innovation. Strategies which embrace the complex interchange between people, economics, ecosystems, municipalities, good governance and global development can support the development and growth of the bioeconomy which also bridges these areas. Fostering of research driven innovation, through targeted European, national, local and private level funding through the *Research and Innovation Strategy for the Smart Specialization of the Czech Republic*⁷⁹ seeks to support a number of sectors including the bioeconomy.

7.2 MAIN OBJECTIVES AND OPPORTUNITIES

The Czech Republic has developed a *Strategic Framework for Circular Economy*⁸⁰ which aims to transition the nation towards a circular economy through sustainable use of resources and waste reduction measures which are also central components of the bioeconomy. This strategy is underpinned by regulations such as the 2020 *Wastes Act*⁸¹ and the 2001 *Packaging Act*⁸² which direct the effective management, recycling and reuse of waste and residue materials aimed at preventing waste and minimising the impact of waste treatment processes. The packaging act establishes obligations on packaging producers, including requirements around recycling and recovery of these materials.

The *Czech Republic's National Energy and Climate Plan*⁸³ (2023) details the path by which the Czech Republic will meet EU climate and energy targets, with deployment of renewable energy sources including bioenergy and biofuels such as biomethane among the range of technologies targeted to meet obligations. Energy efficiency regulations such as the *Act on Energy Management*⁸⁴ (2001) also promote the development of renewable energy sources alongside measures to improve energy saving measures such as eco-design requirements. Another policy, *Act on The Supported Sources of Energy*⁸⁵ lays down measures to promote the use of renewable energy sources to meet (but not surpass) the levels required to meet binding EU targets.

Air quality regulations⁸⁶ build on policies such as *The State Environmental Policy of the Czech Republic*⁸⁷ which establishes the requirement for citizens living in the Czech Republic to be protected from unhealthy environmental conditions.

7.3 BIGGEST CHALLENGES

Whilst there is support for the bioeconomy and circular economy through policy and regulation there is limited detailed implementation strategy or support for specific bioeconomy sectors or measures into wider economic or industrial strategies. Support for renewable energy sources is also present





through policy and regulations, but this drive is targeted towards specific targets established by the EU and there appears to be little ambition to overshoot these targets.





8 ESTONIA

8.1 VISION FOR THE FUTURE AND NOTABLE STRENGTHS

Estonia has developed a raft of comprehensive policy measures which seek to support innovative and collaborative approaches to sustainability and climate change. By focusing on holistic, interdisciplinary working and collaboration to bring about changes, Estonia aims to surpass European benchmarks in order to secure a strong and competitive position for the future.

Through existing policies like the *EU Strategy for the Baltic Sea Region: A Bioeconomy for the Baltic Sea Region*⁸⁸ and *Estonia Research and Development Strategy until 2025: Knowledge-based Bioeconomy*⁸⁹ a strong pattern of working has established which is in alignment with EU aims, whilst operating through a deliberate network focussed on trans-national cooperation and integration.

The *Estonian National Energy and Climate Plan*⁹⁰ and *Estonian National Energy Development Plan 2030+*⁹¹ integrate innovation and competitiveness into energy plans with ambitious decarbonisation targets with further policy such as the *National Waste Plan*⁹², *Estonian Circular Economy Programme*⁹³ and *Climate Change Adaptation Development Plan until 2030*⁹⁴ ensuring comprehensive and long-term planning that spans a wide range of sectors supporting efficient resource utilisation.

8.2 MAIN OBJECTIVES AND OPPORTUNITIES

Innovation and efficiency are central to Estonia's approach with guidance from policy such as *Enhancing the Capacity to Implement Research, Development, and Innovation Outcomes in Society and Establishing a Favourable Policy Environment*⁹⁵ and the *Circular Bioeconomy Roadmap*⁹⁶ building on previous policies to support innovation through R&D and academia and drive this innovation, technological advancement and digitisation into the key sectors of Estonia's economy.

Policies which impact Estonia's primary sector such as the *Estonian Forestry Program*⁹⁷, *Estonian Maritime, Fisheries and Aquaculture Fund*⁹⁸, *Estonian Agriculture and Fisheries Strategy 2030*⁹⁹, and *Estonian Rural Development Plan*¹⁰⁰ are ambitious and comprehensive, building on previous policy with community led – local development aligned with a desire to use technology and digitisation to drive efficiency and strong economic outlooks.

8.3 BIGGEST CHALLENGES

Policy has been extensively developed in Estonia and it is both ambitious and comprehensive in scope. In contrast funding such as research and development (R&D) finance is challenging in Estonia compared to some of their European neighbours. Estonia will need to find ways to bridge the funding and technology gap between research and commercial deployment. The use of community led development pathways provides a good outlook for development of smaller scale local projects, through local investment, but ways of funding and developing larger scale projects will likely also be needed in the years ahead.





9 FRANCE

9.1 VISION FOR THE FUTURE AND NOTABLE STRENGTHS

Two years before the EU's commitment to net zero, France established its *National Low Carbon Strategy*¹⁰¹ (2017), pledging carbon neutrality by 2050 in an effort to limit global warming to a maximum of 1.5°C. The strategy flags energy, transport, industry and agriculture as the main targets for carbon emissions reduction and focuses heavily on the development of renewable energies on the national scale, including wind, solar and hydro. It is worth noting that France has also been putting a strong emphasis on its biomethane sector in recent years, recording the most significant sector growth in Europe and now totalling around 730 biomethane injection facilities (producing around 14 TWh of energy)¹⁰². In 2018, the country's *National Bioeconomy Strategy*¹⁰³ came into force with the objective to identify the priority areas for the development of a national bioeconomy, including the sustainable sourcing of biomass (mainly residue and waste biomass streams), the development of a strong biobased refinery industry and the integration of strong circular economy principles within all aspects of the economy. To complete this trifecta, the *National Strategy for the Mobilisation of Biomass*¹⁰⁴ (2018) was developed to encourage and facilitate the procurement of sustainable biomass to use in key sectors such as energy, building and green chemistry. The strategy focusses on good practice and addresses important hurdles such as competition for biomass for food and the mitigation of damage through land use change.

9.2 MAIN OBJECTIVES AND OPPORTUNITIES

Biomass, and particularly the sustainable procurement of sufficient quantities of biomass, is the primary goal of the French bioeconomy framework. To achieve this, the government developed its *Regional Biomass Scheme* framework¹⁰⁵ designed to be applied to each region of France in order to identify the strengths and opportunities specific to each region. In every region, the scheme sets out to identify the available non-food biomass resources from forestry, agriculture and aquaculture streams, before establishing a strategy for the "mobilisation" (or procurement) of said biomass. Biomass-derived energy production targets are set for each area according to feedstocks available and sustainable procurement criteria. Following on from such regional strategies, the *Trajectory for the Reduction of Soils Artificialisation*¹⁰⁶ (which originally aimed to reduce agricultural land use change by 50% by 2031) is now being reworked to tailor its objectives according to the resources and challenges of individual local authorities. As such, the newly proposed version of the text is being developed in close collaboration with local elected officials. Having been voted by the Senate in early 2025, the text will now be reviewed by the National Assembly.

9.3 BIGGEST CHALLENGES

Although securing enough biomass feedstocks to power France's sustainable transition is at the very heart of the country's policy and regulatory landscape, doing so without bringing further harm to the environment has been identified by the government and research institutions as a key challenge. Key biomass producing sectors such as agriculture and forestry have been shown to be low in





biodiversity, making them fragile environments and putting food and biobased materials resources at risk. In response to this risk, the eXtrême Défi Bioéconomie¹⁰⁷ (“eXtreme Bioeconomy Challenge”) initiative (sponsored by the government’s Agency for the Ecological Transition) was set up to encourage innovation and finance projects aiming to identify under-valorised feedstock streams, or to mitigate the impact that biomass sourcing currently has on fragile environments.

Additionally, France’s ambitious regionally tailored bioeconomy strategy will hinge on successful collaboration between national and local administrative bodies, as well as active cooperation between public and private stakeholders. In addition to addressing these key challenges, a number of French bioeconomy-related policies also consider the important role that public engagement should (and will) play within the context of the country’s sustainable transition. As such, significant stakeholder engagement it is to be expected.





10 GREECE

10.1 VISION FOR THE FUTURE AND NOTABLE STRENGTHS

In 2018, Greece approved its first *National Circular Economy Strategy*¹⁰⁸, presenting it as an unprecedented opportunity for the country's "productive reconstruction" following nearly a decade of a hard-hitting economic crisis. The strategy places itself in contrast to the conventional economic model that prevailed until 2015, and encourages better resource utilisation, growth within the national primary sector and a more thorough protection of the natural environment. In 2021, the *National Action Plan for Circular Economy Roadmap* was introduced for a four-year period to implement 71 key actions designed to support the country with its transition towards a circular economy model. The measures are designed to open new industrial and business opportunities, to create safe and competitive markets for new products, and to incentivise the establishment of a sustainable economy. In 2019, Greece submitted its *National Energy and Climate Plan*¹⁰⁹ establishing the country's goal to achieve carbon neutrality by 2050, with intermediate reduction targets of 50% and 80% by 2030 and 2040 respectively. In 2024, the revised version of the Plan increased the 2030 target up to 58% emissions reduction and raised the renewable energy incorporation targets to 81% of all power generation and 14% in transport by 2030 (rising to 91% in 2050). Between 2025 and 2050, renewable gas production is also expected to increase above 4.65 TWh (400 kilotonne equivalent (ktoe)) of biomethane and 20.9 TWh (1.8 million tonne equivalent (Mtoe)) of hydrogen¹¹⁰.

10.2 MAIN OBJECTIVES AND OPPORTUNITIES

Nearly 40% of Greece's territory is dedicated to agricultural land, most of which is divided into small family-run holdings of less than seven hectares (i.e. there are around 700 000 farms in the country)¹¹¹. In spite of this fragmentation, it is reported that around 80% of all bioeconomy-related activities in Greece currently arise from the agricultural sector¹¹², making it a hugely important player in the country's road to net zero and economic recovery. As such, to continue to successfully tap into the many resources that the primary sector can provide, the government developed the following policies: the *Rural Development Program*¹¹³ (ended in 2020) – which provided significant funding to promote farm viability, and towards rural bioeconomy projects and green technologies; the *National Agricultural Development Strategy*¹¹⁴ – designed to support digital farming and eco-innovation in agriculture; and the *Common Agricultural Policy Strategy*¹¹⁵ – focussed on streamlining financial subsidies to farmers to encourage the renewal of machinery, as well as providing incentives for young farmers (aged below 40) to pursue farming careers.

10.3 BIGGEST CHALLENGES

Although Greek bioeconomy-related activities currently create a turnover of around €27 billion, providing half a million jobs nationally, the government is yet to introduce a dedicated national bioeconomy strategy¹¹⁶. The lack of a clear directional roadmap is likely to slow progress down as priority areas and key opportunities remain unaddressed. For instance, while the National Energy and Climate Plan indicates the government's intention on developing a thriving biomethane sector





in the coming years, the sector is reportedly struggling to develop and coordinate within this context of noticeable regulatory limbo¹¹⁷.

Additionally, while Greece's agricultural sector currently presents itself as a significant opportunity for the development of a strong national bioeconomy, it is worth noting that more than 70% of Greece's agricultural land is subject to environmental and topographical constraints such as extreme slopes, soil dryness and island regions, rendering farming difficult and low yielding in places. As such, future dedicated biomass and bioeconomy policies and regulations should make sure to incorporate realistic projections for biomass availability in such environments.





11 HUNGARY

11.1 VISION FOR THE FUTURE AND NOTABLE STRENGTHS

Hungary has delivered a broad policy framework with sustainability and environmental measures tailored towards economic growth and innovation. Policy measures have good alignment with EU aims with strong renewable energy targets looking to utilise biomass as a key resource in decarbonisation, laid out through the *National Energy Strategy 2030*¹¹⁸ and *National Renewable Energy Utilisation Action Plan 2010-2020*¹¹⁹. The *National Climate Change Strategy 2018-2030*¹²⁰ and *National Biodiversity Strategy 2015-2020*¹²¹ further embed climate-change mitigation and conservation.

11.2 MAIN OBJECTIVES AND OPPORTUNITIES

A number of holistic strategies delivered through the *National Development 2030 - National Development and Territorial Development Concept*¹²², *Hungary's Food Economy Concept 2017-2050*¹²³, *National Clean Development Strategy 2020-2050*¹²⁴ and *New Széchenyi Development Plan*¹²⁵ recognise the importance of the bioeconomy for driving economic growth, innovation and job creation.

Innovation is also supported through policies such as the *National Research and Development and Innovation Strategy 2020*¹²⁶ which promotes research and innovation infrastructure, the *National Environmental Technology Innovation Strategy*¹²⁷ which promotes eco-innovation and sustainable practices and the *Smart Specialisation Strategy 2021-2027* which aligns with EU funding and supports innovation-based transformation through research digitisation and SME development.

Specific policies have also been developed to support development in the primary and waste sectors and rural economies including the *National Waste Management Plan 2021-2027*¹²⁸, *National Forest Strategy 2016-2030*¹²⁹, *National Rural Development Strategy*¹³⁰ and the *New Hungary Rural Development Programme*¹³¹ (both last updated in 2024).

11.3 BIGGEST CHALLENGES

The broad framework of policy in Hungary sets a strong starting point for action but there remain challenges where policy does not include specific measures towards bioeconomy implementation. This could lead to challenges with prioritisation and coordination between sectors and stakeholders. For example, where regional differences are present or land use is in conflict, detailed policy could help to overcome difficulties which arise. Specific challenges also remain for implementation of waste separation and recycling infrastructure where there is a need for greater public awareness.

Dependence on external EU funding for execution of multiple projects is a weakness which could be addressed through development of regional or national funding support which can aid developments beyond the reach of existing EU funding models.





12 ITALY

12.1 VISION FOR THE FUTURE AND NOTABLE STRENGTHS

Italy has developed strong policies such as the *Next Generation Plan*¹³² the *Plan for Ecological Transition*¹³³ and the *National Smart Specialization Strategy*¹³⁴ aimed at delivering a green transition with implementation of innovative measures to grow the bioeconomy alongside measures to increase the presence and efficacy of renewable energy sources. Alongside the green transition Italy has also developed a structure for waste management which prioritises the prevention of waste and embeds circularity of resources at the centre of decision making through the *National Strategy for Circular Economy*¹³⁵ and *National Plan for Waste Management*¹³⁶ in strong alignment to EU policy.

12.2 MAIN OBJECTIVES AND OPPORTUNITIES

Wide ranging policies have been introduced to develop the green bioeconomy across a wide range of sectors for the dual aim of protecting the environment and boosting economic growth. Policies such as the *Bioeconomy in Italy*¹³⁷ and *Action Plan (2020-2025) for the Implementation of the Italian Strategy for the Bioeconomy*¹³⁸ lay out the strategy for bioeconomy across multiple sectors to ensure a holistic and balanced pattern of growth. Policy such as the *National Strategy for Sustainable Development*¹³⁹ details the measures which are necessary to embed the green transition as a driver of growth, for example through sustainable innovation and digitisation.

A number of policies are directed towards the primary sector including, the *National Biodiversity Strategy to 2030*¹⁴⁰ (2010), the *National Forestry Strategy*¹⁴¹ (2021) and the *Italian CAP Strategic Plan*¹⁴² (2023) which seek to integrate climate change mitigation and ecosystem protection across the primary sector (agriculture, fisheries, forestry) and tourism while also recognising the economic importance of these industries and seeking to exploit them in a sustainable way.

12.3 BIGGEST CHALLENGES

The aims laid out above will require significant work to ensure that finance can be delivered to the necessary parts of the economy whilst at the same time developing administration and organisational structures which support growth rather than hindering it. Development of an integral bioeconomy is a complex challenge which will require substantial infrastructure deployment. This deployment risks being fragmented and delayed if it does not receive the backing of all parties involved in the extended bioeconomy ecosystem.





13 LATVIA

13.1 VISION FOR THE FUTURE AND NOTABLE STRENGTHS

The *Latvian Bioeconomy Strategy 2030*¹⁴³ (or LIBRA) was developed in 2017 as part of the country's 2010 *Sustainable Development Strategy to 2030*¹⁴⁴, which had identified key priorities for the country, its society and its cultural heritage. LIBRA aims to implement key changes within three primary fields: promoting and preserving employment in bioeconomy sectors to up to 128,000 employees; increasing the added value of bioeconomy products to at least €3.8 billion by 2030; and increasing the value of bioeconomy export production to at least €9 billion by 2030. The strategy is notably well-aligned with EU flagship initiatives such as "Innovation Union" and "Resource Efficiency Europe", themselves developed as a result of *Europe 2020*¹⁴⁵ and the *European Bioeconomy Strategy*¹⁴⁶. In 2021, Latvia's *Strategy for the Achievement of Carbon Neutrality*¹⁴⁷ established the country's objective to reach carbon neutrality by 2050, with an intermediate target of 65% GHG emissions reduction by 2030 (compared to 1990 levels). The strategy outlines a comprehensive cross-sectoral approach where renewable energy is expected to occupy centre stage. Although wind and solar remain the most widely used and promoted technologies, the Latvian strategy makes special mention of bioenergy, and biomethane in particular.

13.2 MAIN OBJECTIVES AND OPPORTUNITIES

With 3.3 million hectares of forest coverage and 1.97 million hectares of agricultural land (making up around 50% and 30% of the country's total surface area respectively), Latvia holds significant potential for the production of biomass¹⁴⁸. To tap into these available resources, and advance both the country's sustainability agenda and its desire to boost its national growth and skills base, the government has been putting a strong emphasis on developing its national biorefinery sector. With proposed policies such as the recent *Biorefinery Memorandum of Understanding*¹⁴⁹ (2024), Latvia intends to create an environment which fosters research and innovation into the use of sustainable biomass for the production of energy, biobased products, biobased chemicals and pharmaceuticals. In 2023, Latvian bioeconomy exports reached €7.86 billion, making it the biggest contributor to the country's manufacturing industry, and taking it €1.1 billion away from its €9 billion objective by 2030. In view of this success, the government has shown every intention on continuing further in that same direction.

13.3 BIGGEST CHALLENGES

Accessing sufficient funding for the continuous development of the Latvian bioeconomy remains the biggest challenge the country currently faces. The Latvian R&D sector heavily relies on EU funding, however, fluctuations in the availability of EU structural funds is creating an unstable environment for the establishment of a strong and sustainable innovation sector. Additionally, public and private Latvian investments remain insufficient. A 2021 study on the factors affecting the development of the bioeconomy in Latvia¹⁵⁰ has shown that public institutions do not act as (reliable) customers for innovation which for the bioeconomy sector, leads to low and unpredictable public funds being





allocated to it. Similarly, private investments into R&D remain significantly lower in Latvia compared to the European average, reaching 23.4% between 2011 and 2019, against the EU average of 58.9% in 2018.





14 LITHUANIA

14.1 VISION FOR THE FUTURE AND NOTABLE STRENGTHS

The high-level strategy for development of the broader bioeconomy in Lithuania is expressed through two main policies, the *Approval of the Rules for the Implementation of the Intervention Measure "Investments in Bioeconomy Businesses" of the Lithuanian Strategic Plan for Agriculture and Rural Development 2023-2027*¹⁵¹ and the *Comprehensive Plan of the Territory of the Republic of Lithuania (2021)*¹⁵². These policies balance the need for planned sustainable growth and investment in technology and infrastructure, alongside the need to build up robust environmental and safety protections. Strategic priorities include a sustainable economy, resource efficiency and promotion of renewable energy sources which naturally places the bioeconomy as central to the strategy. The new National Bioeconomy Strategy is currently in the consultation phase.

14.2 MAIN OBJECTIVES AND OPPORTUNITIES

Specific bioeconomy and biotechnology strategies including the *Roadmap for the Transition to a Circular Economy in Lithuania by 2035*¹⁵³, *Smart Specialization 2021-2027*¹⁵⁴ and *Life Sciences in Lithuania (roadmap)*¹⁵⁵ outline priorities relating to bioeconomy development such as safe food, health and biotechnology innovation supporting development in agriculture, food and pharmaceutical & medical sectors. These are supported by a range of regulations towards water management and environmental protection¹⁵⁶, biotechnology in agriculture¹⁵⁷ and industrial chemicals safety¹⁵⁸.

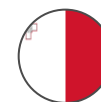
The Lithuanian *National Energy and Climate Action Plan for the period 2021–2030*¹⁵⁹ provides a roadmap for an increase in renewable sources of energy in line with European targets and building on previous decarbonisation efforts. Alongside electrification measures, advanced biofuels will also make up an increasing part of the transport fuel mix especially targeting use of wastes, through anaerobic digestion, to produce biomethane and reduce emissions during waste processing.

The Lithuanian *CAP Strategic Plan (2022)*¹⁶⁰ also acts to apply European level agricultural policy into the Lithuanian context and provides support for production of high-value goods using biomass and increasing innovation within the agricultural sector. This is further supported by a range of environmental protection regulations mitigating against climate change and protecting biodiversity¹⁶¹, managing and protecting water¹⁶², protecting forests¹⁶³ and embedding waste management practices and environmental protection in law¹⁶⁴.

14.3 BIGGEST CHALLENGES

As Lithuania seeks to develop their bioeconomy and circular economy there are expected to be challenging tensions between enacting new technology innovations and new enhanced environmental protection measures. Funding will need to be mobilised for modernising of infrastructure if aims are to be achieved and this will need to be accompanied by increased competitiveness as Lithuania seeks to be part of wider markets. Further integration with neighbours such as other Baltic states will also be necessary.





15 MALTA

15.1 VISION FOR THE FUTURE AND NOTABLE STRENGTHS

Malta has introduced a number of high-level environmental policies and regulations which seek to address renewable energy, resource and waste management and to embed protections through the primary sector. Malta's *National Energy and Climate Plan*¹⁶⁵ (2019 and 2025) sets out the ambition to meet European environmental targets through strategies to deploy renewable energy and enhance energy efficiency. By integrating sustainable biowaste initiatives Malta aims to reduce waste generation and reduce the reliance on fossil fuels. The latest 2024 *National Biodiversity Strategy and Action Plan to 2030*¹⁶⁶ integrates considerations of biodiversity and safeguarding of natural resources through promotion of sustainability across different industries.

15.2 MAIN OBJECTIVES AND OPPORTUNITIES

Reformation of Malta's waste collection system through modernising the collection fleet, harmonising collection practice and building of necessary waste treatment infrastructure as outlined through the *Long-Term Waste Management Plan (2021 to 2030)*¹⁶⁷ and the 2023 *Waste Management (Waste Framework) Regulations*¹⁶⁸ forms the basis for the development of a circular economy in the country. Maximising the value of resources and developing the required infrastructure to recycle or reuse resources provides the opportunity to transform a challenge for the population of Malta into a source of bioenergy and bio-based products.

The primary sector of Malta is primarily supported through its *Common Agricultural Policy Strategic Plan*¹⁶⁹ (2022) which provides fund and support for sustainable agricultural development. Additionally, regular updates to central policies such as the *Fisheries Conservation and Management Act*¹⁷⁰, *Trees and Woodlands Protection Regulations*¹⁷¹ and *Environmental Protection Act*¹⁷² further embed environmental practice and sustainable development across the primary sector.

15.3 BIGGEST CHALLENGES

As the island of Malta has a high population density compared to other countries in the EU, as well as relatively limited agricultural or forestry land, it is vital that it is able to maximise the impact of organic waste through effective resource management in order to be able to reduce reliance on fossil fuels. Renewable electricity through solar and wind provides a pathway towards decarbonisation through electrification but this is only part of a solution. Diversification of energy supply is envisaged with low-carbon energy provided through solutions such as interconnectors (electricity) and biofuels alongside local generation.





16 POLAND

16.1 VISION FOR THE FUTURE AND NOTABLE STRENGTHS

Unlike the majority of EU countries, and unlike the EU itself, Poland has not set a target for the decarbonisation of its economy, nor has it pledged national carbon neutrality by 2050 or any other date¹⁷³. In spite of this, the country has developed a policy landscape to transition towards more sustainable and lower carbon activities, as laid out in its 2019 *Roadmap Towards the Transition to the Circular Economy*¹⁷⁴. The roadmap was developed as part of the Polish *Strategy for Responsible Development*¹⁷⁵ (2017), leading to its full and effective integration into a broader vision of the future of the Polish economy. It focusses on promoting sustainable industrial production, reduced and sustainable consumption of goods, innovative business models, and the establishment of the bioeconomy.

16.2 MAIN OBJECTIVES AND OPPORTUNITIES

Over the 2005 to 2023 period, Poland reduced its net greenhouse gas emissions by 9.3%, however this is far below the EU's average of 30.5%. While Poland provides 4.7% of the European Union's year-on-year GDP, it is responsible for 10.7% of its net GHG emissions. To combat this, the Polish government is actively working towards promoting renewable energy production and uptake, which has led to key policies such as *Poland's Energy Policy until 2040*¹⁷⁶ (2021) and the *National Energy and Climate Plan*¹⁷⁷ (original text introduced in 2019 with a current recast in consultation). Both texts call for the significant increase in the share of renewable energy in the country, for both power and heat, although non-biogenic technologies such as wind and solar remain the preferred options, with little to no mention of bioeconomy-related sectors such as biogas, biomethane and biomass combustion. However, the energy sector remains the one with the most opportunities for bioeconomy solutions to break through. Additionally, the country seems interested in developing a hydrogen industry, as demonstrated by their *Polish Hydrogen Strategy until 2030 (with a perspective to 2040)*¹⁷⁸, with a particular focus on green hydrogen for the industry, transport and heating sectors.

16.3 BIGGEST CHALLENGES

Poland still relies heavily on coal mining and its associated industries for power and heat across the country. In 2024, 70% of Poland's power was generated by fossil fuels, most of which came from coal¹⁷⁹. Although it has set targets for the decommissioning of its active mines and coal-fired power plants, and while the Polish mining sector has been declining significantly over recent decades, the last open mine is not set to close until 2049, by which time a number of EU countries have pledged to have reached (or neared) carbon neutrality. As such, it is widely thought that in spite of a number of sustainability-driven policies being introduced in recent years, the rate of uptake of renewable energy technologies will be too slow to meet EU targets.





17 PORTUGAL

17.1 VISION FOR THE FUTURE AND NOTABLE STRENGTHS

In 2019, the Portuguese government published its *Long-Term Strategy for Carbon Neutrality of the Portuguese Economy by 2050*¹⁸⁰, announcing its intent for the country to reach carbon neutrality by 2050. One year later, it published its first *Portuguese Bioeconomy Strategy*¹⁸¹, pointing to the development of a strong circular and sustainable bioeconomy as a key objective on the road to carbon neutrality, and signalling its determination to support innovation, resource efficiency and the development of biobased products and services. At the end of 2021, the country's new *Basic Climate Law*¹⁸² overwrote Portugal's carbon neutrality target, bringing it forward by five years to 2045. That same year, the *Integrated National Energy and Climate Plan 2021-2030*¹⁸³ set clear targets for greenhouse gas emissions reduction (i.e. 55% drop by 2030), renewable energy adoption (i.e. 51% share of renewable energy in gross final energy consumption by 2030, including 93% renewable electricity), energy efficiency, and electrical interconnections, serving as a detailed and decisive strategic action plan to net zero.

17.2 MAIN OBJECTIVES AND OPPORTUNITIES

The Portuguese government has designed a national sustainable strategy which will lean heavily on the country's natural resources, as well as its traditional industrial sectors, making the most out of locally sourced biomass and promoting the conservation of culturally significant manufacturing practices. The *Blue Bioeconomy Roadmap for Portugal*¹⁸⁴ (2020) was designed to sustainably harness Portugal's rich maritime resources for the purpose of developing the national bioeconomy. By fostering Portugal's maritime leadership, and by encouraging marine research and innovation, the strategy aims to map maritime bio-resources, and to identify and address challenges to safely access valuable renewable and biomass feedstocks streams. On the industrial front, the *Sustainable Bioeconomy Action Plan – Horizon 2025*¹⁸⁵ was developed to accelerate the transition to sustainable business and industrial practices. The plan succeeded in defining clear sector-specific measures and priorities, and focussed investments in key sectors of the economy which are significant to Portugal's cultural and societal heritage, including textiles, footwear and natural resin production.

17.3 BIGGEST CHALLENGES

Portugal has so far been very successful in reducing its emissions of greenhouse gases, registering a drop of 43.9% from 2005 to 2023, far outweighing Europe's 30.5% average over the same period¹⁸⁶. Crucially, a significant share of the country's GHG emissions reduction relies on forests acting as carbon sinks, which in recent years, and due to increasing instances of catastrophic forest fires, has been posing serious challenges (extensive fires in 2017 led to an increase in GHG emissions in the region). As such, the government is putting efforts into developing its forest management practices to reduce fire risk, as demonstrated by its 2015 *National Forestry Accounting Plan 2021-2025*¹⁸⁷, which as well as encouraging the establishment of sustainable forest-based industries, aims to improve forest resilience to climate change and global warming.





18 ROMANIA

18.1 VISION FOR THE FUTURE AND NOTABLE STRENGTHS

Romania is committed to the EU's greenhouse gas emissions reduction strategy, pledging in 2021 to reach carbon neutrality by 2050 with an intermediate 78% reduction by 2030. The country's comprehensive action plan is outlined in its *Long-term Strategy for Reducing Greenhouse Gas Emissions (Neutral Romania 2050)*¹⁸⁸, which includes measures to transition to a low-carbon economy by enhancing efficiency, promoting renewable energies and implementing sustainable practices across a variety of industrial sectors including energy, building and transport. The following year, the Department of Sustainable Development published its *National Strategy for the Circular Economy in Romania*, which follows on from a key priority raised in the country's 2018 *Strategy for Sustainable Development*¹⁸⁹, and which identified fourteen sectors with significant circular potential, including agriculture, forestry, automotive, construction, consumer goods, packaging, textiles, and electrical and electronic equipment.

18.2 MAIN OBJECTIVES AND OPPORTUNITIES

Alongside its national policies and broad objectives for the future, the Romanian public sector has developed a set of regional climate and bioeconomy policies designed to lean on regional assets and to established tailored priorities according to the local economic context. These include the *Regional Smart Specialisation Strategy of the Century Region*¹⁹⁰, the *Unleashing opportunities for the bioeconomy in the mountain regions of Romania*¹⁹¹ and the *Roadmap for a bioeconomy strategy in the Covasna region*¹⁹². Agriculture and forestry are strong traditional sectors in the country, particularly in the mountain regions where urbanisation remains limited. As such, there is a large potential for the production of sustainable biomass to feed a budding national bioeconomy. Inhabitants of these regions have developed an enduring agricultural and silvicultural know-how which, in addition to the national *CAP Strategic Plan*¹⁹³, is likely to prove invaluable for the advancement of sustainable land management practices and for the development of a successful circular economy model. In addition, operational well-established biomass value supply chains, as well as numerous pre-existing local bioenergy facilities, will provide excellent foundations for the expansion of local innovation and R&D facilities and projects.

18.3 BIGGEST CHALLENGES

While Romania boasts the largest national population of farmers in the EU (i.e. around 3.5 million farmers), the vast majority practice agriculture on very small holdings or plots, often farming for their own consumption rather than on a commercial scale¹⁹⁴. As such, much of the country's agricultural products are not integrated within large agri-food supply chains from which feedstocks could be extracted for further processing, or which could foster innovation and R&D initiatives. Furthermore, the fragmentation of the Romanian agricultural sector is exacerbated by an ageing farming population, the exodus of younger generations towards more urban areas, and the lack of large farming unions or groups¹⁹⁵, by which stakeholder collaboration (and by association, sustainability





practices and biomass procurement) could be established. Therefore, tapping into Romania's biomass production opportunities will require more stringent social engagement, stronger support for land workers, and the development of effective and efficient value chains.





19 SLOVAKIA

19.1 VISION FOR THE FUTURE AND NOTABLE STRENGTHS

In its 2020 *Low-Carbon Development Strategy of the Slovak Republic until 2030 (with a View to 2050)*¹⁹⁶, Slovakia joined the EU in its pledge to reach carbon neutrality by 2050. The strategy primarily focusses on the country's low-carbon roadmap to 2030, with a clear view to stay in line with the Paris Agreement goal of limiting global warming to a maximum of 1.5°C. The document provides projected scenarios of carbon emissions reduction on a sectoral basis, highlighting key actionable areas for change. Although the strategy mainly focusses on the road to 2030, it encompasses projections up to 2050 and the ultimate carbon neutrality objective. In order to continue the country's transition towards a sustainable future, the Slovakian government introduced its *Vision and Strategy of the Development of Slovakia 2030*¹⁹⁷ to mitigate any potential negative impacts that changes in administration could have over the coming years. This is achieved by integrating strategic management and planning at all levels of public administration, ensuring continuity in the implementation of strategic programmes and projects despite political cycles. The text covers a range of societal objectives, including sustainability development goals such as climate action and clean water, and integrates their continuous implementation at the national and regional levels.

19.2 MAIN OBJECTIVES AND OPPORTUNITIES

Resource efficiency and management are cited as clear priorities in a number of key Slovakian sustainability policies such as the *National Forestry Program*¹⁹⁸ (2025), which focusses on the sustainable management of forest habitats and the use of biomass streams, and the *Common Agriculture Policy Strategic Plan*¹⁹⁹ (2023), designed to support sustainable agriculture and rural development. These clear priorities arise from current difficulties brought upon by the overwhelming privatisation of forest land in the country (80% of forest cover, divided into small, fragmented plots) which has been impeding the standardisation of forest management practices; as well as restrictive rules on biomass usage for farming activities (e.g. manures and slurries can only be used on the farm where it was produced). In addition, Slovakia's motivation to build strong biomass supply chains is tightly linked to the national push for eco-innovation, which is expected to be primarily directed towards research into natural resources, both to boost their potential and to maintain high environmental standards within the natural habitats from which the materials are obtained. This desire is mainly supported by the country's 2021 *Smart Specialisation Strategy*²⁰⁰, designed to support research into circular production systems based on biomass while fostering strong national, international, public and private sector collaboration; and by *A Roadmap Towards Circularity for Competitiveness, Eco-innovation and Sustainability*²⁰¹ which was hailed as the first Slovakian definite move towards the development of a national circular economy.

19.3 BIGGEST CHALLENGES

Although Slovakia has developed an ambitious policy landscape protected from governmental and political changes, details on actionable measures remain scarce. There is a clear lack of





comprehensive, measurable objectives, and limited articulation of funding and incentive schemes designed to support the country's sustainable transition. This becomes particularly evident within the context of the bioeconomy which remains under-represented and poorly integrated within the national sustainable strategies. While in recent years the country has begun to incorporate principles of circular economy within its national framework, there is insufficient representation of the benefits that bioeconomy activities could bring, and a clear lack of prioritisation of bioeconomy sectors and their associated innovative solutions. Additionally, legislations such as the ban on cross-farm mixing of manures and slurries for biogas and fertiliser production are also seen as direct obstacles to the development of bioeconomy practices.





20 SLOVENIA

20.1 VISION FOR THE FUTURE AND NOTABLE STRENGTHS

Slovenia has ambitious plans for its sustainable future and has outlined a holistic vision for the country's green economic transition. As exemplified by the *Slovenian Development Strategy to 2030*²⁰² and the framework programme for the *Transition to a Green Economy*²⁰³, the country is keen to develop a comprehensive and well-informed policy package that aligns with the UN Sustainable Development Goals, and which encourages efforts across all sectors of the economy. The well-being of the country's population is at the heart of the policy and regulatory landscape, with the protection of the natural environment and the reduction of waste and chemical pollution flagged as important components of the government's active commitments, and a large share of the current regulatory landscape.

20.2 MAIN OBJECTIVES AND OPPORTUNITIES

The country has a clear intent on being at the helm of their own sustainable transition, and to drive research and innovation at the national and international scales. The *Slovenian Sustainable Smart Specialisation Strategy (S5)*²⁰⁴ is designed to encourage the development of advanced technologies within key bioeconomy sectors, such as sustainable food production, biobased materials and circular economy initiatives, to promote competitiveness without compromising on environmental commitments. Where Slovenia stands out from other countries is in its leadership on "governance model innovation", which focuses on easing synergies between government institutions, adequately informing decision-makers, fostering cooperation, and promoting systemic thinking in practice²⁰⁵. To achieve those innovation goals, aligning public bodies and private stakeholders is seen as a key element of success. The country's *Roadmap Towards the Circular Economy in Slovenia*²⁰⁶ aims to integrate the circular economy across a range of sectors (including agriculture, forestry, energy and manufacturing) by fostering "industrial symbiosis" and encouraging collaboration across sectors, and through public-private partnerships.

20.3 BIGGEST CHALLENGES

Although Slovenia has made its intent to transition towards a sustainable economy clear, there remains a lack of policy focus on bioeconomy across all sectors. The country is yet to formalise a clear bioeconomy action plan that will integrate bioeconomy-sectors within the broader national economy and its current green transition. To achieve this goal, work is being done to ensure a smooth coordination and cooperation between all the actors of the country's sustainable transition, including regulators and policymakers, various sectors across the economy, and all associated stakeholders. Difficulties in achieving this have made the implementation of the *Sustainable Smart Specialisation Strategy*²⁰⁷ and the *Roadmap Towards the Circular Economy in Slovenia*²⁰⁸ complicated over the past few years. In particular, ties between public institutions and private enterprises will require strengthening so strategies can align better, and so the country can work towards developing its Bioeconomy Action Plan.





21 SPAIN

21.1 VISION FOR THE FUTURE AND NOTABLE STRENGTHS

Standing out as an early adopter of bioeconomy principles, Spain introduced the first version of its *Spanish Bioeconomy Strategy: Horizon to 2030*²⁰⁹ in 2015, establishing a comprehensive framework for the development of the bioeconomy in the country, with a particular emphasis on sustainability and innovation. Following on from this, the nation-wide *Spanish Circular Economy Strategy to 2030*²¹⁰ was established in 2020 to promote a novel production and consumption model based on circularity (with a target of 30% reduction in resource consumption), and where waste generation is reduced by 15% by 2030. The strategy reaches wide across numerous sectors of the economy, with construction, agri-food, fishing, forestry, industry, consumer goods, tourism, textiles, and fashion being more specifically targeted. Since then, the country has continuously been updating and introducing regulations in line with EU guidelines to support its primary objectives, with a particular emphasis on waste management in the past few years.

21.2 MAIN OBJECTIVES AND OPPORTUNITIES

Interestingly, in addition to the broad-reaching, nationwide policies, multiple autonomous communities of Spain have set up their own, additional circular economy and bioeconomy strategies, going further to strengthen sustainable principles at a smaller, more manageable scale. These include the *Circular Bioeconomy Strategy of Andalusia*²¹¹ (2018), the *Bioeconomy Strategy of Catalonia 2030*²¹² (2021), the *Circular Economy Strategy of Castile and Leon*²¹³ (2021), the *Plan for the Circular Economy and Bioeconomy of the Basque Country*²¹⁴ (2021) and the *Circular Economy Strategy of Castilla-La Mancha*²¹⁵ (2021). Such regional policies have already allowed for more targeted efforts, with autonomous authorities having the opportunity to tailor bioeconomic and sustainable efforts to their area, with a better understanding of local resources and challenges. The region of Castilla-La Mancha for instance, set up its own *Regional Strategy for Forest Biomass*²¹⁶, which aimed to promote the sustainable use of forest biomass resources in the area while fostering sustainable forest management, green jobs creation and climate change mitigation (this policy ended in 2022). In 2024, Castilla-La Mancha put its new *Regional Biomethane Plan*²¹⁷ for consultation, aiming to develop a localised biogas sector which will fully and sustainably integrate within the local environment.

21.3 BIGGEST CHALLENGES

Spain's biggest challenge is likely to lie within its biggest opportunity and its forward-thinking regional policies. Although regional strategies are likely to have a very successful impact on the local and national economies, collaboration and cooperation within different levels of administration (including the European Union) will be essential. Alignment between policies and regulations at those different scales, along with the continuous engagement of stakeholders (in the public and the private sector), will be both crucial and complex to achieve. However, should this prove to be successful, Spain and its autonomous communities will build a highly targeted and efficient bioeconomy framework tailored





to their needs and abilities, at the tip of technological advancements and in line with regional resources and sustainability goals.





22 SWEDEN

22.1 VISION FOR THE FUTURE AND NOTABLE STRENGTHS

The management of the Swedish forests are at the core of the bioeconomy. As a result, the growing stock has doubled in the last 100 years²¹⁸. Over the past 150 years, huge investments have been made into industries processing forest biomass. Sawmills, pulp and papermills, and CHPs are continuously investing in more innovative and effective processes to stay competitive. This is the main driver for innovations and growth in the forest bioeconomy. Since the late 1970s, a large part of the energy sector has transitioned from fossil fuels to bioenergy using residual streams from saw- and pulpmills. Policies like the *Carbon Tax* (1991) and the *EU emissions trading system* (2005) have further promoted biofuels, reducing Sweden's carbon emissions by about 33% since 1990. In 2017, Sweden established its *Climate Policy Framework*²¹⁹, consisting of a Climate Act, clear and ambitious climate targets, and a Climate Council, with the primary goal of creating a stable climate policy landscape that would endure through time and through changes in governance. One such ambitious target is for the country to reach no net emissions of greenhouse gases by 2045, going further by becoming net-negative thereafter. It is also stated that the main target for emissions reduction would be the domestic transport sector (barring domestic flights). To achieve this, Sweden has been fostering strong connections between the public and private sectors, promoting cooperation and supporting industrial stakeholders with their decarbonisation efforts. The 2015 *Fossil-Free Sweden*²²⁰ initiative, aiming to “increase the pace of the climate transition”, has been an instrumental tool in the country’s efforts towards its 2045 goal, particularly through the identification of key barriers and opportunities, and through productive and collaborative work towards finding solutions and establishing ambitious commitments.

22.2 MAIN OBJECTIVES AND OPPORTUNITIES

Dubbed the national “green gold”, forests currently cover nearly 70% of Sweden’s total surface area (with 25% owned by private limited companies and 50 % by private persons), making them the country’s primary source of renewable raw biomass²²¹ and a significant opportunity for the development of the national bioeconomy. Through its *National Forest Programme*²²² of 2018 and its ever-evolving *Forestry Act*²²³ (first introduced in 1903), the Swedish government has been establishing a strong policy and regulatory foundation to promote the continuous extraction of forest materials while ensuring the maintenance of high environmental and conservation standards. Sweden intends to position itself as a global leader on forest management and on the sustainable harvest of forest biomass, showing that natural environments can provide large quantities of materials, offer stable employment opportunities and foster a strong and sustainable bioeconomic model.

22.3 BIGGEST CHALLENGES

The combined effect on Swedish forestry of different directives and acts such as *LULUCF*, the *Deforestation Act*, the *Restoration Act* and the *Renewable Energy Directive*, are still to be





evaluated. There are concerns that the regulations will result in lower investments, lower profitability due to higher administrative burdens and industry closure due to lower annual cuts. Future will tell how the forest-based bioeconomy in Sweden will develop and tackle the new legislative landscape.

Despite the early adoption of ambitious greenhouse gas emissions reduction measures, along with a comprehensive *National Circular Strategy*²²⁴ (2020) highlighting the country's plans for the development of an integrated circular economy – which aims to promote circular production and consumption, as well as non-toxic material cycles – Sweden is yet to introduce a formal national bioeconomy strategy. Hands-on work is being done towards a national strategy, and consultations and exploratory reports are being published – such as “A sustainable bioeconomy strategy: for a prosperous fossil-free society” published in December 2023. However, recent changes in the country's governance have shed doubt on the future of the goals and targets introduced by the previous administration. It remains unclear whether the current government will be keen to provide the bioeconomy sector with the logistical and financial support it requires to develop to the extent previously envisaged.





23 THE UNITED KINGDOM

23.1 VISION FOR THE FUTURE AND NOTABLE STRENGTHS

The UK's intent to transition towards a sustainable economic model was first outlined by the Prime Minister's 2020 *Ten Point Plan for a Greener Industrial Revolution*²²⁵, describing how public and private funding would focus on developing a sustainable energy system led by electrification, hydrogen, energy efficient infrastructure and carbon capture. The country's 2021 *Net Zero Strategy*²²⁶, in which the United Kingdom pledged to transition to a carbon neutral economy by 2050, reiterated the aims of the Ten Point Plan, pointing at widespread electrification as the primary tool for decarbonisation in the coming decades, with industry, transport and building sectors as the primary target for sustainable change. Although most of the proposed actions rely on non-biogenic sources of energy (e.g. offshore and onshore wind, solar), innovation in bioenergy is expected to be supported through a £1 billion package, while transport fuels for the aviation and maritime sectors are expected to strongly rely on biomass-derived low-carbon fuels.

The UK has notable strengths in the life sciences, a significant academic base, and a growing start-up environment which it is advancing through targeted government strategies, cross-sector collaboration, and innovation-driven investments. Engineering biology is a core focus of UK bioeconomy activity which was identified by the previous Government as a critical technology. As a result, it launched the National Vision for Engineering Biology²²⁷, which remains supported by the current Government. As of 2025, initiatives focus on scaling sustainable biomanufacturing, regulatory alignment, and economic growth aim to position the UK as a competitive player in the global bioeconomy.

23.2 MAIN OBJECTIVES AND OPPORTUNITIES

The aviation and maritime sectors are expected to provide ample opportunities for bioeconomy stakeholders as low-carbon fuels (including those of biogenic origins) are seen as a crucial tool for emissions reduction. Their development and subsequent deployment are expected to be heavily incentivised as demonstrated by a consultation published in 2022 on a potential new *Low Carbon Fuels Strategy*²²⁸. Additionally, at the start of 2025, the *Sustainable Aviation Mandate*²²⁹ came into force, applying legally binding biofuel incorporation quotas on UK jet fuel and significantly pushing sustainable aviation fuel (SAF) uptake.

The UK is also aiming to become a research and innovation hub, fostering the development of green skills and green jobs. Supporting foundational principles of the Net Zero Strategy, the *UK Innovation Strategy*²³⁰ aims to boost four essential innovation pillars that will establish a solid base for future environmental policies: supporting innovative businesses; making the UK an attractive place for R&D; matching research activities with business and development needs; and driving innovation in key globally relevant sectors.





23.3 BIGGEST CHALLENGES

Feedstocks availability and biomass stream prioritisation have arisen as notable hurdles within the UK's sustainable transition. Although the UK's 2023 *Biomass Strategy*²³¹ outlines the country's intention to maximise domestic supply of sustainable biomass, pledging to monitor UK availability and remove potential barriers impeding increased supply, there remain significant uncertainties as to current and future biomass availability, and as to any potential prioritisation (towards specific sectors or technology) in the future. Additionally, no clear direction has been agreed for the development of the UK biomass sector. This has left bioeconomy stakeholders somewhat unsure as to future opportunities and safe investment strategies. Adding to this and further hampering the country's objective of strengthening its domestic supply of biogenic feedstocks, delays in the implementation of mandatory segregated food waste collections²³² have been driving competition for this feedstock, especially within the bioenergy sector (i.e. anaerobic digestion).





24 CONCLUSION

Over the past decade, the European Union has been putting vast amounts of efforts and resources into building a strong and comprehensive sustainability policy bedrock. While the present analysis does not cover the policy landscapes of all twenty-seven Member States, it is evident that the EU is showing strong leadership and influence, pushing nations across the continent to transition towards more resilient and environmental economic and industrial models. EU-mandated legislation, such as the National Energy and Climate Plan, the CAP National Strategy and the Smart Specialisation Strategy (to name a few), have been instrumental in allowing Member States to kickstart their sustainability transitions, regardless of any economic, infrastructural and political barriers that may have been present at the time. Crucially, while the EU has been the driving force behind a significant part of the continent's pledge towards sustainability, it has consistently advocated for and encouraged Member States to leverage existing national strengths, be it topographical advantages, traditional know-how or pre-established value chains. As an example of this, several countries have developed and implemented their own focused Bioeconomy Strategies (Figure 3) with others having strategies in development.

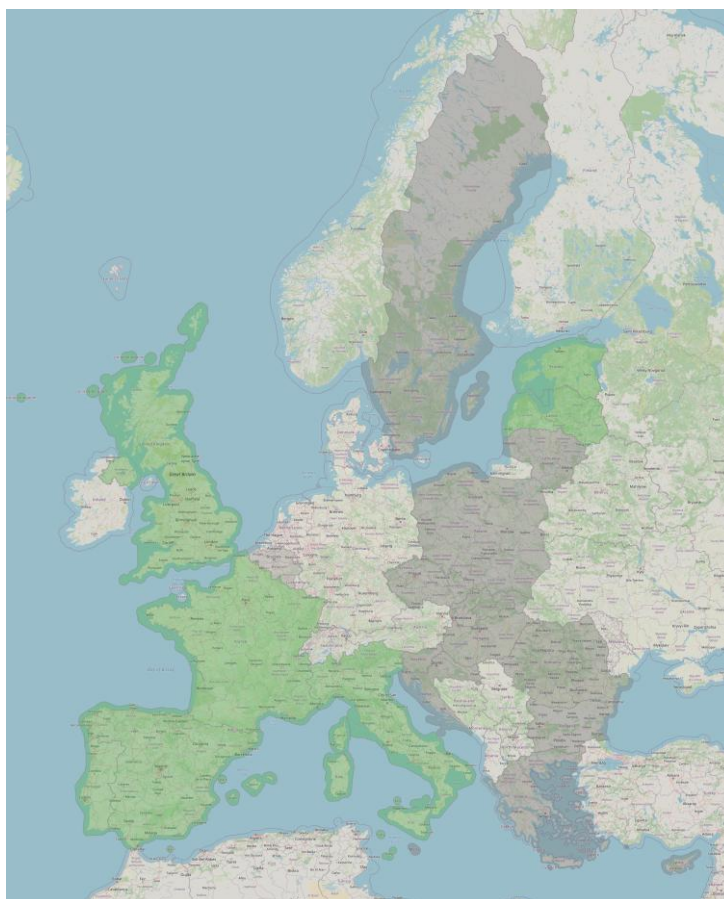


Figure 3: Countries included in ToBeReal with national bioeconomy strategies in place (green). Those with no currently enacted strategy or policy are coloured grey.



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Some key patterns have emerged throughout this assessment, among which is a strong desire to optimise rural activities and agricultural outputs through modernisation. In a number of South-Eastern European countries such as Romania, Bulgaria and Greece for instance, all of whom boast rich agricultural lands and large farming populations, developing strong value chains for the production of agricultural bioeconomy feedstocks is among the chief priorities. Similarly, Portugal is aiming to leverage its unique position as a traditionally maritime nation to nurture a bioeconomy strongly linked to its fisheries and aquaculture sector. Although these ambitions will not be without difficulties, protecting and valorising the generational know-how embedded in rural and coastal communities will be key in meeting both national and European objectives.

Additionally, this analysis has shown a strong and recurring intent on improving resource procurement and efficiency on the national level. Waste, in particular, has been the target of a number of high-profile policies and strategies across the European Union. Central policies such as the Renewable Energy Directive and the Waste Framework Directive have laid down the foundations for Member States to promote recycling and recovery over the production and use of virgin materials, key principles that have now been widely integrated within national circular economy and bioeconomy frameworks. Additionally, the EU-mandated national waste management strategies have gone a long way to introducing new resource efficiency practices across the Union, shining a light on the many pathways to waste valorisation and the role they can play towards the development of a strong bioeconomy.

One area that is still controversial is how best to harness the climate benefits of forests. Some member states consider them important as carbon sinks as well as for biodiversity and as a substitute for fossil materials and energy, while others solely focus on their role as carbon sinks and on biodiversity. Notably, the present overview has revealed the impact that political alliances and changes in administration may have on national sustainability agendas and development of relevant national policies and frameworks, often leading to delays or changes in policy direction. Sweden currently finds itself in such a situation, with a recent change in government putting the drafting of a national bioeconomy strategy in question, further delaying the nationwide implementation of bioeconomy principles and hindering progress from industrial stakeholders. As such, the emergence of policy safeguards, such as the Slovakian *Vision and Strategy of the Development of Slovakia 2030* and the Czech *Act on The Supported Sources of Energy*, tend towards enshrining key targets and objectives into law to limit disturbance and foster progress in the long-term.

In spite of all the progress being made and the good will being shown by the Member States, funding is likely to remain a significant issue for a number of EU nations. Large-scale international events such as the COVID-19 pandemic and the war in Ukraine have had major financial repercussions on all European (and global) countries, which has eventually led to a reduction in funds available for sustainability efforts. Programs such as NextGenerationEU and its Recovery and Resilience Facility have been instrumental in maintaining several national objectives, but complications in the fund claiming process has sometimes led to delays or cancellation of payments.





Overall, the present analysis shows that Europe's sustainability success will rely on encouraging and leveraging national and regional strengths, by valorising communities and their know-how and by fostering new practices for the exploitation of existing resources. Additionally, it is clear that the sustained financial support from the European Commission and Europe's richest countries will be a non-negotiable aspect of Europe's journey to a resilient, inclusive net zero future.

24.1 SUMMARY TABLES

The key regulatory drivers and challenges identified across the 21 countries analyses are summarised below. For ease of reference, the countries have been grouped into four distinct regions across Europe as described in the UN Statistics Division Methodology and presented in four tables:

- Table 2 : Northern Europe (Estonia, Latvia, Lithuania, Sweden and the UK)
- Table 3 : Southern Europe (Croatia, Cyprus, Greece, Italy, Malta, Portugal, Slovenia, Spain)
- Table 4 : Eastern Europe (Bulgaria, Czechia, Hungary, Poland, Romania and Slovakia).
- Table 5 : Western Europe (Belgium and France)





Country	Drivers	Challenges
Estonia	• Strong policy base across energy, waste, climate, and bioeconomy supporting cross-sector planning. • Emphasis on innovation, digitisation, R&D, and economic gains. • Strong alignment with EU and Baltic Sea Region cooperation and bioeconomy goals.	• R&D funding relatively limited, impacting innovation. • Gap between research and commercial deployment. • Local development is strong, but larger-scale project finance needs support.
Latvia	• National bioeconomy strategy with targets for employment, added value, and exports, aligned with EU initiatives and sustainability goals. • Strong natural resource base. • Strategic focus on innovation and high-value sectors particularly biorefineries, alongside growing export performance and bioenergy.	• Insufficient funding with heavy reliance on EU structural funds which limits long-term investment certainty. • Weak domestic public and private investment in R&D. • Limited role of public institutions as innovation customers: low demand and support for bioeconomy development.
Lithuania	• Strong policy framework and sector specific roadmaps integrating bioeconomy into sustainable growth, resource efficiency, and renewable energy strategies. • Emphasis on innovation and high-value sectors (biotechnology, agriculture, pharmaceuticals). • Decarbonisation pathway inc. renewables and advanced biofuels.	• Tensions between advancing technological innovation and strengthening environmental protection requirements. • Significant funding to modernise infrastructure and support bioeconomy transition. • Need to enhance competitiveness and deepen regional integration (e.g. with Baltic neighbours) to succeed in wider markets.
Sweden	• Strong forest-based bioeconomy supported by extensive resources, long-term industrial investment, and advanced processing industries. • Ambitious and stable climate policy framework. • High levels of public–private collaboration and innovation, particularly in forestry, bioenergy, and industrial decarbonisation.	• Uncertainty over the impact of EU and national regulations on forestry: potential negative effect on investment, profitability, biomass supply. • Absence of a formal national bioeconomy strategy. • Uncertainty regarding future support, funding, and commitment to bioeconomy development following changes in government.
UK	• Strong national policy framework driving decarbonisation through electrification, carbon capture, and targeted support for bioenergy. • Advanced innovation ecosystem with strengths in life sciences and engineering biology, supported by national strategies to scale biomanufacturing, R&D, and skills. • Targeted opportunities in hard-to-decarbonise sectors (aviation and maritime), with targeted policy support.	• Uncertainty around biomass availability and prioritisation, limiting clarity for investment and long-term sector development. • Lack of a clear strategic direction for the biomass sector, creating ambiguity for bioeconomy stakeholders. • Delays in waste policy implementation increasing competition for resources.

Table 2: Summary of the key drivers and challenges identified in the analysis of the countries assessed: Northern Europe (Estonia, Latvia, Lithuania, Sweden, UK)





Country	Drivers	Challenges
Croatia	- Policy frameworks aligned with EU climate and bioeconomy goals. - Strong support for primary sectors (agriculture, aquaculture, forestry) and modernisation. - Bioeconomy vision backed by innovation and low-carbon strategies.	- High investment needs to deliver policy ambitions. - Coordination challenges across sectors and stakeholders. - Need for more detailed implementation plans and targeted support for small producers.
Cyprus	- Strong alignment with EU bioeconomy and renewable energy goals. - Comprehensive policies supporting circular economy and low-carbon transition. - Robust frameworks for biodiversity and ecosystem protection.	- High investment needs for infrastructure modernisation and transition to advanced technologies. - Cultural resistance to shifts required for policy adoption. - Balancing resource use with conservation pressures.
Greece	- Strong policy push with ambitious decarbonisation and renewable energy targets, creating momentum for a circular bioeconomy. Significant economic and resource base in agriculture supported by funding, digitalisation, and incentives. - Focus on market creation and industrial opportunities, including new business models and growth in renewable gases.	- Absence of a dedicated national bioeconomy strategy - Regulatory uncertainty in emerging sectors hindering investment, coordination and scale-up. - Structural size and environmental constraints in agriculture limiting productivity and realistic biomass potential.
Italy	- Strong, integrated policy framework supporting green transition, renewable energy expansion, and bioeconomy growth. - Emphasis on circular economy and waste prevention through aligned national strategies, embedding resource efficiency. - Cross-sector bioeconomy development, strategies and action plans, supporting innovation, digitisation, and sustainable primary sectors.	- Substantial, well-targeted financing to support bioeconomy development. - Administrative and organisational capacity constraints that may hinder effective implementation and growth. - Risk of fragmented and delayed infrastructure deployment without coordinated support across stakeholders.
Malta	- Strong national policy framework (renewable energy, energy efficiency, and sustainable resource management) aligned with EU climate and environmental objectives. - Strategic focus on circular economy development through waste system reform, infrastructure investment, and biowaste valorisation. - Integration of sustainability across the primary sector, reinforcing biodiversity protection and sustainable practices.	- Structural constraints from high population density and limited land. - Maximise organic waste utilisation to reduce fossil fuel dependence, placing pressure on waste and resource management systems. - Diversification of energy supply beyond electrification, including reliance on interconnectors, biofuels, and local low-carbon energy generation.





Portugal	• Ambitious policy framework for carbon neutrality (2045) supported by emission reduction, renewable energy, and energy efficiency targets. • Bioeconomy strategy and action plans aligned with circular economy objectives - innovation, resource efficiency, and biobased products. • Strategic use of natural and sectoral strengths, including supported by targeted investment and innovation.	• Heavy reliance on forests as carbon sinks, making emissions reductions vulnerable to external shocks such as wildfires and undermining carbon sequestration. • Need to strengthen forest management and resilience to climate change to sustain long-term decarbonisation progress.
Slovenia	• Strong, policy framework prioritising environmental protection, waste reduction, and a whole-economy green transition. • Emphasis on research, innovation, and advanced technologies in key bioeconomy sectors. • Governance approaches promote cross-sector collaboration, public-private partnerships, and industrial symbiosis to drive circular economy integration.	• Lack of a dedicated bioeconomy action plan. • Coordination and cooperation difficulties among stakeholders, complicating implementation of existing strategies. • Low alignment between public institutions and private sector actors, hindering delivery of circular economy and innovation objectives.
Spain	• Early and comprehensive national bioeconomy and circular economy strategies, promoting sustainability, innovation, and resource efficiency across multiple sectors. • Strong policy coverage across key industries with clear targets for reducing resource use and waste. • Decentralised approach with active regional strategies enabling tailored, place-based bioeconomy development and innovation.	• Complexity in coordinating and aligning policies across regional, national, and EU levels. • Risk of fragmentation and inefficiencies if multi-level governance and cooperation are not successfully managed. • Need for strong and continuous stakeholder engagement across public and private sectors to ensure effective implementation.

Table 3: Summary of the key drivers and challenges identified in the analysis of the countries assessed: Southern Europe (Croatia, Cyprus, Greece, Italy, Malta, Portugal, Slovenia, Spain)





Country	Drivers	Challenges
Bulgaria	• Strong policy alignment with EU sustainability agenda. • Strategic focus on innovation, including investment in research. • Strong rural and natural resource base, leveraged for agriculture, aquaculture, forestry, and bioenergy.	• Significant investment gap requiring funding beyond national capacity, increasing reliance on external (EU) financing • Conditionality and reform burden linked to EU funding, creating administrative and political pressure that may impact delivery.
Czech Republic	• Strong national strategy for sustainable, innovative development. • Clear policy support for circular economy, waste reduction, recycling. • Renewable energy and energy efficiency are embedded in policy.	• Low implementation detail for bioeconomy sectors. • Bioeconomy is not fully integrated into wider industrial policy. • Renewable energy ambition appears limited to EU minimum targets.
Hungary	• Comprehensive and EU-aligned policy framework with strong renewable energy targets and a strategic role for biomass. • Bioeconomy key for economic growth across multiple strategies. • Strong emphasis on research, innovation, and support for SMEs.	• Lack of bioeconomy-specific implementation measures within the broad policy framework, leading to coordination issues across sectors. • Implementation gaps in waste management systems. • Dependence on EU funding, constraining long-term investments.
Poland	• Integrated policy framework promoting circular economy and sustainable economic development, including bioeconomy. • Increasing policy focus on expanding renewable energy and reducing emissions through key strategies. • Emerging opportunities in the energy sector.	• Absence of a national carbon neutrality target and relatively slow emissions reduction. • Reliance on coal, with a long phase-out timeline (to 2049). • Risk that the pace of renewable energy deployment will be insufficient to meet EU climate targets.
Romania	• Strong alignment with EU climate goals and comprehensive national strategy targeting carbon neutrality by 2050. • Strong agricultural and forestry sectors, extensive biomass resources, and established bioenergy supply chains and facilities. • Regional and sector-specific strategies supporting innovation and circular economy growth.	• Fragmented agricultural sector dominated by small, non-commercial farms, limiting integration into value chains and feedstock mobilisation. • Demographic and structural issues, including an ageing farming population, rural depopulation, and weak farmer organisation. • Need stronger value chains, stakeholder coordination, and social engagement to harness biomass potential and support innovation.
Slovakia	• Alignment with EU climate objectives through low-carbon strategy to 2050, and long-term planning to ensure continuity across political cycles. • Prioritisation of resource efficiency, sustainable forestry and agriculture, and biomass utilisation. • Emphasis on eco-innovation and circular economy development, including support through circularity roadmaps.	• Need for detailed, measurable implementation measures, including funding mechanisms and incentives. • Weaker integration and prioritisation of the bioeconomy within broader sustainability strategies. • Regulatory and structural barriers, including restrictive biomass-use and fragmented forest ownership, limiting bioeconomy development.

Table 4: Summary of the key drivers and challenges identified in the analysis of the countries assessed: Eastern Europe (Bulgaria, Czechia, Hungary, Poland, Romania and Slovakia)





Country	Drivers	Challenges
Belgium	• Strong alignment of federal and regional climate and energy policies with EU goals. • Robust regulatory framework supporting renewables, biofuels and energy efficiency. • Advanced bioeconomy and biotech innovation including in waste valorisation	• Complex regional governance leading to coordination challenges. • Farmer and public resistance to costly environmental measures. • Tension between climate ambition, affordability, and public acceptance.
France	• Strong national low-carbon and bioeconomy strategy with carbon-neutrality target by 2050 covering energy, transport, industry, and agriculture. • Major biomethane growth and expanding renewable energy base. • Strong biomass mobilisation framework with regional schemes tailoring action to local resources.	• Challenges over securing biomass without impacting biodiversity or land use • Heavy reliance on coordination across actors with policy delivery dependent on strong stakeholder engagement. • Matching ambition with practical implementation - regional strategies needing to reflect local resources and constraints.

Table 5: Summary of the key drivers and challenges identified in the analysis of the countries assessed: Western Europe (Belgium and France)





25 REFERENCES

European Union Policy Framework

- ¹ European Commission. 2011. *A Roadmap for moving to a competitive low carbon economy in 2050*.
- ² European Union. 2019. *Going Climate Neutral by 2050*.
- ³ European Commission. 2019. *The European Green Deal – Striving to be the first climate-neutral continent*.
- ⁴ The Joint Research Centre: EU Science Hub. 2022. *The twin green & digital transition: How sustainable digital technologies could enable a carbon-neutral EU by 2050*.
- ⁵ European Commission. 2019. *Fit-for-55*.
- ⁶ European Environment Agency. 2024. *Greenhouse gas emissions from land use, land use change and forestry in Europe*.
- ⁷ European Commission. 2023. *Mobility and Transport – ReFuelEU Aviation*.
- ⁸ European Commission. 2023. *ReFuelEU Aviation*.
- ⁹ European Commission. 2023. *The Green Deal Industrial Plan*.
- ¹⁰ European Commission. 2024. *Net-Zero Industry Act*.
- ¹¹ European Commission. 2021. *Common Agricultural Policy (CAP)*.
- ¹² European Commission. 2013. *Common Fisheries Policy (CFP)*.
- ¹³ European Commission. 2020. *Farm-to-Fork Strategy – for a fair, healthy and environmentally-friendly food system*.
- ¹⁴ European Commission. 2020. *EU Biodiversity Strategy*.
- ¹⁵ European Council. 2023. *EU deforestation law: Council formally adopts its one-year postponement*.
- ¹⁶ European Commission. 2020. *Nature Restoration Law*.
- ¹⁷ European Commission. 2021. *EU Forest Strategy*.
- ¹⁸ European Commission. 2025. *Shaping the European Oceans Pact: Commission launches a call for evidence*.
- ¹⁹ European Commission. 2020. *Circular Economy Action Plan*.
- ²⁰ European Commission. 2022. *EU Bioeconomy Strategy*.
- ²¹ European Commission. 2022. *EU strategy for sustainable and circular textiles – to create a greener, more competitive textiles sector*.
- ²² European Environment Agency. 2023. *Managing the systemic use of chemicals in Europe*.
- ²³ European Commission. 2020. *Chemicals strategy – the EU's chemicals strategy for sustainability towards a toxic-free environment*.
- ²⁴ European Commission. 2021. *Zero Pollution Action Plan*.
- ²⁵ European Commission. 2018. *Plastics Strategy*.
- ²⁶ European Commission. 2025. *Commission takes action to boost biotechnology and biomanufacturing in the EU*.
- ²⁷ EuropaBio. 2025. *The EU Biotech Act – EuropaBio Vision Paper*.





²⁸ European Commission. 2021. *NextGenerationEU*.

²⁹ European Commission. 2022. *RePowerEU at a glance*.

³⁰ Reuters. 2025. *EU to propose end-2027 halt to all Russian gas imports*.

³¹ European Commission. 2022. *RePowerEU Plan*.

³² European Commission. 2021. *Resilience and Recovery Facility*.

³³ European Biogas Association. 2022. *The REPowerEU puts forward a Biomethane Action Plan to scale-up the sector by 2030*.

Belgium

³⁴ Belgium Governments. 2023. *Belgium National Energy and climate plan 2021-2030*.

³⁵ Wallonia Government. 2023. *Walloon Air Climate Energy Plan 2030*.

³⁶ Flemish Government. 2019. *Flanders Climate Strategy 2050*.

³⁷ Flemish Government. 2023. *Flanders Energy and Climate Plan*.

³⁸ Ministry of Energy. 2023. *Act laying down product standards for the integration of energy from renewable sources into fossil fuels intended for the transport sector*.

³⁹ Ministry of Energy of Flanders. 2009. *Energy Decree*.

⁴⁰ Ministry of Environment of Flanders. 2011. *Materials Decree*.

⁴¹ Flemish Department of Environment. 2014. *Bioeconomy in Flanders. The vision and strategy of the Government of Flanders for a sustainable and competitive bioeconomy in 2030*.

⁴² Flemish Government. 2020. *Flanders Bioeconomy policy plan*.

⁴³ Flemish Ministry of Economy, Innovation, Employment, Social Economy and Agriculture. 2021. *Decree of the Flemish Government on organic production and labelling of organic products*.

Bulgaria

⁴⁴ Ministry of Agriculture and Forestry. 2023. *Common Agricultural Policy (CAP) Strategic Plan 2023–2027*.

⁴⁵ Ministry of Agriculture and Forestry. 2021. *Agricultural Strategy of Bulgaria Until 2030*.

⁴⁶ Ministry of Environment and Water. 2019. *National Climate Change Adaptation Strategy*.

⁴⁷ Ministry of Food and Agriculture. 2021. *National Aquaculture Development Plan Until 2027*.

⁴⁸ Ministry of Energy. 2021. *Integrated Energy and Climate Plan of Bulgaria 2021–2030*.

⁴⁹ Ministry of Energy. 2020. *Energy Strategy of Bulgaria Until 2050*.

⁵⁰ Ministry of Agriculture. 2011. *Forest Act*.





⁵¹ Ministry of Economy and Industry. 2006. *National Plan for the Development of the Wood Processing and Furniture Industry*.

⁵² Ministry of Economy and Industry. 2021. *Smart Specialization Strategy 2021–2027*.

⁵³ Ministry of Environment and Water. 1998. *National Biodiversity Conservation Strategy and Action Plan*.

⁵⁴ EURACTIV. 2025. *Bulgaria loses €653 million in EU funds amid reform delays*.

Croatia

⁵⁵ Ministry of Environment and Energy. 2019. *Integrated Energy and Climate Plan for the Republic of Croatia 2021–2030*.

⁵⁶ Croatian Parliament. 2020. *Energy Development Strategy With an Outlook to 2050*.

⁵⁷ Ministry of Economy and Sustainable Development. 2023. *Waste Management Strategy of the Republic of Croatia for the Period 2023–2028*.

⁵⁸ Croatian Parliament. 2020. *Strategy for Adaptation to Climate Change in the Republic of Croatia for the Period up to 2040 with a View to 2070*.

⁵⁹ Ministry of Environment and Energy. 2017. *National Biodiversity Strategy and Action Plan of the Republic of Croatia*.

⁶⁰ Croatian Parliament. 2022. *The Agricultural Strategy Until 2030*.

⁶¹ Croatian Parliament. 2022. *National Aquaculture Development Plan Until 2027*.

⁶² Croatian Parliament. 2018. *Law on Forests*.

⁶³ Ministry of Economy. 2023. *National Plan for the Development of Wood Processing and Furniture Production of the Republic of Croatia*.

⁶⁴ Croatian Parliament. 2021. *Croatian National Development Strategy 2030*.

⁶⁵ Croatian Parliament. 2021. *Low Carbon Development Strategy*.

⁶⁶ Ministry of Economy and Sustainable Development. 2016. *Smart Specialization Strategy of the Republic of Croatia for the Period 2016–2020*

Cyprus

⁶⁷ Department of Environment. 2020. *Integrated National Energy and Climate Plan for Cyprus 2021–2030*.

⁶⁸ Department of Environment. 2020. *Energy Strategy of Cyprus until 2050*.

⁶⁹ Department of Environment. 2015. *National Waste Management Plan 2021-2*.

⁷⁰ Ministry of Agriculture, Natural Resources and Environment. 2021. *Low Carbon Development Strategy*.

⁷¹ Ministry of Research, Innovation and Digital Policy. 2022. *Smart Specialization Strategy 2021-2027*.





⁷² Ministry of Agriculture, Natural Resources and Environment. *National Plan for the Development of Wood Processing and Furniture Industry.*

⁷³ Ministry of Agriculture, Natural Resources and Environment. 2017. *Multi-annual National Strategic Aquaculture Plan 2021-2030*

⁷⁴ Forestry Department. 2005. *Forest Law of Cyprus*

⁷⁵ Ministry of Agriculture, Natural Resources and Environment. 2022. *Agricultural Strategy of Cyprus Until 2030*

⁷⁶ Ministry of Agriculture, Natural Resources and Environment. 2014. *National Biodiversity Strategy and Action Plan*

Czech Republic

⁷⁷ Department of Sustainable Development. 2017. *The Strategic Framework of the Czech Republic 2030.*

⁷⁸ Council for Research, Development and Innovation. 2019. *The Czech Republic's Innovation Strategy for 2019–2030.*

⁷⁹ Ministry of Industry and Trade. 2023. *Research and Innovation Strategy for the Smart Specialization of the Czech Republic.*

⁸⁰ Institute of the Circular Economy. 2021. *Strategic Framework for Circular Economy (Circular Czechia).*

⁸¹ Czech Republic Government. 2020. *Wastes Act No. 541/2020.*

⁸² Czech Republic Government. 2001. *Packaging Act 477/20001 Coll.*

⁸³ Czech Republic Government. 2023. *Czech Republic's National Energy and Climate Plan (NECP).*

⁸⁴ Czech Republic Government. 2001. *Act on energy management.*

⁸⁵ Czech Republic Government. 2012. *Act no.165/2012 on the supported sources of energy.*

⁸⁶ Czech Republic Government. 2012. *Act on Air Protection No. 201/2012 Coll.*

⁸⁷ Ministry of the Environment. 2016. *The State Environmental Policy of the Czech Republic.*

Estonia

⁸⁸ EUSBSR. 2018. *EU Strategy for the Baltic Sea Region: A bioeconomy for the Baltic Sea Region.*

⁸⁹ Ministry of Education and Research. 2018. *Estonia Research and Development Strategy until 2025: Knowledge-based bioeconomy.*

⁹⁰ Ministry of Climate and Environment. 2021. *Estonian National Energy and Climate Plan.*

⁹¹ Ministry of Economic Affairs and Communications. 2012. *Estonian National Energy Development Plan 2030+.*

⁹² European Environment Agency. 2025. *National Waste Plan.*

⁹³ Ministry of Climate / Ministry of the Environment. 2018. *Estonian Circular Economy Programme.*

⁹⁴ Ministry of the Environment. 2017. *Climate Change Adaptation Development Plan until 2030.*





⁹⁵ Estonian Research Council. 2023. *Enhancing the Capacity to Implement Research, Development, and Innovation Outcomes in Society and Establishing a Favourable Policy Environment (RITA+)*.

⁹⁶ Ministry of Agriculture. 2023. *Circular Bioeconomy Roadmap of Estonia*

⁹⁷ Ministry of the Environment. 2010. *Estonian Forestry Program*.

⁹⁸ Ministry of Rural Affairs. 2018. *Estonian Maritime, Fisheries and Aquaculture Fund*.

⁹⁹ Ministry of Rural Affairs and Agriculture. 2023. *Estonian Agriculture and Fisheries Strategy 2030*

¹⁰⁰ Ministry of Agriculture. 2014. *Estonian Rural Development Plan*.

France

¹⁰¹ Ministry of the Ecological Transition. 2017. *National Low Carbon Strategy*.

¹⁰² Gaz Mobilité. 2025. *Biométhane: la France passe le cap des 14 TWh*.

¹⁰³ Ministry of Agriculture. 2018. *Bioeconomy strategy for France – Action plan 2018-2020*.

¹⁰⁴ Ministry of Ecology. 2015. *National Strategy for the Mobilisation of Biomass*.

¹⁰⁵ Outils de l'Aménagement. 2024. *Le schéma régional biomasse*.

¹⁰⁶ Ministry of the Territory & Ministry of Ecology. 2025. *Trajectory for the Reduction of Soils Artificialisation*.

¹⁰⁷ eXtrême Défi – Bioéconomie. 2024. *Enjeux*.

Greece

¹⁰⁸ Ministry of Environment and Energy. 2018. *National circular economy strategy*.

¹⁰⁹ Ministry of Environment and Energy. 2024. *Updated National Energy and Climate Plan (NECP)*.

¹¹⁰ Enerdata. 2024. *Greece's revised NECP targets 81% of renewables in its power mix by 2030*.

¹¹¹ European Commission. 2024. *Greece – CAP Strategic Plan*.

¹¹² BioGov.net. 2025. *Greece Factsheet*.

¹¹³ Ministry of Rural Development and Food. 2014. *Rural Development Program*.

¹¹⁴ Ministry of Rural Development and Food. 2021. *National Agricultural Development Strategy*.

¹¹⁵ Ministry of Agriculture and Rural Development. 2023. *Greece's CAP Strategic Plan*.

¹¹⁶ BioGov.net. 2025. *Greece Factsheet*.

¹¹⁷ Habio. 2024. *Biogas and biomethane in Greece*.

Hungary

¹¹⁸ Ministry of National Development. 2012. *National Energy Strategy 2030*.

¹¹⁹ Ministry of National Development. 2010. *National Renewable Energy Utilisation Action Plan 2010-2020*.

¹²⁰ Ministry for Innovation and Technology. 2020. *National Climate Change Strategy 2018-2030*.





- ¹²¹ Ministry of Agriculture. 2015. *National Biodiversity Strategy 2015-2020*.
- ¹²² Hungarian Parliament. 2014. *National Development 2030 - National Development and Territorial Development Concept*.
- ¹²³ Ministry of Agriculture. 2017. *Hungary's Food Economy Concept 2017-2050*.
- ¹²⁴ Ministry for Innovation and Technology. 2021. *National Clean Development Strategy 2020-2050*.
- ¹²⁵ Ministry for National Economy Hungary. 2010. *New Széchenyi Development Plan*.
- ¹²⁶ National Research, Development and Innovation Office. 2021. *National Research and Development and Innovation Strategy 2020*.
- ¹²⁷ Ministry of Rural Development. 2012. *National Research and Development and Innovation Strategy 2020*.
- ¹²⁸ Ministry of Agriculture. 2021. *National Waste Management Plan 2021-2027*.
- ¹²⁹ Ministry of Agriculture. 2016. *National Forest Strategy 2016-2030*.
- ¹³⁰ Ministry of Rural Development. 2014. *National Rural Development Strategy*.
- ¹³¹ Ministry of Agriculture and Rural Development. 2011. *New Hungary Rural Development Programme*.

Italy

- ¹³² Italian Government. 2021. *Next Generation Plan*.
- ¹³³ Committee for Ecological Transition. 2021, *Plan for ecological transition*.
- ¹³⁴ Department for Cohesion Policies and the South. 2017. *National Smart Specialization Strategy*.
- ¹³⁵ Ministry of Ecological Transition. 2022. *National Strategy for Circular Economy*.
- ¹³⁶ Ministry of Environment and Energy Security. 2020. *National Plan for Waste Management*.
- ¹³⁷ Ministry for Economic Development. 2019. *Bioeconomy in Italy*.
- ¹³⁸ National Bioeconomy Coordination Board. 2021. *Action Plan (2020-2025) for the Implementation of the Italian Strategy for the Bioeconomy*.
- ¹³⁹ Ministry of Environment and Energy Security. 2017. *National Strategy for Sustainable Development*.
- ¹⁴⁰ Ministry of Environment and Energy Security. 2023. *National Biodiversity Strategy to 2030*.
- ¹⁴¹ Ministry of Agriculture, Food Sovereignty and Forestry. 2018. *National Forestry Strategy*.
- ¹⁴² Ministry of Agriculture, Food Sovereignty and Forestry. 2022. *Italy CAP Strategic Plan*.

Latvia

- ¹⁴³ Ministry of Agriculture. 2017. *Latvian Bioeconomy Strategy*.
- ¹⁴⁴ Ministry of Environmental Protection and Regional Development .2010. *Sustainable Development Strategy*.
- ¹⁴⁵ European Commission. 2010. *Europe 2020 – A European strategy for smart, sustainable and inclusive growth*.





- ¹⁴⁶ European Parliament. 2012. *A sustainable bioeconomy for Europe*.
- ¹⁴⁷ Ministry of Environmental Protection and Regional Development. 2021. *Latvia's strategy for achieving climate neutrality by 2050*.
- ¹⁴⁸ Mission Latvia. 2025. *Knowledge-intensive bioeconomy*.
- ¹⁴⁹ Investment and Development Agency of Latvia. 2024. *Memorandum of Understanding signed to develop the biorefinery sector*.
- ¹⁵⁰ Muska et al. 2021. Factors affecting the development of the bioeconomy in Latvia. *Proceedings of the 2021 International Conference "Economic Science for Rural Development"*.

Lithuania

- ¹⁵¹ Ministry of Agriculture. 2023. *Approval of the Rules for the Implementation of the Intervention Measure "Investments in Bioeconomy Businesses" of the Lithuanian Strategic Plan for Agriculture and Rural Development 2023-2027*.
- ¹⁵² Ministry of Environment. 2022. *Comprehensive Plan of the Territory of the Republic of Lithuania (2021)*.
- ¹⁵³ European Topic Centre on Circular economy and resource use. 2024. *Roadmap for the Transition to a Circular Economy in Lithuania by 2035*.
- ¹⁵⁴ Ministry of the Economy and Innovation. 2022. *Smart specialization 2021-2027*.
- ¹⁵⁵ Invest Lithuania. 2021. *Life Sciences in Lithuania (roadmap)*.
- ¹⁵⁶ Government of Lithuania. 2013. *Implementation of the Regulation (EU) No 528/2012 of the European Parliament and of the Council of 22 May 2012 concerning the making available on the market and use of biocidal products*.
- ¹⁵⁷ Ministry of Environment. *Evaluation of impact of implementation of the directive 2001/18/ec on the deliberate release into the environment of genetically modified organisms*.
- ¹⁵⁸ Government of Lithuania. 2000. *Law on Chemical Substances and Preparations (No. VIII-1641)*.
- ¹⁵⁹ Government of Lithuania. 2022. *National Energy and Climate Action Plan for the period 2021–2030*.
- ¹⁶⁰ Ministry of Agriculture. 2022. *Lithuanian CAP Strategic Plan (2022)*.
- ¹⁶¹ Government of Lithuania. 2015. *Law on protected areas*.
- ¹⁶² Ministry of Environment. 2018. *Law No. VIII-474 on Water*.
- ¹⁶³ Ministry of Forestry. 1994. *Forestry Law*.
- ¹⁶⁴ Ministry of Environment. 2023. *Law on Environmental Protection*.

Malta

- ¹⁶⁵ Maltese Government. 2024. *National Energy and Climate Plan*.





- ¹⁶⁶ Environment and Resource Authority. 2024. *National Biodiversity Strategy and Action Plan*.
- ¹⁶⁷ Ministry for the Environment, Climate Change and Planning. 2021. *Long Term Waste Management Plan*.
- ¹⁶⁸ Environment and Resource Authority. 2011. *The Waste Management (Waste Framework) Regulations*.
- ¹⁶⁹ Ministry for Agriculture, Fisheries and Animal Rights. 2022. *Common Agricultural Policy Strategic Plan*.
- ¹⁷⁰ Ministry for Agriculture, Fisheries and Animal Rights. 2001. *Fisheries Conservation and Management Act*.
- ¹⁷¹ Ministry for Environment, Energy and Public Cleanliness. 2018. *Trees and woodlands protection regulations*.
- ¹⁷² Ministry for Environment, Energy and Public Cleanliness. 2023. *Environmental Protection Act*.

Poland

- ¹⁷³ European Parliament - Roadmap to EU Carbon Neutrality. 2024. Poland's Climate Action Strategy.
- ¹⁷⁴ Ministry of Economic Development and Technology. 2019. Roadmap Towards the Transition to the Circular Economy.
- ¹⁷⁵ Ministry of Development. 2017. Strategy for Responsible Development.
- ¹⁷⁶ Ministry of Climate and Environment. 2021. *Poland's Energy Policy until 2040*.
- ¹⁷⁷ Ministry of Climate and Environment. 2019. *National Energy and Climate Plan 2019 – 2024*.
- ¹⁷⁸ Ministry of Climate and Environment. 2021. Polish Hydrogen Strategy until 2030 with a perspective until 2040
- ¹⁷⁹ EMBER. 2025. *Poland*.

Portugal

- ¹⁸⁰ Ministry for the Environment and Climate Action. 2019. *Long-Term Strategy for carbon neutrality of the Portuguese economy by 2050*.
- ¹⁸¹ Ministry for the Environment and Climate Action. 2020. *Portuguese Bioeconomy Strategy*.
- ¹⁸² Agencia Portuguesa de Ambiente. 2021. *Basic Climate Law*.
- ¹⁸³ Ministry for the Environment and Climate Action. 2021. *Integrated National Energy and Climate Plan (NECP)*.
- ¹⁸⁴ Ministry of Agriculture, Forest and Rural Development. 2020. *Blue Bioeconomy Roadmap for Portugal*.
- ¹⁸⁵ Ministry for the Environment and Climate Action. 2020. *Sustainable Bioeconomy Action Plan – Horizon 2025*.
- ¹⁸⁶ Think Tank – European Parliament. 2025. *Portugal's climate action strategy*.
- ¹⁸⁷ Ministry of Agriculture, Forest and Rural Development. 2015. *Portugal's National Forestry Accounting Plan 2021-2025*.

Romania

- ¹⁸⁸ Ministry of Environment, Water and Forests. 2021. Romania's long-term strategy for reducing greenhouse gas emissions - Neutral Romania in 2050.





¹⁸⁹ Department of Sustainable Development & Ministry for Environment and Climate Change. 2018. National Strategy for Sustainable Development in Romania.

¹⁹⁰ Ministry of Research, Innovation and Digitalization. 2021. *Regional Smart Specialization Strategy of the Centru Region*.

¹⁹¹ Ministry of Agriculture and Rural Development. 2024. *Unleashing opportunities for the bioeconomy in the mountain regions of Romania*.

¹⁹² Be-Rural. 2019. *Roadmap for a bioeconomy strategy in the Covasna region*.

¹⁹³ Ministry of Agriculture and Rural Development. 2023. *Romanian Common Agriculture Strategic Plan*.

¹⁹⁴ European Commission – Agriculture and Rural Development. 2024. *Romania – CAP Strategic Plan*.

¹⁹⁵ Be-Rural. 2019. *Roadmap for a bioeconomy strategy in the Covasna region*.

Slovakia

¹⁹⁶ Ministry of Environment. 2020. *Low-Carbon Development Strategy of the Slovak Republic until 2030 with a View to 2050*.

¹⁹⁷ Ministry of Investments, Regional Development and Informatization. 2021. *Vision and Strategy of the Development of Slovakia 2030*.

¹⁹⁸ Ministry of Agriculture and Rural Development. 2025. National Forestry Program of the Slovak Republic for the period 2025-2030.

¹⁹⁹ European Commission. 2023. *Slovakia – CAP Strategic Plan*.

²⁰⁰ Ministry of Investments, Regional Development and Informatization. 2021. *Smart Specialisation Strategy*.

²⁰¹ Ministry of Environment. 2022. *A Roadmap Towards Circularity for Competitiveness, Eco-innovation and Sustainability*.

Slovenia

²⁰² Ministry of Cohesion and Regional Development. 2017. *Slovenia Development Strategy 2030*.

²⁰³ Connected for Growth. 2015. *Transition to a Green Economy in Slovenia*.

²⁰⁴ Ministry of Cohesion and Regional Development. 2022. Slovenian Sustainable Smart Specialisation Strategy (S5).

²⁰⁵ Climate KIC. 2021. *Circular Slovenia: Systems innovation for the transition to a circular, regenerative and low-carbon economy*.

²⁰⁶ Ministry of the Environment and Spatial Planning and Circular Change. 2018. *Ministry of the Environment and Spatial Planning*.

²⁰⁷ Government Office for Development and European Cohesion Policy. 2022. *Slovenian Sustainable Smart Specialisation Strategy (S5)*.





²⁰⁸ European Economy Stakeholder Platform. 2018. *Roadmap Towards the Circular Economy in Slovenia*.

Spain

²⁰⁹ Ministry of Agriculture. 2015. *Spanish Bioeconomy Strategy: Horizon to 2030*.

²¹⁰ Ministry of Environment. 2020. *Spanish Circular Economy Strategy*.

²¹¹ Junta de Andalucía. 2018. *Andalusian Circular Bioeconomy Strategy [EABC]*.

²¹² Gencat. 2021. *Catalonia's Bioeconomy Strategy 2030*.

²¹³ Junta de Castilla y León. 2021. *Circular economy strategy 2021/2030*.

²¹⁴ Eusko Jauriaritza. 2021. *Plan de Economía Circular y Bioeconomía 2024*.

²¹⁵ Gobierno de Castilla-La Mancha. 2021. *DG Circular Economy and Agenda 2030 – Circular Economy Strategy 2030 (2021-2030)*.

²¹⁶ Gobierno de Castilla-La Mancha. 2018. *Vice-Ministry of the Environment – Regional Forest Biomass Strategy of Castilla-La Mancha (2018-2022)*.

²¹⁷ Gobierno de Castilla-La Mancha. 2024. *DG Environmental Quality – Decree approving the Regional Biomethanisation Plan of Castilla La Mancha 2024-2030*.

Sweden

²¹⁸ Fridman & Danell. 2024. *Sweden's forests over the last 100 years: the Swedish National Forest Inventory 1923-2023*.

²¹⁹ Ministry of Climate and Enterprise. 2017. *Climate Policy Framework*.

²²⁰ Fossil Free Sweden. 2021. *National initiative to make Sweden the first fossil-free welfare nation in the world*.

²²¹ Swedish Forest Industries. 2024. *Q&A about the Swedish Forestry and more*.

²²² Ministry of Climate and Enterprise & Ministry of Rural Affairs and Infrastructure. 2018. *Strategy document: Sweden's National Forest Programme*.

²²³ The Swedish Forest Agency. 2023. *Forestry Act*.

²²⁴ Ministry of Climate and Enterprise. 2020. *Circular economy - strategy for the transition in Sweden*.

United Kingdom

²²⁵ HM Government. 2020. *The Ten Point Plan for a Greener Industrial Revolution*.

²²⁶ HM Government. 2021. *Net Zero Strategy: Build Back Greener*.

²²⁷ HM Government. 2023. *National Vision for Engineering Biology*

²²⁸ Department for Transport. 2022. *Low carbon fuels strategy – Call for ideas*.

²²⁹ Department for Transport. 2025. *Sustainable Aviation Fuel (SAF) Mandate*.

²³⁰ Department for Business, Energy and Industrial Strategy. 2021. *Policy Paper – UK Innovation Strategy: leading the future by creating it*.

²³¹ Department for Energy Security and Net Zero. 2023. *Biomass Strategy 2023*.

²³² Department for Environment, Food and Rural Affairs. 2024. *Ensuring good waste collection services for households*.



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