CATALYST

European VET Excellence Centre for Leading
Sustainable Systems and Business Transformation

MAPPING AND SKILLS FORECAST REPORT

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Executive Summary

The quick transition to a climate-neutral Europe and the digital revolution are altering how we work, learn, participate in society, and go about our daily lives. It is obvious that Europe cannot take advantage of these opportunities unless its citizens have the necessary skills. Many people need to change employment and pick up new skills in a different economic area. To keep their jobs in a changing workplace, more people will need to upgrade their skills. If there were new educational opportunities addressing these problems and offering cutting-edge trainings to address the shift to a resource-efficient, circular, digitalized, and climate neutral European economy, then entering the workforce for young people might be less challenging.

In order to meet the goal of making European economies and societies more sustainable, resilient, and ready for the possibilities and challenges of the green and digital transitions, new VET skills are essential. The CATALYST project "European VET Excellence Centre for Leading Sustainable Systems and Business Transformation" was created with a clear vision and the desire to support the implementation of the new industrial and SME strategies as well as the European Green Deal.

Athens University of Economics and Business (AUEB) and the Institute for Research in Environment, Civil Engineering and Energy (IECE), supported by all CATALYST partners (North Macedonia, Greece, Portugal, Austria and Germany), performed desk and field research aiming to tackle personal and organisational development, embrace transformation in SMEs, enable and inspire them to re-think and re-design their business models, co-create and share among educational and business organisations.

The desk work aimed to map the dominant European and national policies, sectoral trends and best practices in each country, while the field work was comprised of an online survey and interviews translated and conducted in local languages in the autumn of 2022. 504 professionals and SME representatives filled in the survey, while 64 of them participated in 1:1 interviews. The goal of the field study was to learn more about their actions and needs in terms of sustainability and governance, and to understand what skills are missing from the market.

The desk work summarizes the major international and national policies on innovation, entrepreneurship, and sustainability, while it also provides insights on the strongest sectors per country. Out of the five countries, only north Macedonia does not have a circular economy strategy yet, but all of them have developed National Smart Specialisation Strategies, National Energy and Climate Plans and some form of Sustainable Development Strategy. When it comes to the sectorial analysis and RIS priorities, we see that manufacturing together with food and agriculture, circular economy, energy, and digitalisation are dominating within those countries.

When it comes to the needs of the companies to cope with the sustainability trends, the survey revealed that although collaboration and partnerships, behavior change and sustainability values seem to be the most significant fields for the companies, the majority of the respondents agreed that they would need more trainings and upskilling on all presented sustainability areas showing more preference to sustainable business models, circular economy, sustainable practices and values as well as behavior change and collaborations. In order to address every issue raised in this study, CATALYST should make an effort to include topics such as an introduction to funding mechanisms,

the financial advantages of adopting early sustainable practices, or an explanation of the regulatory frameworks and how they relate to the day-to-day operations of the companies in their training plans. Additionally, it should work to increase awareness in order to a) persuade top management and shareholders to embrace sustainable practices and b) alter consumers' willingness to pay more for sustainable goods and services.

To validate the results of the surveys and interviews, CATALYST ran a series of national roundtables in the five countries. The national roundtables held in in November and December 2022 aimed to establish a dialogue between a diversified group of stakeholders including companies, educational institutions, public bodies and civil society organisations to discuss challenges and opportunities in the transition towards more sustainable practices. The national roundtables covered various elements including policies, laws and strategies, business aspects, and education for defining necessary skills. The challenges faced by companies in implementing sustainable practices included financial constraints, lack of human resources, resistance to change, and lack of regulatory uniformity.

Some of the key growth areas were management and analysis skills, problem-solving ability and sustainability matters including legislation. Recommendations from the workshops included a need for upskilling employees, promoting collaboration between different sectors, implementing policies to encourage cooperation and providing training to raise awareness about sustainability issues. The future development of courses within the CATALYST project should focus on changing mindsets towards sustainability, incorporating real-life examples, and demonstrating the benefits of sustainable practices.

To sum up, although everyone seems to be aware of the necessity to act, no big steps have been taken yet. There is a gap between the way of acting and the challenges which need to be overcome. Lack of time and money are the dominant challenges for a transformation to sustainable business models. Companies claim to have a higher interest in sustainability, but this needs to be put into action and monitored on a frequent basis. Only 26% of them measure their footprint and less than 10% conduct a sustainability report. The main obstacles to the transition to sustainable company models are found to be a lack of time and money.

*This report is produced under the **ERASMUS+ CATALYST**: **European VET Excellence for Leading Sustainable Systems and Business Transformation** project (Ref. number 101056114 — CATALYST — ERASMUS-EDU-2021-PEX-COVE).*

Acronyms

BAU	Business As Usual
CAP	Common Agricultural Policy
CE	Circular Economy
CSO	Civil Society Organisation
EGDIP	European Green Deal Investment Plan
EN-H2	National Hydrogen Strategy
ERDF	European Regional Development Fund
ESF+	European Social Fund Plus
EU	European Union
GDP	Gross Domestic Product
GDPR	General Data Protection Regulation
GHG	Greenhouse Gas
GVA	Gross Value Added
HTS 2025	High-Tech Strategy 2025
NECP	National Energy and Climate Plan
NGO	Non-Governmental Organisation
NNRP	National Recovery and Resilience Plan
NSSD	National Strategy for Sustainable Development
R&D	Research & Development
RES	Renewable Energy Sources
RIS3	Research and Innovation Strategy for Smart Specialization
SBA	Small Business Act
SDG	Sustainable Development Goal
SEIP	Sustainable Europe Investment Plan
SME	Small and Medium Enterprise
UN	United Nations
VET	Vocational Education and Training
VNR	Voluntary National Review

Table of Contents

Table of Figures

Table of Tables

Introduction

The rapid shift towards a climate neutral Europe and digital transformation is changing the way we work, learn, take part in society and lead our everyday lives. It is evident that Europe can only grasp these opportunities if its people develop the right skills. Many people need to acquire new skills and move to new jobs in a different sector of economy. More will need to upskill to keep their job in a new work environment. For young people, entry into the labour market could be very challenging if new educational offer is not made to tackle these issues and provide innovative trainings to answer the change to a resource-efficient, circular, digitalized and climate neutral European economy.

New VET skills are a key to success in order to achieve the vision of European economies and societies becoming more sustainable, resilient and better prepared for the challenges and opportunities of the green and digital transitions. The **CATALYST project** "European VET Excellence Centre for Leading Sustainable Systems and Business Transformation" is designed with strong vision and motivation to contribute to realisation of the European Green Deal and the new industrial and SME Strategies.

The main goal is to establish a unified CATALYST Center for Vocational Education Excellence (CoVE) in **five countries**, Austria, Germany, Greece, North Macedonia and Portugal, which will create educational programs to encourage personal and organisational development in order to facilitate the transformation of small and medium enterprises and encourage cooperation between educational and business organisations. The main focus is addressing sustainability from an organisational, social and economic perspective. Many new technologies are constantly being developed, but what is lacking in Europe is the strong support provided in the business sector to bravely accept the proposed changes and sustainability leadership to lead these processes.

The main project outputs are:

1. 5 CoVEs and CATALYST Network anchored the European VET eco-system;
2. 70 VET courses for up-skilling professionals and students (Enable component);
3. Co-create and disseminate applied knowledge inspiring business-education partnerships involving students, professionals and SMEs (Inspire component)'
4. Create CATALYST Platform which will unite all CoVEs on European level;
5. Implement VET trainings, pilot-project with SMEs and applied joint research projects in selected sectors according to the national S3;
6. Raise awareness of the potential CATALYST CoVEs have and increase the demand and attractiveness of VET.

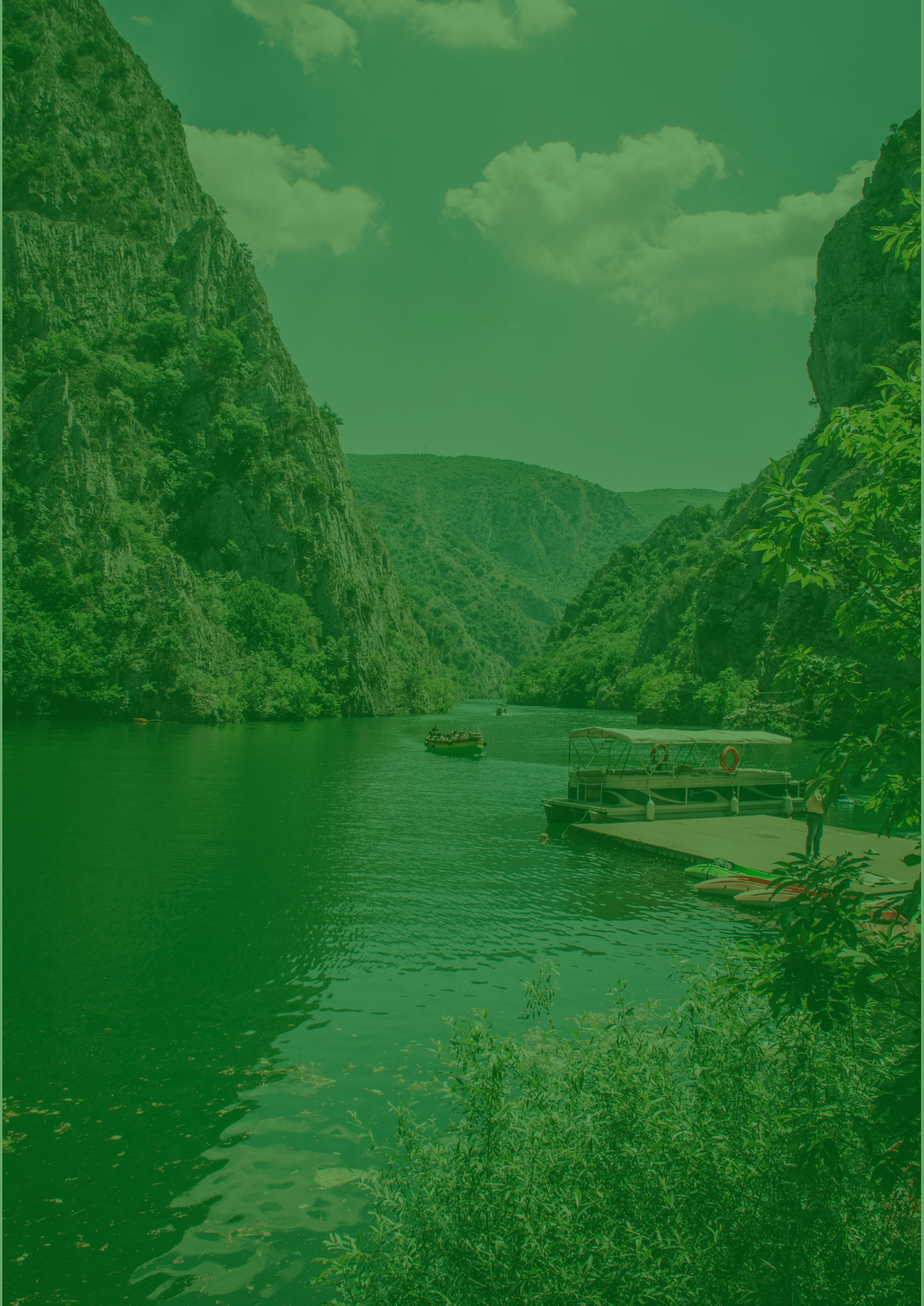
In the first five months of the project research for identifying the industry needs and challenges was conducted. The first part of this research included state of the art analysis and benchmarking of the industry trends in the field of sustainable management and leadership, and, on the other hand, to establish contact among interested SMEs, professionals, VET providers and business associations by creating the CATALYST Network of relevant stakeholders. The second part of this research involved field research, which analysed the needs of professionals and SMEs, assessed the challenges and

skills gap, and collected best practices from industry role-models. Based on the initial findings, six national roundtables were held in November and December 2022 in North Macedonia, Germany, Austria, Portugal and Greece.

Bianchi et al. (2022) define sustainability as *prioritising the needs of all life forms and the planet by ensuring that human activity does not exceed planetary boundaries*. Several European nations began to change their national curricula around the beginning of the 2000s, moving away from a knowledge-based approach to one that was more competency-based. Although there is broad consensus in the literature regarding the competencies required for sustainability (Brundiers et al., 2021), it remains the responsibility of individual institutions and local educational leaders to adopt and implement these competencies in lifelong learning programs. The research that has been done thus far has also tended to be at the higher education level, concentrating on the competencies that recent graduates and professionals need to have in order to contribute to sustainability challenges and opportunities.

Sustainability entails only cutting down as many trees as can be regrown rather than deplete raw materials for survival. In terms of society, this implies that each generation must address its own problems so as not to impose them on later ones. Everyone can contribute. Investors, producers, and consumers are the ones who decide on sustainability; it is not a matter of a sacrificial ethic. Instead, promoting production and consumption patterns that are resource-efficient and kind to the environment calls for vision, innovation, and technological expertise. To achieve this, everyone must actively participate in bringing about structural change, including workers and businesses, trade unions and business groups, universities, and research institutions. However, to meet the sustainability requirements, we need individuals, groups, and organisations that approach life with an entrepreneurial mindset in order to accomplish these goals.

This report seeks to present the foundations of personal and organisational development and embrace transformation in SMEs, enabling and inspiring them to rethink and re-design their business models, and co-creating and sharing among educational and business groups. It is structured in five sections. The first section discusses the international and European policy framework, the second provides a country overview in terms of national policies, sustainability achievements and economic growth. The third section presents the methodology and the results of our field study, conducted in five countries, while the fourth shows the results of the six roundtables conducted in the five CATALYST partner countries. Finally, the last section provides a set of best practices and recommendations for bridging the gap between the market and the universities through reformed training and new educational opportunities.



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The International and EU Policy Framework

Section 1: The International and EU Policy Framework

Governments from around the world decided to take a more sustainable path for our planet and our economy in 2015 by approving the Paris Agreement on climate change and the UN 2030 Agenda for Sustainable Development (UNFCCC, 2022; United Nations, 2022). The 17 Sustainable Development Goals are the cornerstone of the UN 2030 Agenda (SDGs). These objectives will serve as a roadmap for us as we work to prepare for a future that secures stability, a healthy planet, just, inclusive, and resilient societies, and successful economies during the next 15 years. The Paris Agreement is the first-ever universal, global climate agreement to keep global warming to far below 2°C and promote resilience to climate change, and it was signed by 195 countries in December 2015.

Sachs et al. (2019) introduced the six SDG Transformations, the fundamental tenet of which is the understanding that all 17 SDGs are achievable through six significant societal transformations, with a particular emphasis on: (1) education and skills, (2) health and well-being, (3) clean energy and industry, (4) sustainable land use, (5) sustainable cities, and (6) digital technologies. The dual guiding principles of "leave no one behind" and "guarantee circularity and decoupling" govern everyone. The six transformations offer a plan of action for enterprises, civil society organisations, and government agencies.

Urgent action is required to adjust public policy to this new reality as we are forced to deal with the catastrophic and unpredictable effects of climate change and resource depletion. The subsections below present the actions taken on the EU level to provide the policy and legislative framework as well as the financing mechanisms to support these transitions.

1.1. The first climate – neutral continent by 2050

The European Commission unveiled the **European Green Deal** on December 11, 2019, with the goal of making the European Union the first climate-neutral continent by 2050 (European Commission, 2019b). The effects of climate change and environmental degradation are most exposed to those who are most vulnerable, and policymakers are aware that there would be an irreversible fall in the economic production and employment levels for some economic sectors. All areas of the European Union's economy must take consistent action to meet this goal, including investing in environmentally friendly technologies; encouraging industry to innovate; implementing cleaner, less expensive, and healthier modes of private and public transportation; decarbonizing the energy sector; ensuring that buildings are more energy efficient; and collaborating with other nations to raise environmental standards internationally.

The European Green Deal's objective for a climate-neutral economy and society in Europe by 2050 is codified in the **European Climate Law** (European Union, 2021). The law establishes an interim goal of at least a 55% reduction in net greenhouse gas emissions from 1990 levels by 2030. Through 2050, the EU as a whole must achieve net zero greenhouse gas emissions, which will be accomplished primarily by reducing emissions, funding green technology, and preserving the environment. All EU policies must

support this objective, and all facets of the economy and society must participate, according to the legislation.

The law is written as a regulation rather than a directive, which is a crucial distinction to make. As a result, it won't be implemented separately in each Member State, increasing the possibility that the EU targets won't be met on time. At both the Union and national levels, specific legislative solutions will be put into place in accordance with the regulation, but, crucially, the European Commission will have tools to ensure that the targets are effectively achieved: first, through the monitoring mechanism that will allow it to advise member states on any measures they put into place, and second, through its right to legislative initiatives (as well as other actions).

Article 6(4) in particular seems to be the most significant because it will directly affect all future EU law. It stipulates that every draft EU legislation or legislative proposal, including financial measures, will be assessed by the European Commission to determine whether it is consistent with the objective of climate neutrality. If there is a discrepancy between the suggestions and the regulation, the European Commission should correct it. The regulation's climate aims will therefore be taken into consideration when drafting any future legislative measures that govern all economic sectors.

The passage of the European Climate Law, a key component of the European Green Deal, paves the way for future "green" legislative measures in the EU aimed at meeting the EU's climate goals. As was already said, legal entities are not subject to any specific requirements under the law. It does, however, anticipate further specific legislation at the national and Union levels that, over time, will place some requirements on the private sector as well. So, in the coming years businesses should expect regulations implying:

- the phase-out over time of energy subsidies, particularly for fossil fuels;
- the need to prepare for tighter government regulations for the reduction of greenhouse gas emissions;
- future access to the necessary tools and incentives to encourage the necessary investments;
- the opportunity to participate in public debates about energy and the environment, as well as the sharing of best practices for protecting the environment.

With the proposal of the master plan against greenhouse gas emissions, the "**Fit for 55" package,** which is a set of proposals to revise and update EU legislation and to put in place new initiatives with the aim of ensuring that EU policies are in line with the climate goals agreed upon by the Council and the European Parliament, the adoption of specific measures is already under way on the EU level (European Council, 2022). The "Fit for 55" package, which was published in two batches in July and December 2021, consists of draft EU climate and energy laws that will all help reduce greenhouse gas emissions by at least 55% in 2030 compared to 1990 levels. It contains proposed legislation for the following areas: energy taxation; renewable energy; land use and forestry (LULUCF); alternative fuels infrastructure; carbon border adjustment mechanism; social climate fund; EU emissions trading system; effort sharing regulation; CO2 emission standards for cars and vans; and energy efficiency Figure 1.

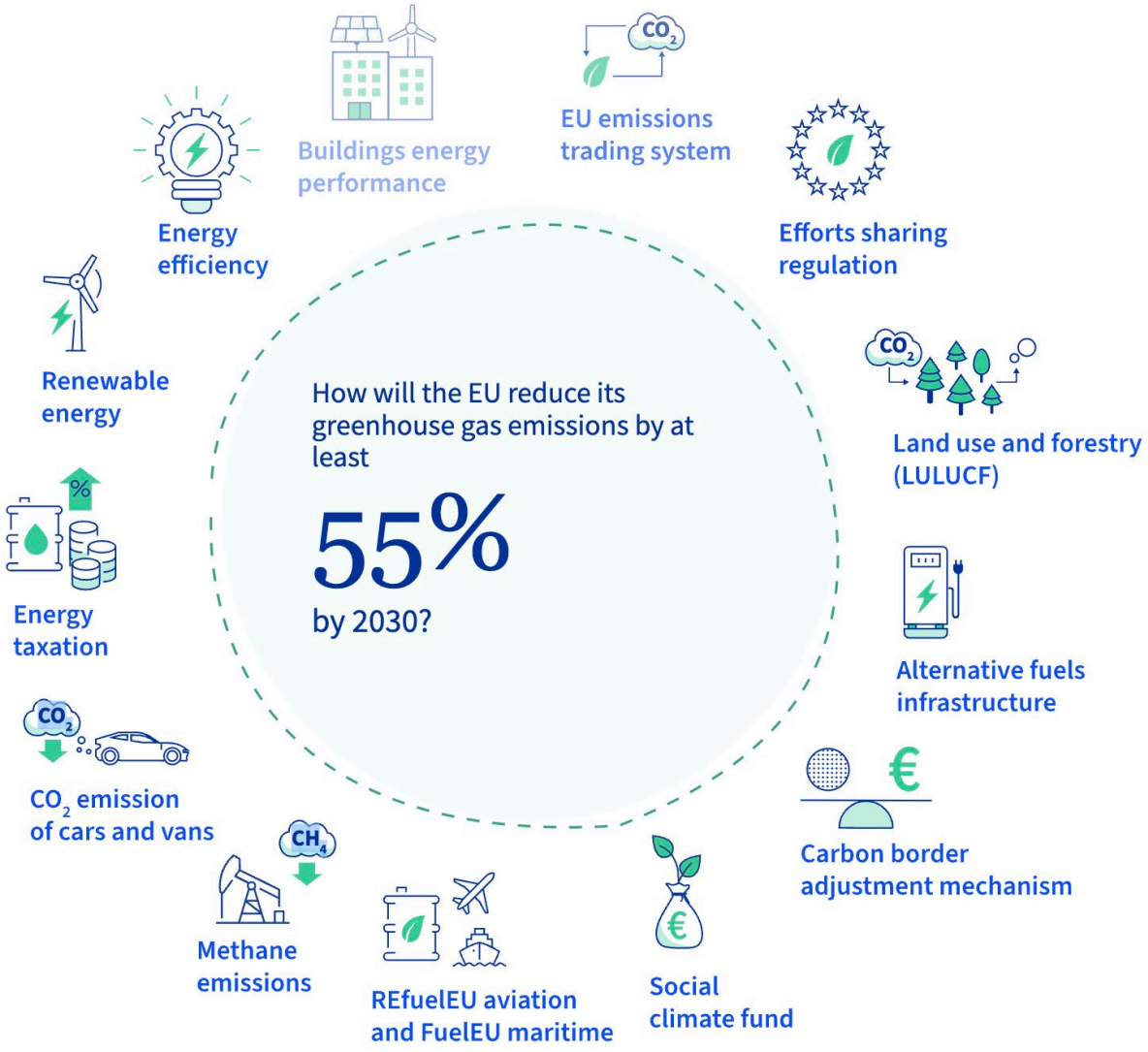

Figure 1 - Fit for 55 package (European Council, 2022)

The EU is the first continent to establish a binding legal framework to fulfil and go above and beyond the commitments made under the Paris Agreement upholding its promises to cut greenhouse gas emissions and give its people reliable, cheap, and sustainable energy. The EU Governance Regulation has established a distinctive system of energy and climate governance to enable the Union and its member states to jointly plan for and achieve the 2030 targets, as well as to ensure a just and affordable transition to a carbon neutral economy for all. The Sibiu Declaration underlined the Union's dedication to being a responsible global leader on climate change, while safeguarding our citizens, preserving our environment, and respecting the ideal of fairness.

EU members are required to create a 10-year integrated **National Energy and Climate Plan (NECP)** for the years 2021 to 2030 in order to satisfy the EU's energy and climate targets for that year. The final NECP was to be submitted to the Commission by the end of 2019 under the regulations established under the Regulation on the governance of the energy union and climate action (EU/2018/1999). The EU set three main goals: to raise energy efficiency by at least 32.5%, increase the share of renewable

energy sources to 32%, and reduce greenhouse gas emissions by 55% (relative to 1990 levels) (European Commission, 2019a). Table 1 summarizes the NECP targets of each CATALYST partner country.

Table 1 - NECPs targets per country

	EU targets	***NECP Austria***	***NECP Germany***	***NECP Greece***	***NECP N. Macedonia***	***NECP Portugal***
Lower GHG emissions compared to 1990 levels	**55%**	40%	55%	42%	82%	45-55%
Lowering GHG emissions compared to 2005 levels	**40%**	36%	38%	56%	78%	45-55%
Increase the share of RES in gross final energy consumption	**32%**	46-50%	30%	35%	38%	47%
Reduce primary energy consumption compared to 2007	**39%**	25-30%	30%	38%	34.5%	35%

Other relevant policies:

- Communication – REPowerEU Plan (COM/2022/230)
- Communication – EU "Save Energy" (COM/2022/240)
- Proposal for a directive amending the Renewable Energy, Energy Performance of Buildings and Energy Efficiency directives (COM(2022) 222)
- Proposal for a regulation on the deployment of alternative fuels infrastructure, and repealing Directive 2014/94/EU of the European Parliament and of the Council (COM (2021) 559)
- Proposal for a directive on energy efficiency (recast) (COM(2021) 558)
- Proposal for a council directive restructuring the Union framework for the taxation of energy products and electricity (COM(2021) 563)
- Directive (EU) 2018/2002 amending Directive 2012/27/EU on energy efficiency
- Directive (EU) 2018/2001 on the promotion of the use of energy from renewable sources
- Directive (EU) 2014/94 on the deployment of alternative fuels infrastructure

Besides energy decarbonization, one of the fundamental pillars of the European Green Deal, the new agenda for sustainable growth in Europe, is circular economy. The EU has adopted special policies for all types of packaging waste since 1994, such as the **Directive 94/62/EC**, a new revision of which is planned to be released in 2023. In 2018, the EU adopted the **European Strategy for Plastics in a Circular Economy**, which is based on the forecasted increase in plastic consumption and the urgency to tackle plastic pollution, especially of the marine environment. It stipulates that by 2030 all produced plastics must be reused, recycled or composted in a cost-effective manner and focuses on promoting various innovations for recyclable plastics (European Commission, 2018a).

In 2020, the European Commission launched a new **Circular Economy Action Plan** that is carried out at the European level. It introduces both legislative and non-legislative initiatives that are aimed at areas where EU intervention can actually contribute value (European Commission, 2020c). This strategy offers a long-term agenda for building a more competitive and environmentally friendly Europe in collaboration with business stakeholders, consumers, and civil society organisations and prioritizes the necessity for circularity in the way plastics are produced, used and discarded. It seeks to maximize new opportunities from the transition while minimizing constraints on people and enterprises. It also seeks to streamline the regulatory structure and make it sustainable.

When it comes to single-use plastics, the EU has set a target of 77% by 2025 and 90% by 2029 for the separate recycling collection of single-use plastic product waste (**Directive 2019/904**). In addition, single-use plastic products for which there are sustainable, easily available and affordable alternatives

(such as cotton bud sticks, cutlery, plates, straws, stirrers, sticks for balloons), but also food and beverage containers from expanded polystyrene and all single-use plastic products made of oxo degradable plastic, will be exempted from member countries' markets by 2021. Regarding plastic bags, the EU has adopted **Directive 2015/720** to deal with unsustainable consumption and use of lightweight plastic carrier bags with a thickness below 50 microns. The directive requires member countries to take special measures, such as national reduction targets of plastic bags, marketing restrictions (bans) and/or economic instruments (e.g. fees, taxes) (European Commission, 2015, 2019c).

1.2. Financing the transition to sustainability

The investment pillar of the European Green Deal, which was presented by the Commission to the European Parliament, the Council, the European Economic and Social Committee, and the Committee of the Regions on January 14, 2020, is known as the European Green Deal Investment Plan (EGDIP), also known as the Sustainable Europe Investment Plan (SEIP) (European Commission, 2020a). It is the financial branch of the European Green Deal, which was established to finance the transition of European economies to carbon-free energy sources (Figure 2). The Green Deal will mobilize at least €1 trillion in sustainable investments over the following ten years in order to accomplish its objectives.

Figure 2 - The European Green Deal Investment Plan (European Commission, 2020a)

Over the next ten years, a combination of money from the EU budget and investments from the public and private sectors will be able to mobilize at least EUR 1 trillion in the following ways:

- From 2021 to 2030, the European Union's budget for climate and environmental spending will provide 502 billion euros, resulting in 114 billion euros in additional **national climate and environmental co-financing**

- by offering a financial guarantee from the European Union to lower the risk of financing and investment activities, the **InvestEU Fund** will leverage approximately EUR 279 billion of private and public climate and environmentally-related investments during the period 2021– 2030
- the **Just Transition Mechanism** will receive funding from the European Union budget, co-financing from member states, as well as contributions from InvestEU and the European Investment Bank, to reach EUR 100 billion of investments to be mobilized over 2021–2027
- the **Innovation and Modernization funds**, which are not included in the EU budget but are supported by a portion of the proceeds from the auctioning of carbon allowances under the EU Emissions Trading System, will contribute about EUR 25 billion to the EU's transition to climate neutrality, with the Modernization Fund placing a particular emphasis on lower-income member states.

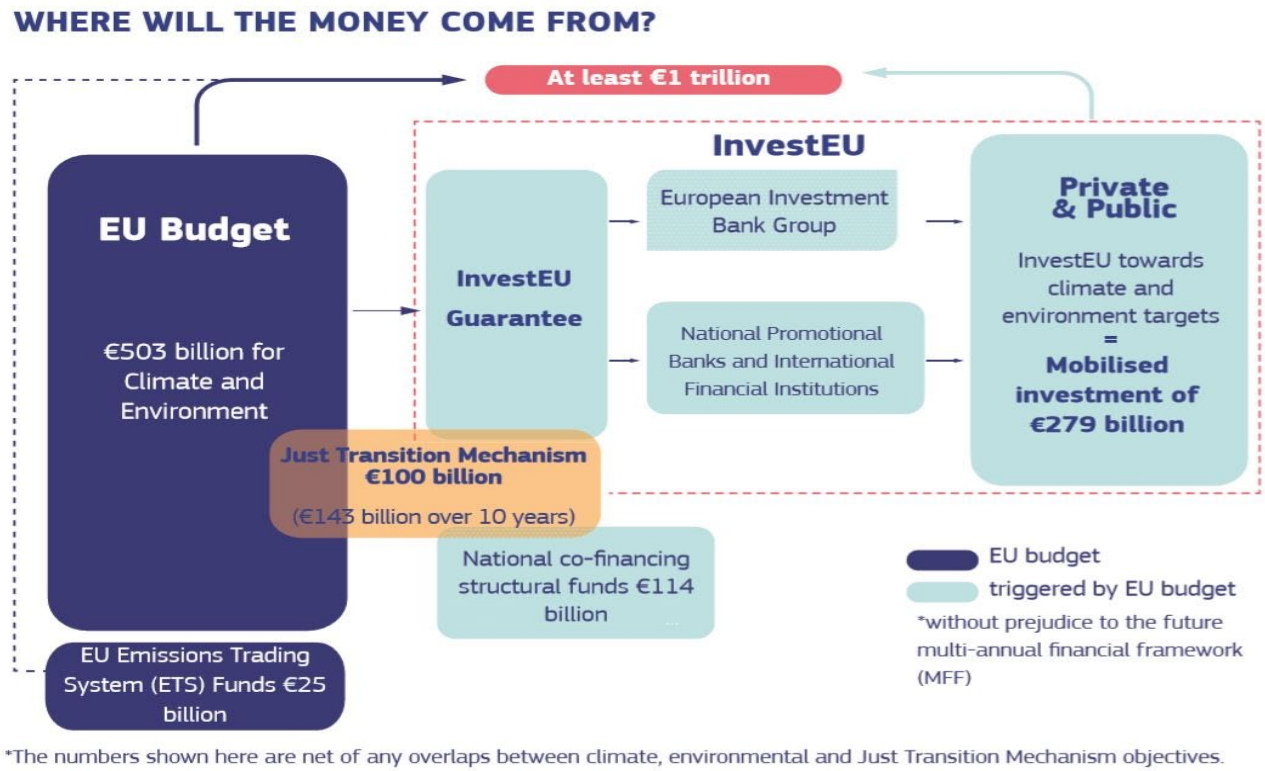

Figure 3 - The European Green Deal Investment Plan (European Commission, 2020a)

The Just Transition Mechanism will concentrate on the areas and industries that will be most impacted by the transition due to their reliance on fossil fuels or their industrial processes that produce a lot of greenhouse gases (European Commission, 2020b). Three pillars make up the Just Transition Mechanism: the ***Just Transition Fund***, which is implemented under shared management and is primarily used to provide grants; ***a special program under InvestEU*** to crowd-in private investments covering projects for energy and transport infrastructure, including gas infrastructure and district heating, as well as decarbonization projects; and ***a public sector loan facility*** through the EIB Group to encourage additional investments in the region (Figure 4).

The Just Transition Fund will prioritize reducing regional disparities while focusing on the economic diversification of the regions most impacted by the move toward climate neutrality. As a result, it is created within the framework of the EU Cohesion Policy and carried out through shared management in close coordination with stakeholders and local, regional, and national authorities. From their

resources under the European Regional Development Fund (ERDF) and the European Social Fund Plus (ESF+), member states supplement their Just Transition Fund allocation. This implies that the Just Transition Fund's overall budget will be more than EUR 30 billion and might even reach EUR 50 billion.

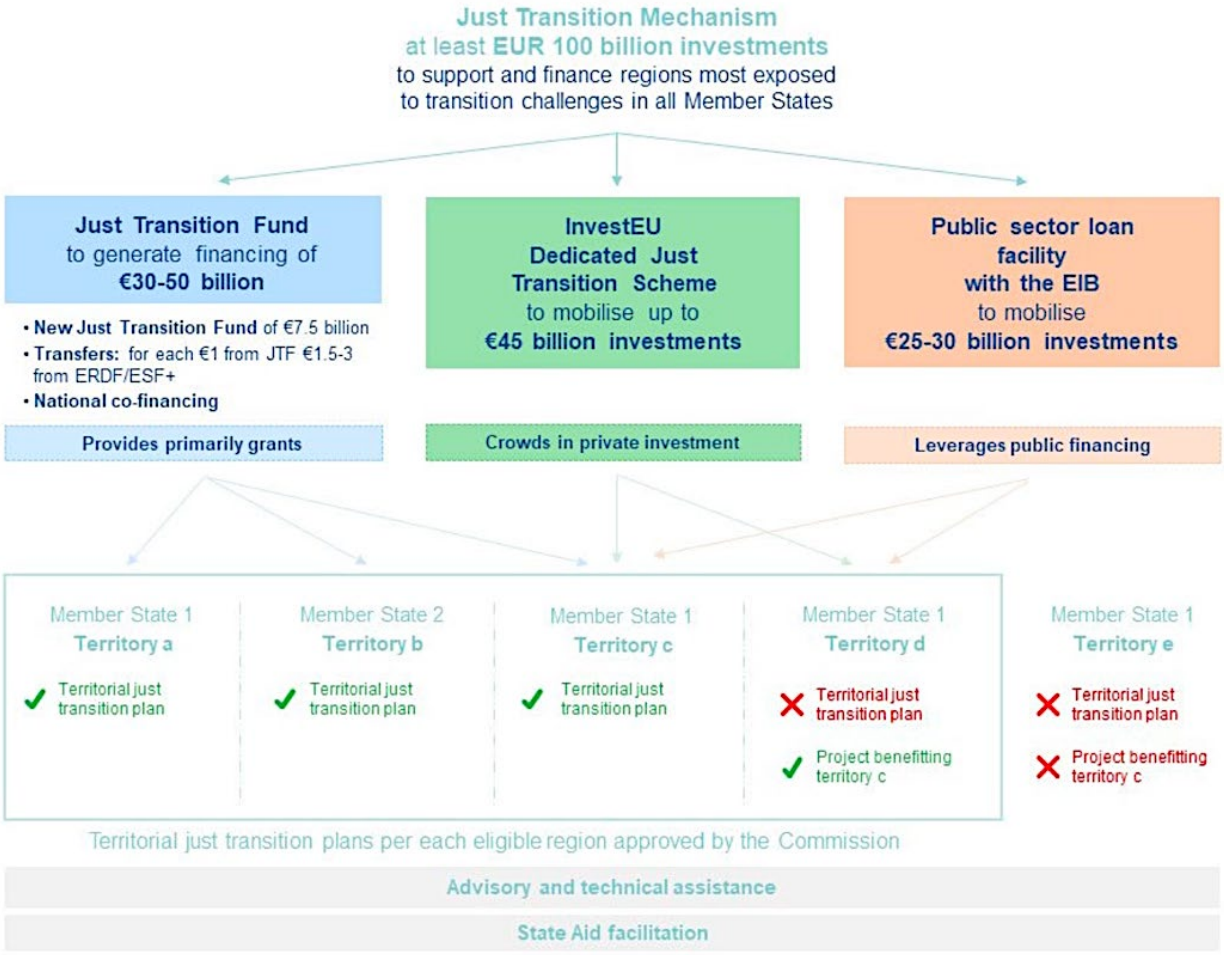

Figure 4 - Just Transition Mechanism over the 2021-2027 period (European Commission, 2020a)

The Just Transition Fund is programmed through the European Semester, with adherence to national energy and climate plans as a prerequisite. In addition to the InvestEU Advisory Hub and Jaspers, territories receiving support from the Just Transition Fund will also profit from a dedicated technical assistance facility through a customized package of measures utilizing all forms of support from the European Commission, the EIB, and other international organisations.

These tools build on the European Commission Action Plan on Sustainable Finance, which was adopted in March 2018, is currently being implemented with the help of a package of four legislative measures that were approved in May 2018, including those related to a unified EU classification system (or "taxonomy"), investor responsibilities and disclosures, low-carbon benchmarks, and better sustainability advice for clients (European Commission, 2018b). In order to achieve sustainable and inclusive growth, the Action Plan on Sustainable Finance has three main goals: (1) reorient capital flows toward sustainable investments; (2) manage financial risks associated with climate change, environmental degradation, and social issues; and (3) promote transparency and long-termism in financial and economic activity. It is in response to advice provided to the Commission by the High-Level Expert Group (HLEG) on Sustainable Finance in January 2018.

Sustainable finance measures, including the EU Taxonomy for classifying green investments, will contribute to the European Green Deal by boosting private sector investment in green and sustainable projects (European Union, 2020). The EU taxonomy is a classification scheme that creates a list of economically viable and ecologically sustainable activities. Companies, investors, and regulators have access to proper definitions of whether economic activities qualify as ecologically sustainable according to the EU taxonomy. This should provide security for investors, safeguard private investors from greenwashing, assist businesses in becoming more environmentally friendly, lessen market fragmentation, and assist in directing investments to areas where they are most needed. Establishing a classification system for the entire EU should have the effect of giving businesses and investors a standard vocabulary to express the level of environmental sustainability of their economic activity.

1.3. The European competence frameworks

As outlined in the European Green Deal, the **European Skills Agenda** helps people and businesses develop more essential skills (European Commission, 2020d). This five-year strategy, which began in 2020 and will end in 2025, aims to boost resilience, ensure that everyone has equal access to opportunities for upskilling, and promote sustainable competitiveness. Besides enhancing sustainable competitiveness, it ensures social justice by putting into practice the first principle of the European Pillar of Social Rights "access to education, training, and lifelong learning for everyone". It also builds resilience to respond to crises based on the lessons learned during the COVID-19 pandemic. The European Skills Agenda has 12 activities for this which are organised into four categories: collaborating, ensuring individuals have the appropriate skills for the work, supporting, and promoting. Table 2

Table 2 - European Skills Agenda (European Commission, 2020d)

A call to join forces in a collective action	Action 1: A Pact for Skills
Actions to ensure that people have the right skills for jobs	Action 2: Strengthening skills intelligence
	Action 3: EU support for strategic national upskilling action
	Action 4: Proposal for a Council Recommendation on vocational education and training (VET)
	Action 5: Rolling out the European Universities Initiative and upskilling scientists
	Action 6: Skills to support the twin transitions
	Action 7: Increasing STEM graduates and fostering entrepreneurial and transversal skills
	Action 8: Skills for life
Tools and initiatives to support people in their lifelong learning pathways	Action 9: Initiative on individual learning accounts
	Action 10: A European approach to micro-credentials
	Action 11: New Europass platform
A framework to unlock investments in skills	Action 12: Improving the enabling framework to unlock Member States' and private investments in skills

The European Skills Agenda is projected to increase the proportion of adults with basic digital skills, the participation of skilled workers in training programs, and the number of unemployed with recent training experience. By achieving these objectives, employees will be better equipped to respond to emergencies (as they did in the case of the COVID-19 pandemic), that all workers will have access to education, training, and lifelong learning, and that the acquisition of new skills will increase the sustainability of business competitiveness. A significant investment in talents is necessary for this to be feasible.

In 2022, JRC published a reference framework for competences related to sustainability, the **European sustainability competence framework – GreenComp**, seeking to bridge the gap between what sustainability entails and the knowledge, skills and attitudes professionals need to have to cope with the new era (Bianchi et al., 2022). Table 3 provides an overview of these competencies and their

definitions. This framework comes to complete the **EntreComp framework**, the European Entrepreneurship Competence Framework, developed three years earlier that aims to provide the milestones of entrepreneurial mindset including the knowledge, skills and competencies needed (European Commission, 2019d). EntreComp defines entrepreneurship as *the capacity to act upon opportunities and ideas and transform them into value for others. The value that is created can be financial, cultural or social.*

Table 3 - GreenComp areas, competences, and descriptors (Source: (Bianchi et al., 2022))

Area	Competence	Description
1. Embodying sustainability values	1.1 **Valuing sustainability**	To reflect on personal values; identify and explain how values vary among people and over time, while critically evaluating how they align with sustainability values.
	1.2 **Supporting fairness**	To support equity and justice for current and future generations and learn from previous generations for sustainability.
	1.3 **Promoting nature**	To acknowledge that humans are part of nature; and to respect the needs and rights of other species and of nature itself in order to restore and regenerate healthy and resilient ecosystems.
2. Embracing complexity in sustainability	2.1 **Systems thinking**	To approach a sustainability problem from all sides; to consider time, space and context in order to understand how elements interact within and between systems.
	2.2 **Critical thinking**	To assess information and arguments, identify assumptions, challenge the status quo, and reflect on how personal, social and cultural backgrounds influence thinking and conclusions.
	2.3 **Problem framing**	To formulate current or potential challenges as a sustainability problem in terms of difficulty, people involved, time and geographical scope, in order to identify suitable approaches to anticipating and preventing problems, and to mitigating and adapting to already existing problems.
3. Envisioning sustainable futures	3.1 **Futures literacy**	To envision alternative sustainable futures by imagining and developing alternative scenarios and identifying the steps needed to achieve a preferred sustainable future.
	3.2 **Adaptability**	To manage transitions and challenges in complex sustainability situations and make decisions related to the future in the face of uncertainty, ambiguity and risk.
	3.3 **Exploratory thinking**	To adopt a relational way of thinking by exploring and linking different disciplines, using creativity and experimentation with novel ideas or methods.
4. Acting for sustainability	4.1 **Political agency**	To navigate the political system, identify political responsibility and accountability for unsustainable behaviour, and demand effective policies for sustainability.
	4.2 **Collective action**	To act for change in collaboration with others.
	4.3 **Individual initiative**	To identify own potential for sustainability and to actively contribute to improving prospects for the community- munity and the planet.

Table 4 - EntreComp areas, competences, and descriptors (European Commission, 2019)

Area	Competence	Description
1. IDEAS & OPPORTUNITIES	**Spotting opportunities**	• Identify and seize opportunities to create value by exploring the social, cultural and economic landscape • Identify needs and challenges that need to be met • Establish new connections and bring together scattered elements of the landscape to create opportunities to create value
	Creativity	• Develop several ideas and opportunities to create value including better solutions to existing and new challenges • Explore and experiment with innovative approaches • Combine knowledge and resources to achieve valuable effects
	Vision	• Imagine the future • Develop a vision to turn ideas into action • Visualise future scenarios to help guide effort and action
	Valuing ideas	• Judge what value is in social, cultural and economic terms • Recognise the potential an idea has for creating value and identify suitable ways of making the most out of it
	Ethical and sustainable thinking	• Assess the consequences of ideas that bring value and the effect of entrepreneurial action on the target community, the market, society and the environment • Reflect on how sustainable long-term social, cultural and economic goals are, and the course of action chosen • Act responsibly
2. RESOURCES	**Self-awareness & self-efficacy**	• Reflect on your needs, aspirations and wants in the short, medium and long term • Identify and assess your individual and group strengths and weaknesses • Believe in your ability to influence the course of events, despite uncertainty, setbacks and temporary failures
	Motivation & perseverance	• Be determined to turn ideas into action and satisfy your need to achieve • Be prepared to be patient and keep trying to achieve your long-term individual or group aims • Be resilient under pressure, adversity, and temporary failure
	Mobilising resources	• Get and manage the material, non-material and digital resources needed to turn ideas into action • Make the most of limited resources • Get and manage the competences needed at any stage, including technical, legal, tax and digital competences
	Financial & economic literacy	• Estimate the cost of turning an idea into a value-creating activity • Plan, put in place and evaluate financial decisions over time • Manage financing to make sure your value-creating activity can last over the long term
	Mobilising others	• Inspire and enthuse relevant stakeholders • Get the support needed to achieve valuable outcomes • Demonstrate effective communication, persuasion, negotiation and leadership
3. INTO ACTION	**Taking the initiative**	• Initiate processes that create value • Take up challenges • Act and work independently to achieve goals, stick to intentions and carry out planned tasks
	Planning & management	• Set long-, medium- and short-term goals • Define priorities and action plans • Adapt to unforeseen changes
	Coping with uncertainty, ambiguity & risk	• Make decisions when the result of that decision is uncertain, when the information available is partial or ambiguous, or when there is a risk of unintended outcomes • Within the value-creating process, include structured ways of testing ideas and prototypes from the early stages, to reduce risks of failing • Handle fast-moving situations promptly and flexibly
	Working with others	• Work together and co-operate with others to develop ideas and turn them into action • Network • Solve conflicts and face up to competition positively when necessary
	Learning through experience	• Use any initiative for value creation as a learning opportunity • Learn with others, including peers and mentors • Reflect and learn from both success and failure (your own and other people's)

2

The socio-economic and policy framework of the CATALYST partner countries

Section 2: The socio-economic and policy framework of the CATALYST partner countries

The EU's growth plan for the years 2014 to 2020 was called Europe 2020. The Union specifically defined five goals to be accomplished by 2020 in the areas of employment, innovation, education, social inclusion, and climate/energy. As a crucial component of the proposed EU Cohesion Policy reform, the EU also asked its members to develop smart specialization (on strategies practice-based ('non-technological') innovation and knowledge and innovation adoption and diffusion). "**Smart specialization strategy**" is defined as "national or regional innovation strategies that set priorities to build competitive advantage by developing and matching research and innovation own strengths to business needs in order to address emerging opportunities and market developments in a coherent manner, while avoiding duplication and fragmentation of efforts" (European Commission, 2014).

For the purpose of concentrating economic development efforts and investments on each region's respective strengths, national and regional authorities around Europe were compelled to adopt Smart Specialization Strategies (RIS3). Priorities are determined by a bottom-up process known as the "entrepreneurial discovery process" that includes national or regional managing authorities, as well as stakeholders including universities and other higher education institutions, business, and social partners. This is backed up by 'strategic intelligence,' or information about the strengths, weaknesses, competitive advantages, and potential for excellence of a region. In this sense, policy recognizes the diversity of regional innovation and growth routes.

The first smart specialization strategy was issued on March 14th, 2014, and provisioned activities for the period 2014-2020. In brief, it recommends the following:

1. to concentrate investments and policy support on important national and regional goals, problems, and needs for knowledge-based development
2. to capitalize on the superiority potential, competitive advantages, and strengths of each nation or region
3. to encourage practice-based and technology innovation, with a focus on boosting private sector investment
4. to encourage experimentation and innovation among all parties
5. to include solid monitoring and evaluation systems that are evidence-based.

Smart specialization assists an area in being positioned in certain global markets/niches and global value chains by concentrating on what offers a region its greatest competitive potential. Among others, it allows addressing issues related to demographic change, resource efficiency, energy security, and climate resilience while placing specific regions in certain global markets, niches, and global value chains. Regions will be able to focus on areas of genuine potential and strength, adapt policies based on its capabilities, opportunities, and requirements and diversify into technologies, products, and services that are closely tied to the existing dominating technologies and the local skill base.

Smart specialization strategies, which enhance thematic concentration and reinforce strategic programming, were thus a crucial component of the EU Cohesion Policy overhaul. As an ex-ante conditionality for using available resources to strengthen research, technological development, and innovation, they were established by the General Regulation establishing Common Provisions on European Structural and Investment Funds (European Union, 2013). This was done so that the **European**

Structural Investment Funds (ESIF) could be used more effectively and synergies between various EU, national, and regional policies, as well as public and private investments, could be increased.

Through the adoption of Smart Specialization Strategies, the **EU Cohesion Policy** will spend the majority of its budget on advancing a "Smarter Europe" during the years 2021–2027. In order to respond to a number of new "enabling conditions," European regions must now update their smart specialization strategies. These conditions include current analysis of innovation diffusion bottlenecks, including digitalization; existence of capable institutional bodies responsible for managing the strategies; monitoring and evaluation tools to measure objective performance; efficient operation of the entrepreneurial discovery process; and actions to improve national infrastructure.

In terms of innovation, a key component of the European policy framework for sustainable consumption and production is the **Eco-Innovation Action Plan.** Eco-innovation is crucial in assisting this shift to a circular economy and meeting the goals of the European Green Deal since it reduces environmental consequences, boosts resilience against external pressures, and makes better use of resources. The 8th Environment Action Programme of the EU expedites the shift to a regenerative economy that gives back more to the planet than it consumes, especially "through continuous innovation, adaptation to new challenges, and co-creation," supporting the environment and climate action goals of the European Green Deal. The biennial thematic report outlines successful eco-innovation strategies, motivators, and barriers to assist a circular industrial transformation.

The circular economy idea brings together many of the objectives of the Eco-Innovation Action Plan, and many useful instruments have been created to promote eco-innovation. An **Eco-innovation Scoreboard** collects information on eco-innovation performance within the EU and outside of it, assisting in tracking and assessing advancements made since 2010 (European Commission, 2023). Out of the five countries, only North Macedonia does not have a circular economy strategy yet, while all of them have developed National Energy and Climate Plan and some form of Sustainable Development Strategy.

Table 5 and Figure 5 show the economic profile of the five CATALYST partners. Although the numbers differ significantly among the countries, the services sector is responsible for more than the 62% of the GDP (in North Macedonia it is 56.85%) being followed by the industrial and the agricultural sectors. Greece, North Macedonia and Portugal's economies depend less on their industries and more on the agricultural sector in comparison with northern countries, such as Germany and Austria, that also have some of the highest GDP per capita in Europe.

Table 5 - Country profile (source: https://www.worldometers.info/gdp/gdp-by-country/)

	Austria	Germany	Greece	North Macedonia	Portugal
GDP	$417 billion	$3.693 trillion	$203 billion	$11.28 billion	$219 billion
Population	8,819,901	82,658,409	10,569,450	2,081,996	10,288,527
GDP per capita	$47,261	$44,680	$19,214	$5,418	$21,316
GDP growth	3.04%	2.22%	1.35%	0.24%	2.68%

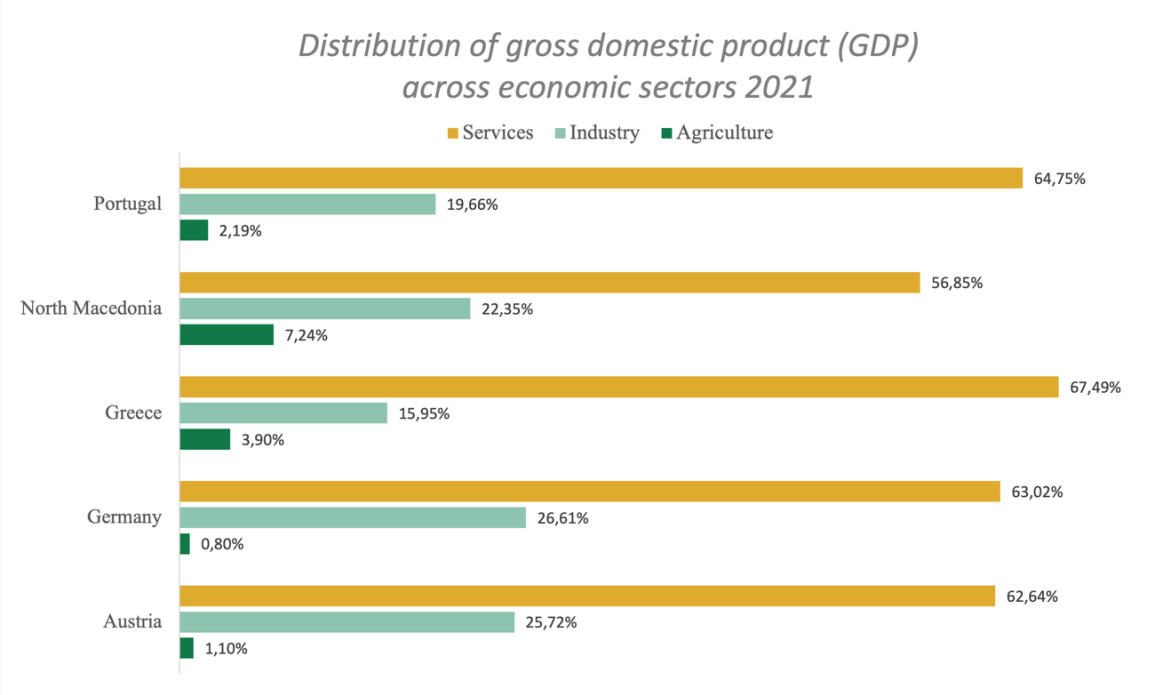

Figure 5 - Distribution of gross domestic product (GDP) across economic sectors in 2021 (source: www.statista.com)

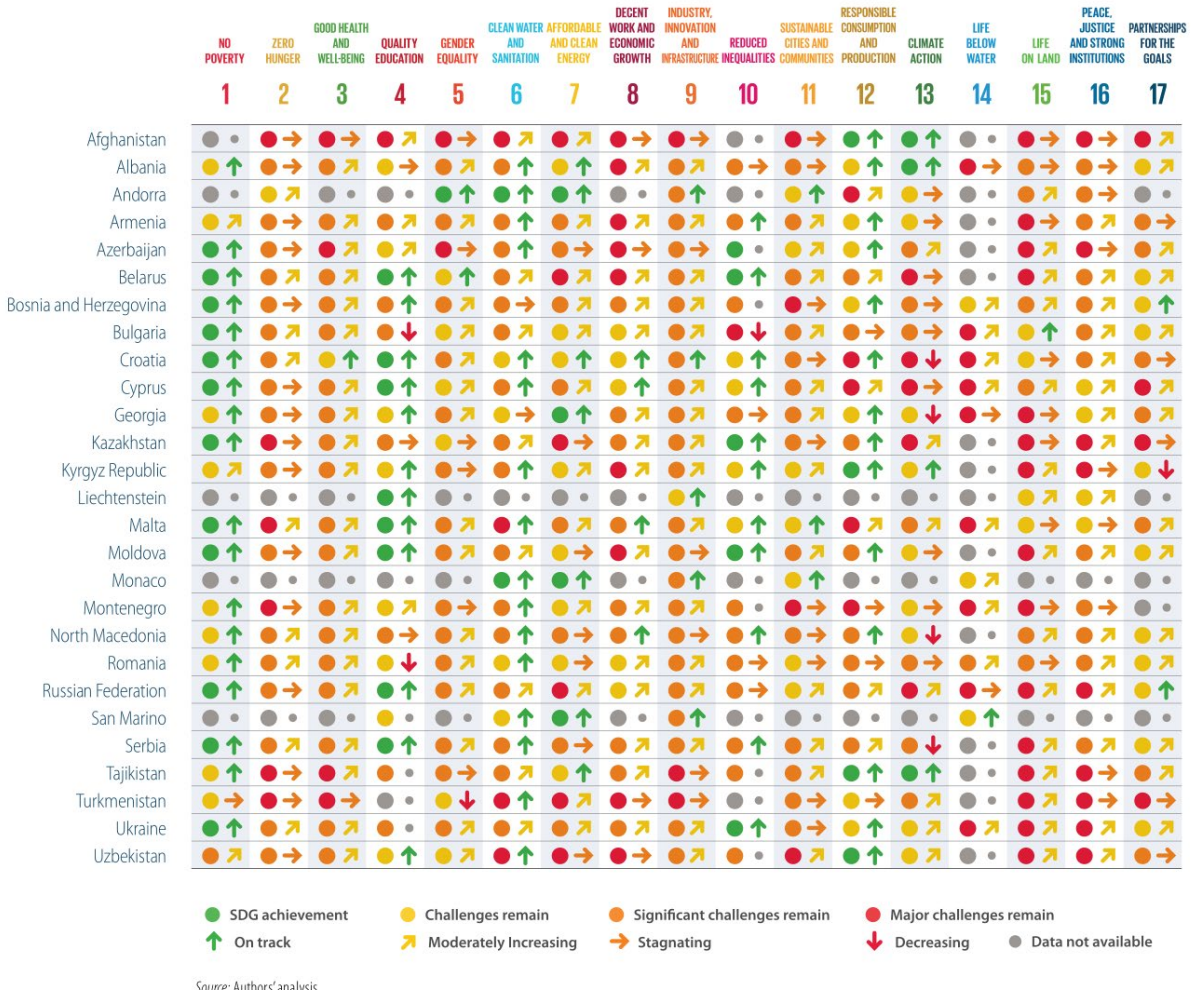

Figure 6 - 2022 SDG dashboards for Eastern Europe and Central Asia (levels and trends). Source: (Jeffrey Sachs et al., 2022)

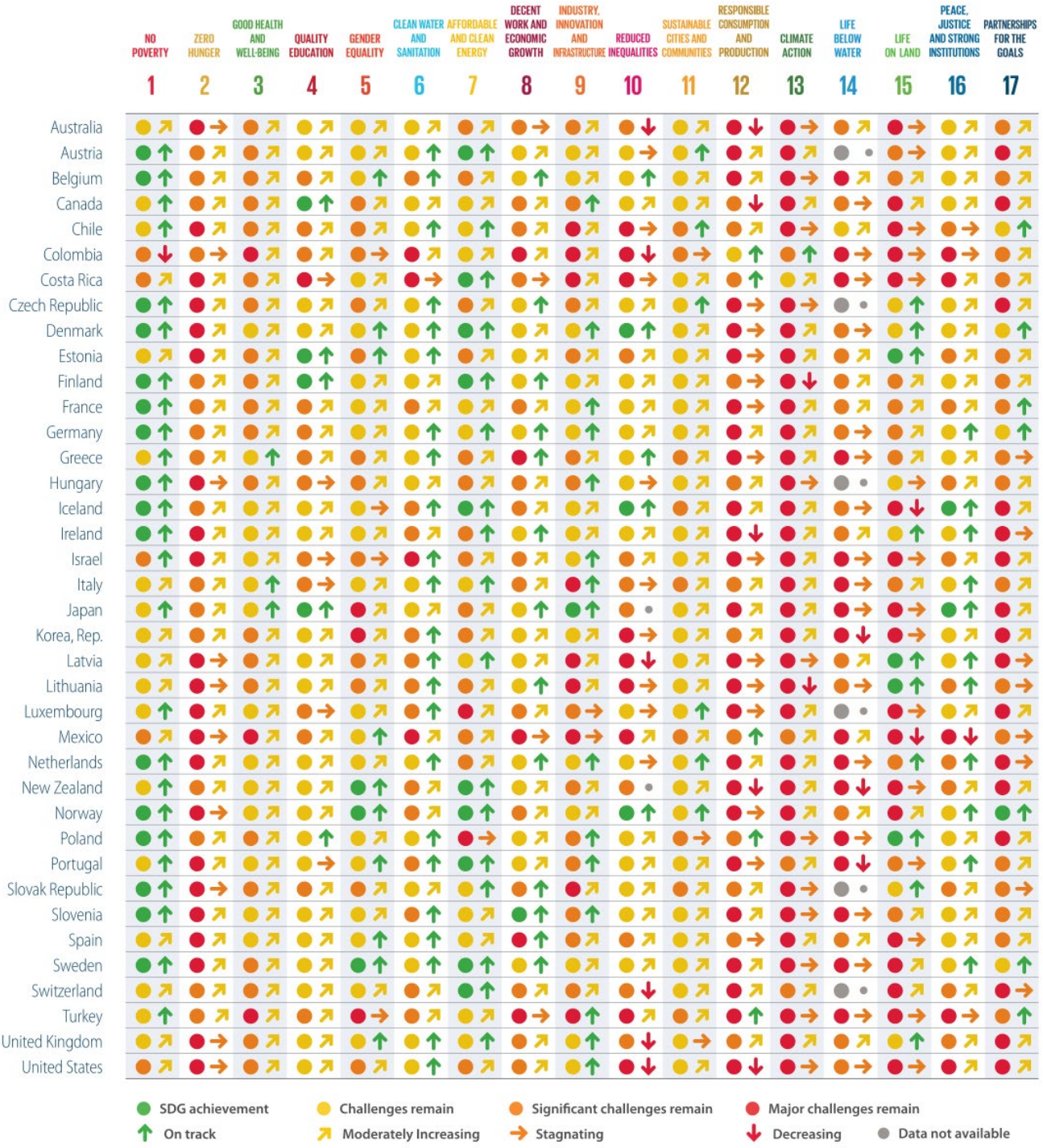

Figure 7 - 2022 SDG dashboards for OECD countries (levels and trends). Source: (Jeffrey Sachs et al., 2022)

In terms of sustainable development, low- and lower-middle-income countries (LICs and LMICs) are generally the ones with the highest SDG gaps. This is primarily caused by a lack of the human, digital, and physical infrastructure (schools, hospitals) required to manage major environmental concerns and fulfil the socioeconomic goals (SDGs 1-9). For years, ongoing wars in some nations have resulted in subpar and declining performance on the majority of SDGs, while the pandemic stalled years of advancement towards eliminating extreme poverty. The conflict in Ukraine poses a threat to global food security, notably in nations already struggling to meet SDG 2 (No Hunger). Figure 6 and Figure 7 present the progress of Eastern Europe, Central Asia and OECD countries in terms of the SDGs levels and trends.

2.1. Austria

2.1.1. Policy framework of Austria

Research & Innovation and Economic Growth

The goal of **Smart Specialization in Austria** is to increase growth and competitiveness over the long term. The idea of "Smart Specialization" has led to the development of a new generation of business location strategies that specify thematic investment priorities for those areas where certain strengths, competencies, and development potentials hold the potential to strengthen the local economy and society. They are founded on innovation and global market success, empowering it to meet present and upcoming problems. The notion is thought to have long-term promise for Austria in the encouragement of a new knowledge-driven location policy (Gruber & Handler, 2016). The process of "entrepreneurial discovery" is a crucial component. The following considerations are made when putting S3 techniques into practice. It has to be open with respect to process design, content and innovation and take into consideration the framework conditions.

The 2014-2020 RIS3 set the following priorities (JRC, 2022a):

- ***Life sciences***
- ***Service innovations and tourism***
- ***Bio-Economy and sustainability***
- ***Information and communication technologies***
- ***Intellectual, social and cultural sciences***
- ***Climate change***
- ***Material sciences and intelligent manufacturing***
- ***Quality of life***

As one of the largest metropolises in the EU, Vienna aspires to be a role model for innovation, resource conservation, and quality of life in Europe. Vienna will draw on its already-existing strong areas, including its capabilities in business, administration, research, and civil society, to achieve this goal. It is intended to start annual strategy implementation procedures for Vienna's sustainable development as a center of innovation and business over the next ten years. It will be feasible to meet current needs through tangible flagship projects and, if necessary, modify the strategic objectives to new difficulties through these processes.

The "**VIENNA 2030 - Economy & Innovation**" strategy builds on Vienna's advantages as a commercial destination and makes use of its potential and covers the period 2019-2030. The goal is to present "Viennese solutions" to address the major issues of the upcoming years, such as climate change and digitalization. In these and other areas, Vienna aspires to be a global leader. All Viennese citizens are to enjoy prosperity and a good standard of living, and the city is doing this through creating high-skilled jobs and first-rate infrastructure (City of Vienna, 2019). The six theme areas that make up the "VIENNA 2030" strategy expand on the city's current advantages. The following domains of leadership aspire to become highly visible, internationally competitive fields by 2030:

- Smart solutions for life in the 21st-century city
- Vienna as a metropolis of health
- Digitalisation, Viennese-style

- Smart production in the big city
- place of international encounter
- Vienna - a metropolis of culture and creativity

Nine states make up the Federal Republic of Austria. In 2016, the state of Styria published its economic strategy for the period 2016 – 2025 (**Economic Strategy Styria 2025**). By 2025, the area is to be a benchmark for intelligent change and development toward a society based on knowledge-based manufacturing, with a definite commitment to growth based on resource-sustainable use. The two most important skills for the future are knowledge and innovation capacity. The five fundamental strategies (see
Figure 8) that make up the strategic objectives are used to implement the three performance functions. These goals serve as the foundation for the Ministry of Economic Affairs' short- and medium-term planning and operational programs. They also serve as a guide for external important actors who support regional and national economic growth.

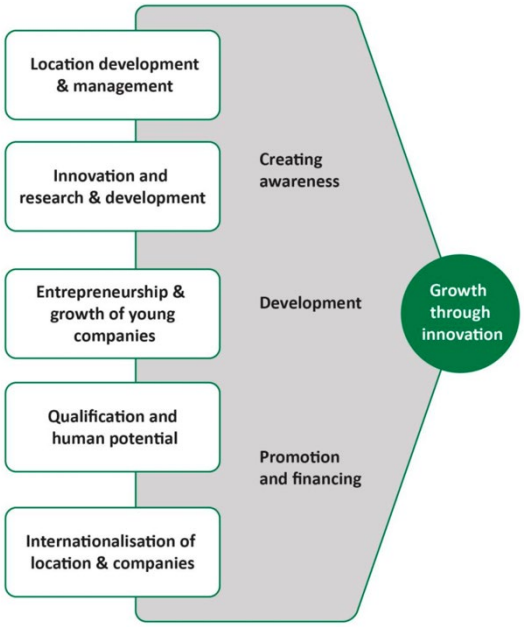

Figure 8 – Elements of the Styrian economic strategy 2025 – Growth through innovation. Source: (Styrian State Government, 2016)

In addition, activities in five key domains are provided by the **Energy Strategy of Styria 2025:** Energy infrastructure, district heating and cogeneration, renewable energies, energy efficiency and energy savings, space planning and mobility, research and education, and energy consulting (Steiermarkt, 2016).

In April 2021, the **Austrian Resilience and Recovery Plan** was submitted. The plan's overarching goal is to strengthen Austria's transition to a greener and more digitalized economy and society while addressing its current economic, ecological, and social flaws. Investments are therefore planned to support the economic and social recovery in education, research, the economy, and sustainability. The planned promotion of sorting facilities is one illustration specifically connected to the circular economy. Grants totalling €3.46 billion will help the achievements of these goals. The strategy will support climate goals to the tune of 59% and the digital transition to the tune of 53%.

Sustainable Development

Austria has had its own sustainability strategy since 2010 (**Austrian Strategy for Sustainable Development**), supported by the Federal Provinces and the Federal Government (Federal Government of Austria, 2010). The strategy is based on the goals and guiding principles of the EU Sustainable Development Strategy, the National Strategy for Sustainable Development of the Federal Government (NSTRAT 2002), and the strategies and programs for sustainable development of the Federal States. It also draws inspiration from the United Nations Millennium Development Goals. Policymakers and administrators are its main objective, and a work schedule has been created for the strategy's execution over a number of years.
The Austrian Strategy for Sustainable Development serves the federal government and the states as a joint orientation and implementation framework on the way to a sustainable Austria. The federal government and the states are committed to the guiding principle "*to create and maintain an Austria that in the long term will have an intact environment, economic performance and social cohesion*

without violating intergenerational justice or shirking global responsibility". The following difficulties should be overcome by initiatives and activities: protecting the environment and the natural systems that support life; achieving the employment goals; ensuring a high level of social security and social cohesion; countering demographic trends with adequate measures; increasing Austria's attractiveness as a business location and its internationally competitive and innovative economy; understanding and using globalization as an opportunity; and shaping it in a way that is environmentally and socially acceptable.

Since its implementation in 2010 several initiatives and programs have been developed and implemented that have a widespread impact on the general public in Austria, some examples:

- Green Events Austria - Anchoring sustainable event organisation in the event industry
- Austrian Sustainability Action Days - Austria-wide initiative that takes place once a year over a period of about ten days and puts the commitment for a sustainable development in Austria in the limelight
- Initiative Bewusst Kaufen - The initiative "Buy consciously - live climate-friendly" draws attention to sustainable consumption issues and helps consumers to live in a climate-friendly manner
- Initiative "Growth in Change"- initiative to invite people from institutions, organisations and companies to engage with questions about growth, prosperity and quality of life.

Austria was one of the first EU countries to establish a detailed action plan for the implementation of specific action recommendations in 2012, together with a strategic approach to climate change adaptation. The updated strategy was accepted by the Conference and the Council of Ministers in August 2017.The **Austrian strategy for adaptation to climate change** targets 14 areas of action, these are: Agriculture, Forestry, Water Resources and Water Management, Tourism, Energy – Focus on the Electrical, Industry, Protection from Natural Hazards, Construction and Housing, Disaster Management, Health, Ecosystem/Biodiversity, Transport Infrastructure Including Aspects of Mobility, Spatial Planning, Business/Industry/Trade and Cities – Urban Green and Open Spaces (Republic of Austria, 2017).

In December 2019, Austria adopted its **National Energy and Climate Plan** (NECP) seeking to achieve the Sustainable Development Goals in the areas of greenhouse gas reduction, renewable energy, energy efficiency and security of energy supply by 2030 (Republic of Austria, 2019). Specifically, it aims to:

- Reduce greenhouse gas (GHG) emissions by more than 40% compared to 1990 levels and more than 36% compared to 2005 levels by 2030.
- Increase the share of renewable energy sources (RES) in gross final energy consumption, with a target from 46% to 50%.
- Reduce primary energy consumption by 25-30% compared to 2015 levels.

Numerous recent initiatives have been made in the direction of a circular economy, and Austria issued its first draft of a **National Circular Economy Strategy** in December 2021. Reduced home material consumption, increased resource efficiency in the Austrian economy, increased use of reusable resources, and a reduction in household material consumption are its key goals (Republic of Austria, 2021). The goal of the plan, which adheres to the guidelines of the European Union's Circular Economy Action Plan, is to establish a sustainable and circular economy throughout the entire supply and value chain. Specifically, it aims at:

- Goal 1: Reduce resource use by 2030, domestic material consumption (DMC) will be 25% less, at 14 t/cap/a; and by 2050, cut the material footprint (MF) by 80%, to 7 t/cap/a.
- Goal 2: By 2030, double domestic resource productivity.

- Goal 3: By 2030, raise the circularity rate to 18%.
- Goal 4: By 2030, cut private home material usage by 10%.

2.1.2. Sustainability performance of Austria

In terms of sustainability, Austria is ranked 5th globally with 82.3/100 score (Jeffrey Sachs et al., 2022). Austria submitted a Voluntary National Review (VNR) in 2020, has integrated the SDGs into sectoral action plans and a national strategy on sustainability and included them in the national budget. In 2022, Austria achieved SDG1 "No poverty", SDG7 "Affordable and clean energy", while is on track to achieve SDG6 "Clean water and sanitation", SDG11 "Sustainable cities and communities". No data were available for SDG14 "Life below water", while for SDG12 "Responsible consumption and production" SDG13 "climate action", significant challenges remain.

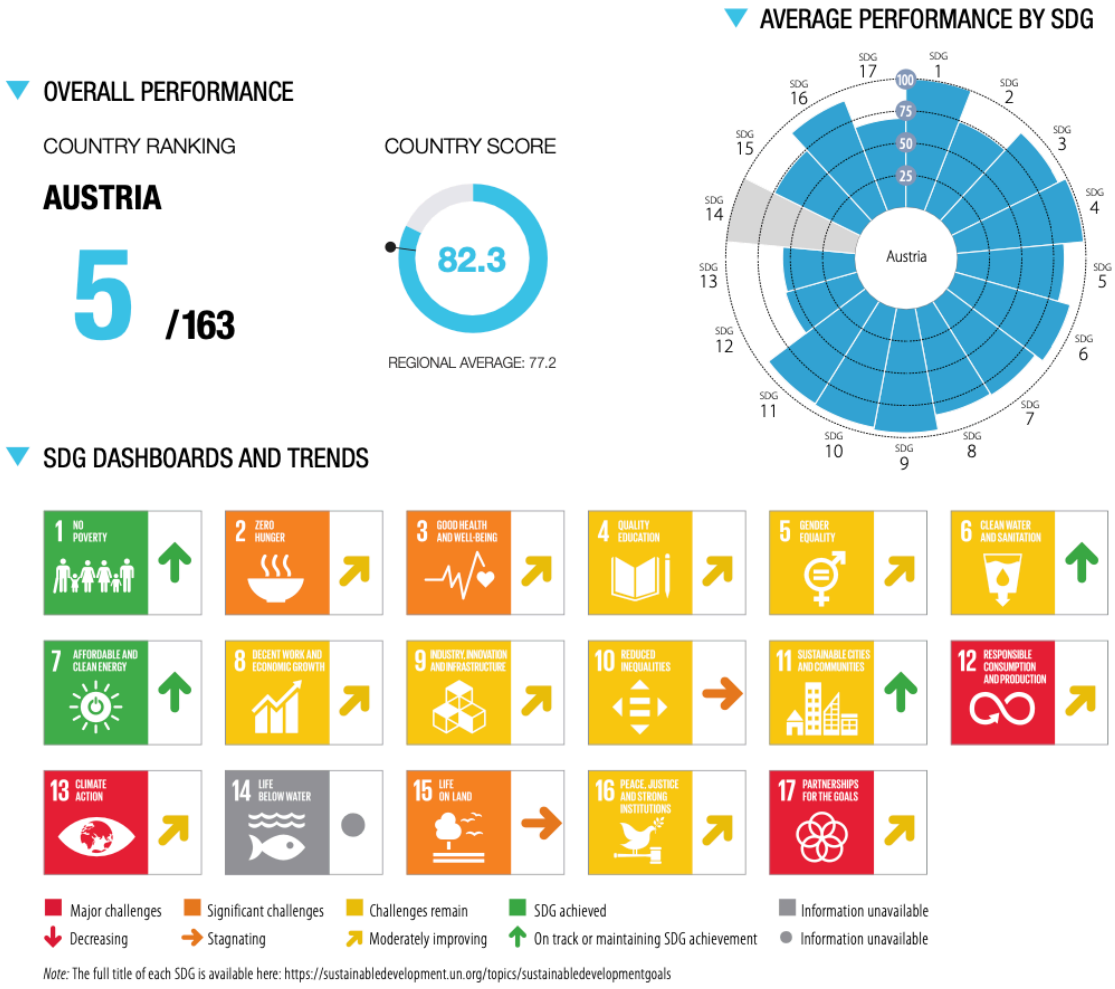

Figure 9 - Sustainability performance of Austria, 2022 (Jeffrey Sachs et al., 2022)

The Eco-Innovation Leaders group includes Austria. Over time, performance in comparison to the EU has improved. In terms of the three circular economy (CE) dimensions, Austria performs around average compared to the EU. While Austria has relative deficiencies in eco-innovation activities, it has relative strengths in socioeconomic outcomes. Eco-innovation related to academic publications and employment in environmental protection and resource management activities has the best performance among eco-innovation indicators. The quantity of ISO 14001 certifications and patents pertaining to eco-innovation have the worst performance as eco-innovation indicators (Kaltenegger & Niederl, 2022). According to CE measures, Austria does relatively well in terms of business operations

and somewhat poorly in terms of society behaviors. The number of EPR programs and information that is easily accessible to aid in obtaining funding for initiatives related to the circular economy rank as the strongest performing CE metrics. The number of businesses engaged in the repair of computers, personal and household products, along with the proportion of employees engaged in such repair, are the CE indicators with the worst performance.

2.1.3. Austria's sectorial analysis

With $417 billion GDP and 8.8 million people, Austria ranks among the richest countries in the world The dominant cornerstones of the Austrian economy are its industry, public administrations, including education, health, and social services, as well as trade. When comparing the federal states, the extraordinary importance of the service sector in the federal capital, Vienna, stands out. Upper Austria hasa strong industrial, while Burgenland has a strong agricultural sector.

The following industries prove to be the most significant business sectors when considering Austria's gross value added in each of the separate sectors in 2021. The gross value added in Austria's manufacturing sector, which includes mining, was around 67.9 billion euros in 2021. This amounts to 18.8% of the overall value added and represents a price-adjusted growth of 8.8% from the previous year. This industry had the biggest gross value added, followed by trade (12.2%), public administration, education, health, and social work (18.2%), and around 65.72 billion euros (18.2%). The value added in real estate and housing was almost 37.03 billion euros (10.3%), while the value added in other economic services was roughly 36.49 billion euros (10.1%). Table 6 presents the sectors with the greatest added valued to the GDP (Statista, 2021).

Table 6 - Dominant economic sectors in Austria (source: www.statista.com)

	Manufacturing sector	***Construction sector***	***Trade sector***	***Accommodation and gastronomy***	***Other economic services***
Total number of companies	25,800	38,400	80,000	45,300	18,600
Total number of employees	316,000	263,700	435,300	298,300	137,100
Apprentices	12,200	15,500	14,100	6,900	1,100
Turnover (net)	70 Bn. Euro	42 Bn. Euro	202 Bn. Euro	20 Bn. Euro	17 Bn. Euro
Gross value added at factor cost	22 Bn. Euro	15 Bn. Euro	26 Bn. Euro	10 Bn. Euro	9 Bn. Euro

The subsections below present the following industries/sectors:

a) *Manufacturing sector*
b) *Automotive industry*
c) *Metal industry*
d) *Construction industry*
e) *Chemical industry*
f) *Healthcare*
g) *Tourism sector*

A. Manufacturing industry in Austria

This statistic shows the turnover of the manufacturing industry in Austria in the years from 2012 to 2018 and a forecast by Statista until the year 2025 (in billions of euros). According to the forecast, turnover will be around 265.37 billion euros in 2025. Industry creates the future, and the people in the country benefit from it. Almost half of all research expenditures in Austria come from industry. In addition, companies that invest heavily in research and development have three times the employment growth and up to 17 times the export rate of other companies (Statista, 2023c). In 2020, the manufacturing industry in Austria generated a turnover of around 217.4 billion euros; this was, due to the Corona pandemic, less than in the previous year. The most important single sector is the metalworking industry with approximately 36.7 billion euros. The value-added share of the manufacturing industry (incl. mining) was 18.1 % of the total economy. Although this makes it the second most important sector of the economy, its importance has steadily declined in recent years. The approximately 678,000 people in employment make up 15.8 % of all workers; in relation to the industrial sector as a whole, this is almost 1.1 million people and a share of 25.1 %. 53 % of Austria's GDP is generated by exports. The manufacturing sector (excluding construction) generates 57 % of its turnover from exports. Goods worth more than 15,000 euros per inhabitant are exported annually. Foreign trade directly and indirectly secures jobs for about 1.7 million people. Every one percent increase in exports means 10,000 new jobs.

Skilled workers are urgently needed; demographic development and the trend towards higher education mean that skilled workers will be increasing sought, or alternatives need to be considered (e.g. individual upskilling of existing HR). Education to enter the manufacturing sector may start in the vocation-oriented qualification stream the Austrian education system offers, or as late as at HE level. There are numerous qualifications offered in the manufacturing industry. In general, apprenticeship training is important in the industry sector: with about 14,000 apprentices, it is one of the largest elements in the country. Domestic industrial companies spend an average of around 104,000 euros on high-quality apprenticeship training and thus on the future of a young person, which is more than any other sector of the Austrian economy.

B. Automotive industry in Austria

The automotive industry is one of the most important industrial sectors in Austria. In addition to the production of cars, the other main products in this industry manufactured in Austria are bicycles, motorcycles, commercial vehicles, rail vehicles and aircraft and spacecraft. In addition, there is the production of engines and transmissions as well as car chassis and superstructures and similarly this applies to engines and transmissions as well as the manufacture of trucks and semitrailers. Examples: vehicles from Mercedes, BMW, Jaguar and Toyota have been produced at Magna Steyr; KTM manufactures the X-Bow sports car in Austria. Among others, BMW and MAN are represented with their own plants in Austria. Other internationally successful companies with manufacturing operations in Austria include Rosenbauer AG (manufacturers of fire fighting vehicles) and the Schwarzmüller Group (producer of towed commercial vehicles).

The value of goods produced in Austria for agricultural and forestry machinery and rail vehicles was also at a high level. (For example, in the production of rail vehicles, the value increased significantly to around 2.2 billion euros in 2020; the bicycle sector also increased its production again in 2020.) The

manufacturing of motor vehicles and parts generated sales of around 16.05 billion euros in 2020 in Austria. The total vehicle manufacturing industry in Austria generated approximately €20.67 billion. While the production volume in industry has doubled in the last 20 years, production in the vehicle industry has almost tripled in the same period. The vehicle sector remains a key industry and a multiplier for the overall economy. Including suppliers as well as upstream and downstream economic sectors, every ninth job in the Austrian economy depends on this sector. While employment in the industrial sector has increased by around 3% since 2000, + 56% additional jobs have been created in the vehicle industry over the same period.

In Austria, around 37,700 people were employed in the manufacturing of motor vehicles (or parts) in 2020 (of a total appr. 51,000 people in vehicle manufacturing.) In 2020, the vehicle industry in Austria employed around 1,200 apprentices. At the end of 2021, around 267 apprentices had completed a single apprenticeship, the most popular areas here being body construction technology, process technology and mechanical engineering technology designer. In addition to various dual apprenticeships (e.g. mechanical engineering technology designer & metal technology machine construction technology), there are also modular apprenticeships in the automotive industry (e.g. automotive technology - commercial vehicle technology and system electronics).

C. Metal Industry in Austria

The metal industry includes all companies in the industrial production that are working with and processing metals. The industry is usually sub-divided into the steel, non-ferrous and foundry industries as well as metal processing. In the international economic classification, a division is made between metal production and processing and the manufacturing of metal products. In 2018, the turnover in the metal industry in Austria amounted to around 18.3 (production and processing) and 17.1 (production of metal products) billion euros. In total, around 142 companies were active in the production or processing of metals in Austria in 2018. They employed around 37,800 people and generated a gross value added of 4.5 billion euros. About 8.6 billion of the total turnover of the sector was generated by the production of pig iron and steel. With 3,872 companies in 2018, the largest share of Austrian companies in the metal industry was located in the production of metal products. About 79,600 employees produced metal products and generated a total gross value added of €6.5 billion. For 2019, there were orders worth around 14.5 billion euros in the manufacture of metal products.

D. Construction industry in Austria

The construction industry is a significant factor in Austria in terms of gross value added - its share of total gross value added was around seven percent. The turnover of the construction industry in Austria has tended to increase in recent years. In general, the construction industry can be divided into the main construction and finishing trades. In 2020, around 24,000 new buildings were completed in Austria, most of which were residential buildings. The smaller share was made up of non-residential buildings (e.g. industrial and warehouse buildings, hotels, inns and guesthouses or agricultural buildings). The number of companies also increased (Statista, 2023a).

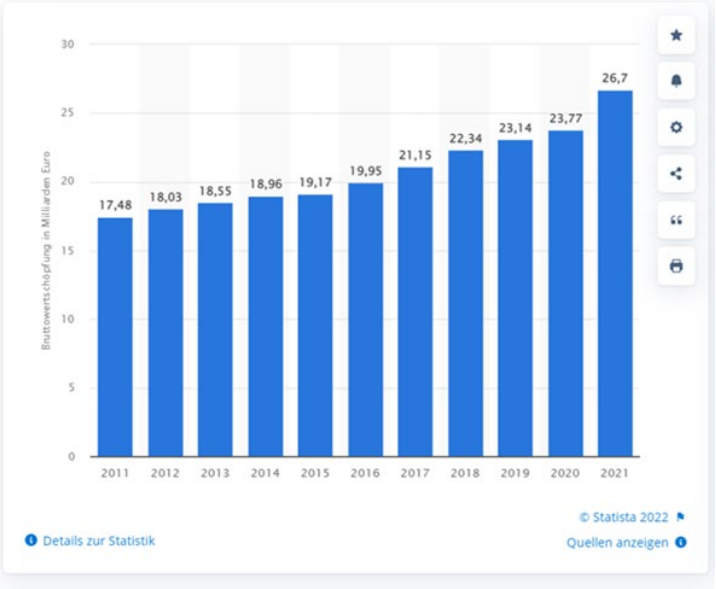

Figure 10 - Gross value added in construction in Austria from 2011-2021(in billion €). Source: Statista

The gross value added of the Austrian construction industry amounted to 26.7 billion euros in 2021, which corresponded to a share of 7.2 percent of the country's total gross value added. The turnover of the construction industry in Austria reached a total of 53.3 billion euros in 2020 and was divided among the three sectors as follows: building construction generated €16.84 billion, civil engineering €8.83 billion and other construction activities €27.64 billion. The more than 37,000 companies in the sector had about 316,600 employees.

There is a clear trend towards ecological building, which is expected to increase further. The refurbishment sector offers many challenges, as subsequent installations and conversions are often complex to plan and implement. As all industries, the building technology sector is facing the challenges of digitalization: autonomous vehicles (transport), the Internet of Things and the analysis of large amounts of data (data mining, data science), 3D printing and Building information modelling.

E. Chemical industry in Austria

In Austria, the chemical industry is one of the largest and most important industrial sectors in the country. Products of the chemical industry can be found almost everywhere in our everyday lives, for example in plastic goods, pharmaceuticals, fibres, paints or fertilisers. The sector is an important branch of industry in the country and an impetus for innovations in numerous other branches of the economy. In 2020, 232 national patents from the chemical sector (incl. pharmaceuticals) were registered with the Austrian Patent Office. Austria's share of European chemical sales was approximately three per cent in 2019. The sector has been more willing to invest again in recent years. While only 462 million were invested by the chemical industry in 2015, this expenditure increased to a total of 1.1 billion euros in 2020. In 2019, the majority of gross investments in Austria flowed into the segment of production of basic chemical products (Statista, 2023d).

In relation to the total industry, the chemical industry in Austria represents:

- 11.8 % of the workforce
- 10 % of the production value
- 13.1 % of the gross value added
- 11.2 % of foreign turnover

- 18.3 % of R&D expenditure
- 13.6% of investment
- 15 % of environmental protection expenditure

The chemical industry was the third largest industry in Austria in terms of turnover in 2020, generating around €15.55 billion. Gross value added amounted to around 6.22 billion euros in 2018. The number of companies in the manufacture of chemical products grew in recent years from 324 in 2010 to 416 in 2019. The number of employees, however, did not increase quite as steeply in recent years and even saw a decline in 2020. In 2020, 46,841 people were employed in the chemical industry in Austria. In 2021, there was an annual average of around 47,700 employees in the Austrian chemical industry (see Figure 11).

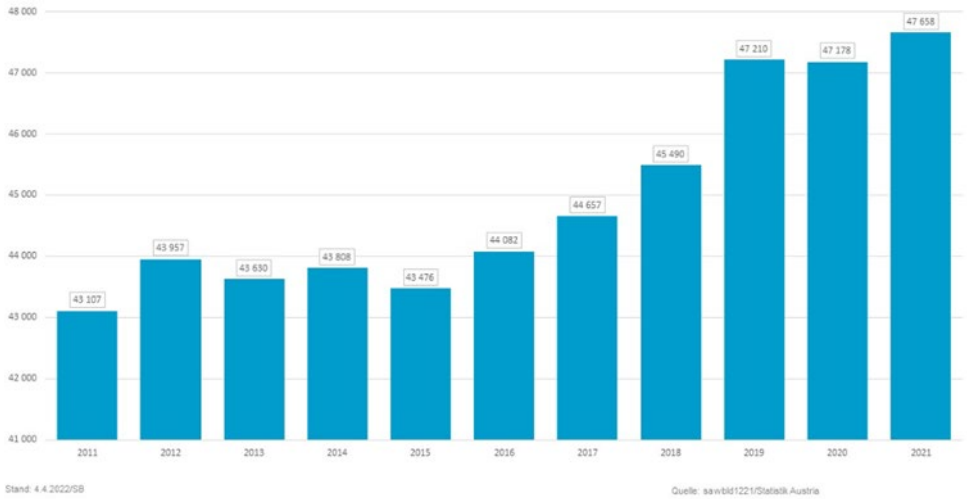

Figure 11 - Employees in the chemical industry annual average 2011 – 2021

F. Healthcare in Austria

The health care systems are the focus of political and social debates in Europe because of their importance and the critical system influence in fulfilling elementary social functions. In particular, the challenges of an aging society and medical progress are important drivers. The Austrian health care industry includes not only health care in a narrower sense, but many other areas whose growth is largely determined by the demand for health. In addition to the core area of inpatient and outpatient care, the so-called extended health economy (pharmacies, self-help, the pharmaceutical industry, biotechnology, medical technology, structural adaptations, wellness, sports or health tourism) arise from the need for health but are not always referred to as healthcare. Still, they are an important part of the Austrian economy. In 2020, the expenditures of the social health insurance institutions in Austria amounted to approximately 21.55 billion euros, whereas the revenues amounted to approximately 21.4 billion euros.

Every seventh employee in Austria is directly employed in the healthcare sector. If intermediate consumption effects and induced effects are considered in this calculation, every fifth job is linked to the need for health. With the interlinking effects, as much as 16.5% of Austria's value added is created directly, indirectly or induced by demands in the health economy.
The focus of the health economy is on services (generating more than 80 % of the gross value added in the healthcare industry). The health economy as an export economy still has room for development, as the contribution of the health economy to the overall Austrian export surplus (goods and services) amounts to 6.26 %. The Austrian healthcare industry is therefore a very important economic sector in

that it obtains intermediate inputs from the domestic economy via economic linkages. Approximately 870,000 employment relationships depend on there being a demand for healthcare services in Austria.

G. Tourism sector in Austria

The tourism sector used to be one of the most important business areas in Austria until it was dramatically hit by Covid 19. Figures highlight though that Austria might not have lost as many tourists as other European countries where the average shows a 74% decline in arrivals. Still, the Austrian tourism sector has not yet fully recovered. In summer 2021, e.g. only 30% of the room capacity was booked. Still, the majority of guests returned in 2021 (64% of summer and 77% of our winter tourists). Consequences of the drastic incline in tourists have been inter alia, a shift towards domestic tourism, shorter overnight stays, loss of expertise and staff due to their move into other sectors and an expected rise in upcoming company closures the sector sees itself confronted with.

In 2020, 20.5 million visited Austria (which equals around 45% of loss or the status of before the turn of the millennium) who counted for nearly 98 million overnight stays which takes us back to figures achieved in the early 70s of the last century. The majority of tourists, 66.3 million (67.7%), were accounted for by guests from abroad. The average time stayed at the holiday destination was again nearly 4 days in 2021 but only 3.6 in 2022. On average, this sector was worth € 45.2 bn, or 12.1% of the GDP in 2021. Based on figures achieved in 2021, the tourism industry offers some 216,800 full-time jobs and with the leisure industry it adds up to 240,300 full-time jobs (which equals 5.6% and respectively 6.2% of the total employment in Austria). 16,000 job vacancies were still registered in 2021 by the labour market service (Österreich Webung, 2023).

2.2. Germany

2.2.1. Policy framework of Germany

Research and Innovation and Economic Growth

The **High-Tech Strategy 2025** (HTS 2025) demonstrates how Germany can employ innovation and research to create the future of the country (Federal Ministry of Education and Research, 2022). Based on the demands of the public (Field of Action I), it strives to give direction to every participant in innovation. It supports research and innovation in areas that are aligned with those of the **Smart Specialisation** priorities for Germany for the period 2014-2020 (JRC, 2022b).

Table 7 - Germany RIS3 and HTS 2025 priorities

S3 Priorities 2014-2020	High-Tech Strategy 2025
Civilian security	Safety and security
Digital economy and society	Urban and rural areas
Intelligent mobility	Mobility
Healthy life	Health and care
Innovative work environment	Economy and work 4.0
Sustainable economy and energy	Sustainability, climate protection and energy

It will help keep jobs in Germany, preserve the economy, and position Germany at the forefront of the upcoming technology revolutions. Support for new technologies will go hand in hand with investment in training and ongoing education as well as societal involvement to prepare people for impending change (Field of Action II). High-Tech Strategy 2025 opens up space for fresh concepts and offers coordinated support for innovation. This will motivate a large number of stakeholders to actively support growth. The HTS 2025 provides guidance and several options for doing so (Field of Action III). This is not just restricted to Germany. The HTS 2025 is an invitation to collaborate and can provide guidance for collaboration among innovative actors in Europe.

For the period 2021-2027, Germany has not updated its national S3, but it has developed regional strategies for Baden-Württemberg (BW) and Berlin (European Commission, 2020e). The update of the RIS3 for Baden-Württemberg for the period 2021-2027 has already been formulated and approved by the state government in the Council of Ministers. A main concern of the RIS3 is to seize the opportunities of the transformation processes in order to make these regions technology leaders in intelligent, resource-saving and climate-friendly technologies.

Table 8 – Berlin and Baden-Württemberg S3 Priorities 2021-2027

Berlin S3 Priorities 2021-2027	Baden-Württemberg S3 Priorities 2021-2027
• Transport, mobility and logistics • Smart cities • Industrial production • Clean technologies • Energy technologies • Health care industry • ICT, media and creative industry • Photonics	• Digitization, artificial intelligence and industry 4.0, • Sustainable mobility, • Healthcare, • Resource efficiency & energy • Sustainable bioeconomy

Sustainable Development

The first **Sustainable Development Strategy for Germany** was adopted in 2002, and it has since been updated on a regular basis. The appropriate modified strategy in each situation defines how the nation's sustainable growth will proceed. The Sustainable Development Strategy, which was improved in 2021, encourages quicker implementation of the SDG 13 with regard to energy production and climate protection ("climate protection measures"). Germany is expected to attain greenhouse gas neutrality by 2045, according to a law that the Federal Government passed in 2019 and revised in 2021. For this reason, emission thresholds that gradually decrease have already been established. The Federal Government is dedicated to advancing global health in order to tackle so-called zoonoses, or infectious diseases that can affect both humans and animals, as part of the SDG 13 “Climate Action” and SDG 3 "Health and Wellbeing" (Federal Government of Germany, 2021).

The German Government's **economic stimulus program**, which was adopted on June 12, 2020, allocates 130 billion euros in funding for 2020 and 2021. It includes a program for managing crises and stimulating the economy, as well as steps for adopting new technology and taking on obligations abroad. To safeguard the survival of enterprises and social services, protect jobs, and avoid social misery and social crises, swift economic action was taken. The actions included in the future technologies package are long-term in nature. With a funding of EUR 50 billion, this package aims to assist Germany's modernization and its position as a leading technology exporter globally, particularly by making investments in the digital future and in climate technologies.

The strategy encompasses five sustainability principles, which will apply sustainable development as a guiding concept in all decisions.
(1) Assume global responsibility
(2) Strengthen the natural resource base on which life depends
(3) Strengthen sustainable economic activity
(4) Preserve and enhance social cohesion in an open society
(5) Use education, science and innovation as drivers of sustainable development

In addition to that, Germany adopted a **National Energy and Climate Plan** in October 2019 giving a summary of the nation's energy and climate policies as well as the status of current plans. Climate and energy policies are always changing (Federal Government of Germany, 2019). Among others, Germany aspires to the following:

- Reduce its greenhouse gas emissions by at least 55% by 2030 compared to the 1990 baseline.
- Increase the share of RES in gross final energy consumption by 30%.
- Reduce primary energy consumption by 30% compared to 2008 levels.

The German government's primary objective, which is reflected in a number of its policy objectives, is to boost raw material productivity by decoupling economic growth from resource consumption. There was no national strategy for the circular economy in place in Germany as of May 2022, but there are policies for resource efficiency, sustainable consumption, and waste prevention. The data show that Germany has a sophisticated waste management system, but it is not strategically incorporated into a circular economy strategy. In Germany, the circular economy has traditionally been associated with waste management. A more comprehensive knowledge of the circular economy has only lately been incorporated into the German discourse by players from the private sector, academia, and civil society. Germany increased its climate protection-related investment in 2022.

Before that, a **Renewable Energy Sources Act (EEG 2017)** was formulated and aimed to reduce the costs of the energy supply to the economy, including long-term external effects, to enable the energy supply to develop sustainably, especially in the interest of reducing climate change and protecting the environment, to conserve fossil energy resources, and to promote the further development of technologies to produce electricity from renewable energy sources (BMWK, 2017).

Germany's strategy to accomplish the goals of the European agricultural reform starting in 2023 is laid out in the **Common Agricultural Policy Strategic Plan** in accordance with EU regulations. It encourages resilience in agricultural output to increase food security, rewards efforts to safeguard the environment and the climate, and supports the sustainability of rural areas. The plan calls for, among other things, determining technical requirements from a SWOT analysis of the German agricultural policy's strengths, weaknesses, opportunities, and threats in respect to nine specific objectives and the overarching objective of knowledge, innovation, and digitization. The demands that are given the highest priority receive the development of concrete support measures (intervention descriptions) (BMEL, 2022b). The CAP strategic plan is reviewed and has been in effect since January 1st, 2023. For the period 2023–2027, it specifies how the 30 billion euros in subsidies would be used.

In addition to providing farmers with basic income support, particular ecological support priorities—also known as organic schemes—have been determined. As a result, there is strong support for promoting organic farming. The term "eco-schemes" refers to measures that farmers voluntarily take, such as creating flowering areas, old grass strips, and unproductive areas, growing a variety of crops, including legumes in five major crop types, and maintaining their permanent grassland by grazing animals to a certain extent or with specific plant species. Those that refrain from using pesticides, maintain agroforestry on farmland or permanent grassland, or follow management procedures in Natura 2000 areas are also eligible for funding.

The **National Food Strategy** of Germany suggests that clear goals and objectives should be established for nutrition policy, together with action areas accompanied by quantifiable measures. According to the coalition agreement of 2021, BMEL is responsible for developing a plan by 2023. The strategy will be established as an umbrella strategy in stages and will build on and incorporate current strategies and action plans, while it will involve interested stakeholders (BMEL, 2022a). Among others, this strategy will aim at a more plant-based diet; reducing the consumption of sugar, fat and salt; reducing food waste; promoting community catering with an increased share of seasonal-regional and organic-climate-friendly food and a more active society.

The **Guidelines on Sustainable Buildings** were initially released by the German Federal Ministry of Construction in 2001. The quality requirements for federal buildings were fundamentally established and stated in a realistic manner in a completely redesigned edition that was released in 2013. The national sustainability policy, which was updated in 2017 and is constantly being improved upon, places a high priority on sustainable construction. It explains generally applicable principles and methods for the planning, construction, use and operation of buildings and serves as a working aid for the consideration of sustainability aspects over the entire life cycle of buildings and real estate in the sense of a unity of building and property. It addresses issues such building in a way that is climate- and environmentally friendly, the need for cost-, energy-, and resource-effectiveness, or the demands of demographic development (des Innern & Bau, 2019).

The **emergency program for the building sector** became necessary because emissions from the building sector in 2021 had exceeded the permissible annual emission level by two million metric tonnes of CO2 equivalents (115 Mt. CO2-eq. instead of 113 Mt. CO2-eq.). In order to now comply with the federal government's binding emissions targets, the ministries responsible for the building sector have therefore presented an immediate action program for the building sector, the aim of which is to "put the building sector on track in terms of climate policy". Two measures will be taken to accomplish the building reform: New qualifying requirements are applicable to ongoing subsidies for both complete renovations and new construction as of July 28,2022. Following this, new financial requirements for certain renovation initiatives went into effect on August 15, 2022. In 2023, new construction subsidies will also be reorganised and improved. A thorough revision of the GEG has been scheduled for 2023. The focus is on raising the new-build requirement to the EH-40 standard starting in 2025, as well as requiring that starting on January 1, 2024, every newly installed heating system be fuelled by 65 percent renewable energies (BMWK, 2022).

Regarding circular economy, the German government's primary objective, which is reflected in a number of its policy objectives, is to boost raw material productivity by decoupling economic growth from resource consumption. There is no national strategy for the circular economy in place in Germany as of January 2023, but there are policies for resource efficiency, sustainable consumption, and waste prevention. The data show that Germany has a sophisticated waste management system, but it is not strategically incorporated into a circular economy strategy. In Germany, the circular economy has traditionally been associated with garbage management. A more comprehensive knowledge of the circular economy has only lately been incorporated into the German discourse by players from the private sector, academia, and civil society.

Other national plans of high relevance to the implementation of circular economy

- German Ordinance on Single-Use Plastics (Einwegkunststoffverbotsverordnung) (2021)
- German Packaging Act (2019)
- Federal Waste Prevention Programme (2013)
- German Circular Economy Act (2012)

2.2.2. Sustainability performance of Germany

In terms of sustainability, Germany is ranked 6th globally with 82.2/100 score (Jeffrey Sachs et al., 2022). Germany submitted a VNR in 2016 and 2021, has integrated the SDGs into sectoral action plans and a national strategy on sustainability and included them in the national budget. In 2022, Germany achieved SDG1 “No poverty”, and is on track to achieve SDG6 “Clean water and sanitation”, SDG7 “Affordable and clean energy”, SDG8 “Decent work and economic growth”, SDG9 “Industry, innovation and infrastructure”, SDG16 “Peace, justice and strong institutions” and SDG17 “Partnerships for the goals”. However, major challenges remain at SDG12 “Responsible consumption and production” and SDG13 “Climate action”.

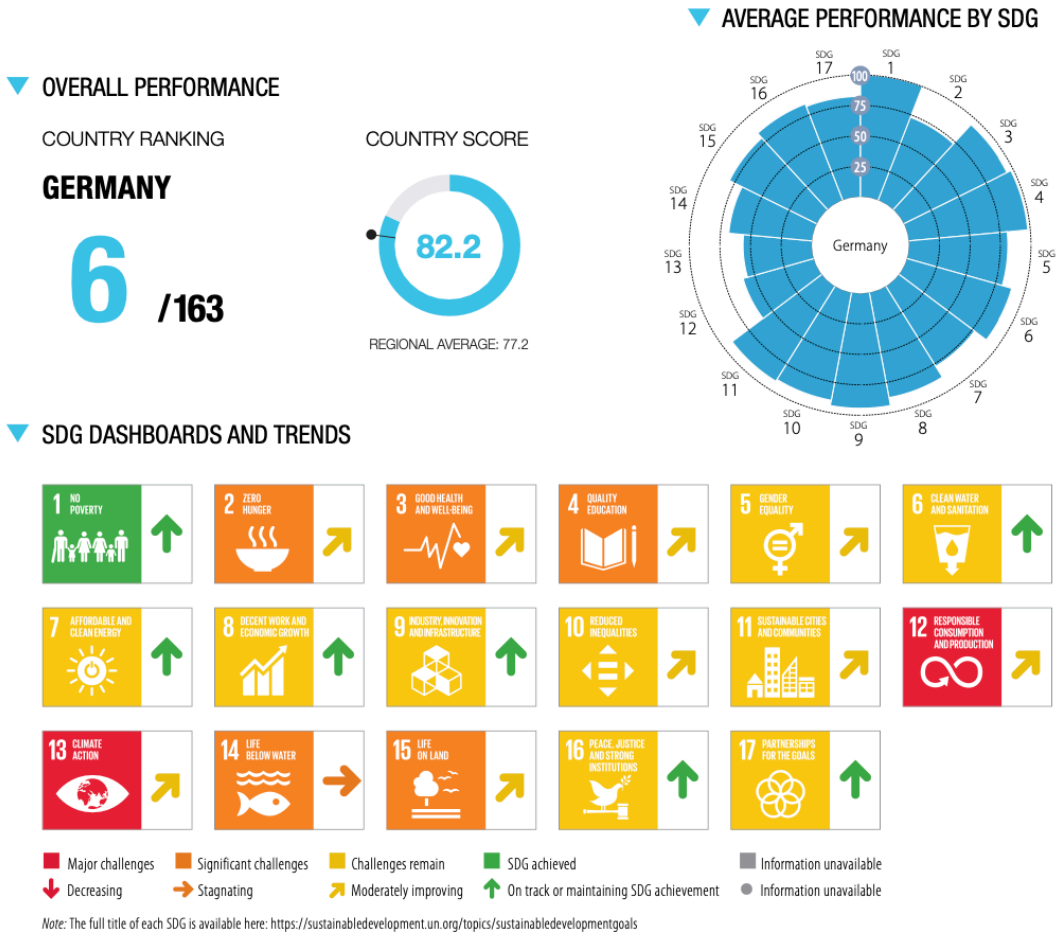

Figure 12 - Sustainability performance of Germany, 2022 (Jeffrey Sachs et al., 2022)

Germany is also among the group of eco-innovation leaders. Performance in comparison to the EU has improved over time. In all three circular economy (CE) parameters, Germany outperforms the EU average. German resource efficiency results are a relative strength, but eco-innovation initiatives are a relative weakness. The two eco-innovation metrics that perform the best are material productivity and water productivity. Employment in environmental protection and resource management activities, as well as the number of ISO 14001 certificates, are the eco-innovation indicators that perform the worst (Wynarski, 2022). According to CE measures, Germany's performance reveals relative strengths in business operations and relative shortcomings in society behaviors. Municipal garbage recycling and information that is easily accessible and can be used to acquire financing for activities related to the circular economy are the CE metrics with the best performance. The percentage of employees who repair computers, personal items, and household products, as well as the percentage of businesses who fix these items, are the CE indicators that perform the worst.

2.2.3. Germany's sectorial analysis

With $3.693 trillion GDP and 82 million people, Germany has the largest national economy in Europe and fourth largest by nominal GDP in the world. The social market economy of Germany is distinguished by a highly skilled labor force, a developed infrastructure, a sizable capital stock, a low degree of corruption, and a high level of innovation. Around 63% of the overall GDP is contributed by the service

sector, followed by industry at 26.6% and agriculture at 0.8%. Germany is a world leader in the manufacture of machinery, electrical equipment, chemicals, and automobiles. Trade, hotels and restaurants, and transportation together with financial, renting, and commercial activities make up a significant share of services, followed by other service activities.

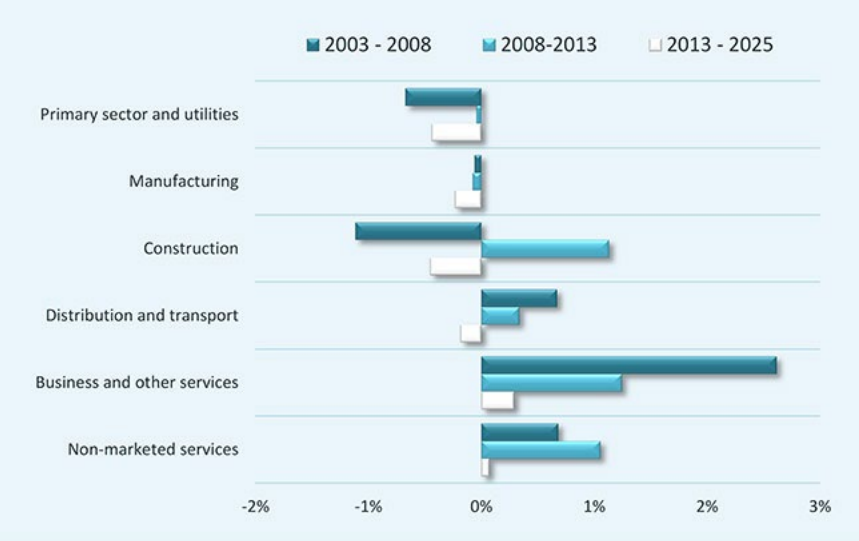

Figure 13 - Employment trends by sector, average annual growth rate, 2003-25, Germany (%). Source: (CEDEFOP, 2015)

However, as seen in the RIS3 strategy for Germany presented above, there are several sectors that need to be looked at closely in order to meet the international and national trends. This sub-section presents an overview in the following industries/RIS3 priorities:

A. ***Waste Management***
B. ***IT / Digitalisation***
C. ***Food***
D. ***Construction/Building***

A. Waste Management

Waste management encompasses the avoidance, recycling and disposal of waste within the meaning of the Circular Economy and Waste Management Act. In 2021, the industry's estimated sales will amount to 40.6 billion euros. The waste generated increased within 8 years (yr. 2012 to 2020). In 2020, the waste management plants in total were 13,744 and total generated waste was 413,994 mil. tonnes.

Table 9 - Waste Management in Germany (in mil. tons)

Year	Total waste generated	Deposition	Thermal disposal	Treatment for removal	Energetic recycling	Material recycling	Recycling rate
2012	380.5	63.7	12.4	4.3	34.8	265.3	79%
2020	414	67.5	3	5	48.3	290	82%

In 2022, there were 512 vacant apprenticeship/study places linked to waste management.

B. IT / Digitalisation

For the first time in 2018, the German information technology market's volume surpassed €90 billion (see Table 10). Hardware, software, and IT services combined to create sales revenue in Germany of over 93 billion euros in 2019. For 2020 as a whole, a decrease to about 88 billion euros is anticipated. The strongest segment in terms of sales in 2019 was IT services with slightly under 40 billion euros, followed by hardware and software. Around one million people are employed in the German IT industry overall (including self-employed individuals), with the bulk of these individuals working in the software and IT services sectors. The Federal Statistical Office estimates that there are over 94,000 IT companies in Germany, with T-Systems, IBM, and Atos among the industry's top vendors of IT services (Statista, 2022).

Table 10 – Key statistics for the IT Sector in German.

Turnover	Number of IT companies in Germany	Employees in IT
105.9 billion €	89,502	1,079,300

C. Food

One of Germany's strongest industries and a significant employer with 5 million workers is the food industry. The food trade with retail and wholesale can be loosely separated into the manufacturing food industry with agriculture, food industry, and food craft. Additionally, the hotel sector may be included. Germany's agricultural sector produced revenues of 41 billion euros in 2020. Most farms in the agricultural sector are run by families. These include fishery, horticulture, viticulture, forestry, and fruit, vegetable, and animal husbandry as well as the production of animals???? (forest and timber). In 2020, 26100 farms will be organic, representing one in ten of all farms. Around 2200 aquaculture farms exist (fish, shellfish, etc.) (Statistisches Bundesamt (Destatis), 2023).

The small- and medium-sized business sector dominates the food industry. These include the industries that process meat, fish, dairy products, fruits, and vegetables; those that produce vegetable and animal oils and fats; those that produce starch and starch products; those that process confections and baked goods; those that process other foodstuffs and animal feed; and those that produce beverages, including alcoholic ones. In 2020, the food sector alone brought in 188.4 billion euros. As a result, Germany has Europe's largest food industry. The majority of businesses in the food industry are bakeries and butchers/butcher shops. Brewers, maltsters, confectioners, millers, and wine coopers are also among them. In 2019, they produced 41.7 billion euros together (BMEL-Statistik, 2022).

The major sales channel for the industry is food retailing (LEH), which is expected to generate 149 billion euros in revenue in 2021. The majority of food is distributed through stationary retail to final consumers. About three-quarters of revenues are accounted for by four big corporations (Edeka, REWE, Schwarz Group, and Aldi). For food makers, this entails strong competition for the limited space on the shelves of retail companies. In recent years, the share of farm managers with an agricultural education has increased: Nine percent of managing directors and farm managers in the country and 67 percent of managing directors nationwide have degrees in horticulture or agriculture. 33 percent of managers and farm managers nationwide have just hands-on farming experience. 85 percent of the managers on full-time farms, where agriculture provides more than half of the income, have degrees in the field. In peripheral farms, this number is 48 percent, whereas 52 percent of management and farm managers have solely practical agricultural experience (Statistische Amter, 2022).

D. Construction/Building

There are 961,000 workers in the construction business in Germany, with a €175 billion annual revenue, which contributed 5.5-7.9% of the country's total value added in 2021. Around 11.1 percent of Germany's GDP was allocated to construction measures in 2021(Statista, 2023b). Only 0.5% more was invested in building in 2021, following five years of, in some circumstances, strong price-adjusted growth. The causes of this, despite considerable demand, are construction's completely employed capacity due to a lack of manpower and material constraints as a result of the supply bottlenecks already indicated. As a result, the cost of building has also significantly increased.

In June 2021, the German construction sector (excluding real estate developers) employed 1.9 million workers, a decrease from 939,000 in 2019; of them, nearly 869,000 worked in the primary construction business. 91% of them were full-time workers, albeit this percentage is eroding. In 2021, there were approximately13% women working in the construction industry. After a modest spike in 2020 brought on by Corona, the unemployment rate dropped once more in 2021. In contrast, after a modest dip in 2020, the number of open positions increased once more in 2017.

Young people find the construction industry appealing since it offers a wide range of apprenticeships and gives excellent chances for growth, additional training, and the potential to open one's own business. The sector includes the following apprenticeship specialties: carpenters, plasterers, tile, slab, and mosaic installers, screed installers, heat, cold, and noise insulators, and dry construction fitters in the finishing industry. In the building construction industry, there are bricklayers, concrete and reinforced concrete installers, building mechanics, furnace and chimney installers, and track installers. In the civil engineering industry, there are construction equipment operators, road, pipeline, sewer, well, and special civil engineers. The technical and commercial sector contains draftsman/draftswoman and commercial specialist as its last subset (SOKA-BAU, 2023).

The entire construction sector needs to reconsider construction.

- Cross-sector thinking and integrated planning: cross-sector networking as a future skill, for example, with the building sector and forestry or agriculture for urban farming, or with the energy business for increased energy efficiency
- Modular and sustainable construction, 3D printing, and robotics will fundamentally change job profiles in the construction industry. Upgrade traditional craftsmanship with digital know-how.
- From troop to team: overcoming silo thinking, transparent, and cross-trade construction teams work together (digitally).
- Accelerate digitally by putting new system improvements in place (use robotics, automation, smart building technology consciously and purposefully).
- From conception to construction, responsibility will be a necessary ability
- Architects should no longer only concentrate on new construction, but also understand the interaction between building tradition and innovation (Building Tomorrow 2021, p. 190)
- Data protection will also become a crucial competence for the industry (p. 192)
- Building information models, software for analyzing the internal environment, and bettering the digital information flow during the design process are all examples of software used in the construction industry.
- Nanotechnology in building: self-cleaning surfaces, antimicrobial coatings, better indoor air quality, nanotechnology on photovoltaic modules, and the development of manufacturing and processing techniques

- Construction materials testing, large-scale outdoor testing, bonding of building materials, ecologically friendly insulating materials and flame retardants, and recyclables with multiple uses (PCM).
- People in rooms: improved performance through comfort, a healthy indoor environment, and buildings with membranes
- Building automation: improving quality of life through sensor technology; safety; energy; sustainable neighbourhoods: describing and evaluating sustainability in urban development; requirements for socially and environmentally sustainable settlements; electromobile city; urban innovation management; internationalization: building in other climate zones; intercultural teamwork

2.3. Greece

2.3.1. Policy framework of Greece

Research & Innovation and Economic Growth

One of the requirements for receiving funds for research and innovation actions under the 2014-2020 Partnership Agreement was the creation of a Research and Innovation Strategy for Smart Specialization (RIS3). At the national level, the RIS3 for 2014–2020 was developed by the GSRI and adopted by the Greek government in 2015 (General Secretariat for Research and Innovation, 2023a). The new national Smart Specialization Strategy is a comprehensive agenda for economic transformation in line with European Structural Funds Policy Objective 1 (PO1): "A Smarter Europe - Innovative & Smart Economic Transformation" for the 2021–2027 Programming Period. Specific goals for PO1 include strengthening capabilities for research and innovation and the adoption of cutting-edge technology; gaining from digitization's benefits for people, businesses, and governments; improving SMEs' growth and competitiveness; and acquiring abilities for entrepreneurship, industrial transformation, and clever specialization.

The priority sectors identified in the new National Smart Specialization Strategy developed by General Secretariat for Research and Innovation (2023b) for the period 2021-2027 are the following:

- ***Agri-food Chain***
- ***Digital Technologies***
- ***Life Sciences, Health, and Medicine***
- ***Tourism, Culture and Creative Industries***
- ***Sustainable Energy***
- ***Environment and Circular Economy***
- ***Materials, Construction and Manufacturing***
- ***Transport and Supply Chains***

In 2020, two strategies were developed seeking to strengthen the economic growth of the country. The **Long-term Strategy 2050** seeks to present the available technological solutions that can be applied in the domestic field, avoiding the unitary selection of some of them, so that at the level of energy policy there is the possibility and flexibility to adapt the measures according to technological progress and structure of final energy consumption in the branches of economic activity after the year 2030. In this light, the long-term strategy examines the range of available options and different scenarios for the development of the energy system, for the necessary energy transition in the most economically competitive way for the national economy, in order to achieve a drastic reduction of greenhouse gas emissions and modernization of the economy (Ministry of Environment and Energy, 2020).

The **Greek National Recovery and Resilience Plan** (NNRP), published in November 2020, aims to support a paradigm shift in the Greek economy and institutions toward a more extrovert, competitive, and green economic model, with a more effective, less bureaucratic digitalized state, a significantly smaller "grey sector," a more growth-friendly tax system, and a more robust social safety network. This change goes beyond the economy alone (Hellenic Republic, 2020). It aspires to bring about a more fundamental change in the economy and society that will impact not only economic activity but also institutions, technology, and attitudes, a change that integrates social justice, social inclusion, and

economic efficiency. The NNRP for the country states that it supports the National Action Plan by funding initiatives related to sustainable production with ecological planning and incentives; sustainable consumption with green public procurement; reduction of waste, prevention of waste generation, and reduction of disposable plastics; introduction of smart meters for water management and energy management; and financing programs.

Sustainable Development

Just before the Johannesburg Summit on Sustainable Development in 2002, the Council of Ministers approved Greece's first National Strategy for Sustainable Development (NSSD), which had a significant environmental focus. The second NSSD, created in 2007, was in line with the updated 2006 EU Sustainable Development Strategy but added four new national goals (culture, tourism, agriculture and spatial planning). In response to the onset of the financial crisis and the need for greater emphasis on climate change mitigation and adaptation, the country's priorities throughout the entire Government structure were set under the overarching objective of "Green Growth" in 2009 when "the Ministry of Environment, Energy and Climate Change" (MEECC) was first established. With a focus on resource efficiency and the transition to a low-carbon economy, a "Programme of Development Interventions for the Real Economy" was developed in 2010 to this end. It was aligned with the EU's Europe 2020 Strategy and served as the nation's strategic reference for sustainable development until 2013, though it was not an NSSD.

In 2016, Greece developed a **National Climate Change Adaptation Strategy** that aims to increase the nation's resilience to the effects of climate change (Ministry of Environment and Energy, 2016). Specifically, it seeks to:
1. develop and improve the decision-making process (short- and long-term) regarding adaptation challenges;
2. combine adaptation with the implementation of regional/local action plans to promote a sustainable growth model;
3. encourage adaptation policies and practices across the board in the Greek economy, with a focus on the most vulnerable sectors;
4. establish a mechanism for the monitoring, evaluation, and updating of adaptation policies and practices; and
5. strengthen public awareness and capacity for adaptation.

Greece established a **National Growth Strategy** in July 2018, and it was amended in May 2019 to become the "**National Strategy for Sustainable and Fair Development 2030**", which is completely in line with the goals of the 2030 Agenda for Sustainable Development. 40 important performance indicators, many of which related to SDG implementation at the national level, were among the items included in the 2019 NSSFG (Ministry of Development and Investments, 2018, 2019). In December 2019, the Ministry of Environment and Energy (2019) adopted a **National Energy and Climate Plan** (NECP) which set ambitious targets such as:

- Lowering greenhouse gas (GHG) emissions by more than 42% compared to 1990 levels and more than 56% compared to 2005 levels by 2030, exceeding even the primary EU targets.
- Increasing the share of renewable energy sources (RES) in gross final energy consumption, with a target of a minimum share of 35% as opposed to the initial NECP draft's target of 31%. Additionally, this is substantially greater than the 32% primary EU goal for RES.

- Increasing energy efficiency in final energy consumption by a minimum of 38% compared to the projected evolution of final energy consumption by 2030, as assessed in 2007 within the context of the EU energy policy.
- Reducing the share of lignite in power generation, or the so-called lignite phase-out, by implementing an appropriate front-loaded program in the following decade and completely ending the use of lignite for power generation in Greece by 2028.

In alignment with RIS3, Greece's national development policy acknowledges that the shift from a linear to a circular economic model offers enormous development potential that fosters employment, investment, and entrepreneurship while bringing sustainability to growth. This policy is primarily carried out via the **National Strategy for Circular Economy**, which was adopted in December 2018 and whose operational action plan for the years 2018 to 2019 was revised in November 2021 and certified on April 29, 2022 (A' 84) (Hellenic Republic Ministry of Energy and Environment, 2018, 2022). The Greek economy will be able to become more circular, sustainable, and competitive by implementing the 71 actions outlined in the **National Action Plan for Circular Economy** (NAPCE), a four-year roadmap (2021-2025).

Relevant Legislative Framework
– Framework law on waste (L. 4819/2021 – Official Gazette A’ 129)
– Law on single-use plastics (L. 4736/2020 – Official Gazette A’ 200)
– Joint Ministerial Decision on landfill (MEEN ΔΔΑ/90439/1846/2021)

Other national plans of high relevance to the implementation of circular economy

- ✓ National Green Public Procurement Action Plan (GPP)
- ✓ National Waste Management Plan (NWMP)
- ✓ National Waste Prevention Program (NWPP)

The National Strategy for Circular Economy 2018-2019 was the first regulatory initiative for the promotion of circular economy principles in Greece and the predecessor of the recent and more detailed roadmap of the New Action Plan 2021-2025.

The New Action Plan, which consists of 71 actions for the years 2021 through 2025, aims to hasten the shift to the circular economy. Out of these actions, 46 of these behaviours, including production, consumption, waste management, and horizontal measures (e.g. governance), are fundamental economic axis. The remaining 25 actions deal with circular policies for certain goods and products.

All actions in the New Action Plan are broken down into five categories, including:

1. Measures to promote industrial symbiosis and a climate-neutral, effective circular economy through sustainable development and industrial policy
2. Sustainable consumption initiatives to strengthen consumers' participation in the circular economy and the demand for sustainable products
3. Less waste with greater value intended to reduce waste generation and landfilling as well as boost waste recycling
4. Horizontal actions involving governance, legislation, planning, and implementation
5. Special actions for certain products, such as packaging, plastics, textiles, construction and ICT equipment, batteries and cars, that require immediate attention owing to their environmental impact.

2.3.2. Sustainability and Innovation performance of Greece

In terms of sustainability, Greece is ranked 32nd globally with 76.8/100 score (Jeffrey Sachs et al., 2022). Greece submitted a VNR in 2018 and 2022 and has integrated the SDGs into sectoral action plans. However, the SDGs are not included in the national budget. In 2022, Greece had achieved none of the SDGs, but is on track to achieve SDG1 “No poverty”, SDG3 “Good health and well-being”, SDG6 “Clean water and sanitation”, SDG8 “Decent work and economic growth” and SDG10 “Reduced inequalities”. Nonetheless, major challenges remain at SDG12 “Responsible consumption and production”, SDG13 “climate action” and SDG14 “Life below water”.

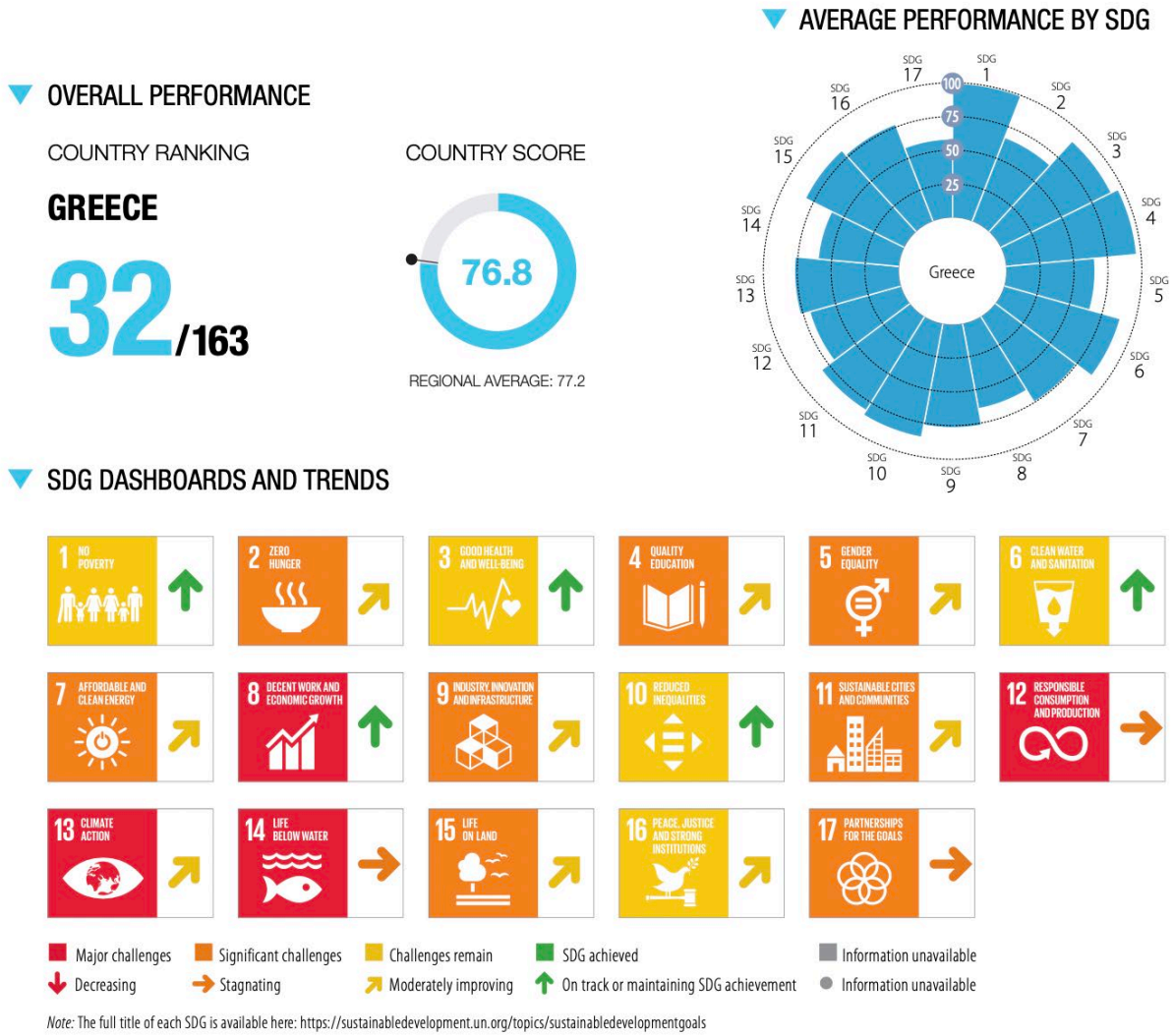

Figure 14 - Sustainability performance of Greece, 2022 (Jeffrey Sachs et al., 2022)

Greece is a member of the average group of eco-innovation performers. Performance in comparison to the EU has improved over time. Greece outperforms the EU average in all three circular economy (CE) characteristics. Greece has comparative advantages in eco-innovation inputs and disadvantages in resource efficiency results. Academic publications on eco-innovation and the overall number of researchers and researchers in R&D have the best performance as eco-innovation indicators. Water productivity and patents relating to eco-innovation have the worst performance as eco-innovation indicators (Orfanidou & Kondylidou, 2022). Based on CE metrics, Greece's performance reveals relative advantages in corporate operations and relative disadvantages in the management of sustainable resources. The information that is easily accessible and can aid in obtaining funding for activities related to the circular economy as well as the percentage of SMEs that support product recycling after use are the strongest performing CE indicators. Recycling rates for municipal waste and biowaste have the lowest performance levels of CE metrics.

2.3.3. Greece's sectorial analysis

With $203 billion GDP and 11 million people, Greece's economy ranks 53rd in the world in terms of nominal gross domestic product (GDP) and the sixteenth largest in the European Union as of 2021. Greece is a developed nation with a service-based economy (67%) and an industrial economy (16%). In 2021, the agricultural sector was projected to have contributed almost 4% of the country's overall economic output. The shipping and tourism industries are significant in Greece. Greece ranked 16th in the world and seventh in the European Union in 2021 with 15 million foreign visitors (UNWTO, 2022).

However, as seen in the RIS3 strategy for Greece presented above, there are several sectors that need to be looked at closely in order to meet the international and national trends. This sub-section presents an overview in the following industries/RIS3 priorities:

A. Packaging and plastics: waste and environment (*Environment and Circular Economy priority*)
B. Construction and buildings *(Materials, Construction and Manufacturing priority)*
C. Mining and metal industry *(Materials, Construction and Manufacturing priority)*
D. Electronics *(Digital Technologies priority)*
E. Energy: Renewables *(Sustainable Energy priority)*
F. Energy: Transport and batteries *(Transport and Supply Chains priority)*
G. Food and agriculture *(Agri-food Chain priority)*

A. Packaging and plastics: waste and environment

Although plastic products are widely used thanks to their adaptability, they also create considerable environmental problems due to the vast amounts of waste they generate, a large proportion of which ends up in oceans as plastic litter. Global plastics production has increased 20 times in the last 50 years and is expected to double in the next 20 years. Plastic is a significant and widespread material of low cost for everyday life with many functions and, largely made of oil: 90% of plastic feedstock is oil. This represents 6% of global oil consumption, which is expected to skyrocket to 20% by 2050 (Cairns et al., 2021). The production of plastics has increased due to economic growth, rising population and growing urbanization.

Globally, only 14% of total plastic waste is recycled, a share significantly lower than that of the EU, where 1/3 of total plastic waste is recycled, 25% is landfilled and 43% goes to energy recovery, i.e. fuel combustion in waste-to-energy facilities (Cairns et al., 2021). In the EU, 40% of plastics demand is for packaging (2019), which also accounts for 61% of plastic waste (Plastics Europe, 2020). Building and construction consume 1/5 of total plastic demand, and nearly 10% is used by the automotive sector. Electrical and electronic devices, as well as household leisure and sports commodities account for another 10% of total plastic demand.

In terms of plastics pollution, over 150 million tonnes of plastics, most of which is plastic packaging, have ended up in the oceans. Over the last years, 8 million tonnes of plastic are annually thrown into the maritime environment, a number which is expected to double by 2030 and quadruple by 2050 (Cairns et al., 2021). Although EU countries are responsible for a small fraction of the annual plastic litter found in the oceans (around 4%), the majority of this ends up in "particularly vulnerable" areas, such as the Mediterranean Sea and the Arctic Ocean (European Comission, 2018). According to the Ellen MacArthur Foundation (2023) ''there could be more plastic in the ocean than fish by 2050 (by weight).''

One out of two of pieces of plastic waste in the ocean is a single-use plastic product, which is "typically intended to be used just once or for a short period of time before being disposed of" (European Commission, 2018). The 10 most frequently found single-use plastic items on European seacoasts are cotton bud sticks, cutlery, plates, straws, stirrers, balloons, sticks for balloons, food and beverage containers, beverages cups, cigarette butts, plastic bags, packets and wrappers, wet wipes and sanitary items. These items account for 70% of EU marine litter. Plastic bags for example usually need centuries to fully decompose and, in the meantime, can be swallowed by animals or are break down into microplastics (below 5mm in size) accumulated in the sea and pass into the human and animal food chain.

More recycling and less plastics use is the only answer to this problem: the Ellen MacArthur Foundation (2020) reports that global demand for recycled plastics increased by 17% between 2012 and 2016. In addition, interest in recycling from plastic producers has also intensified. At the same time, there has been a customer turn to reusable plastics from single-use plastics, as well as customer pressure regarding plastic pollution. In the USA for example, reusable plastic packaging for new products is forecasted to be among the fastest growing packaging types.

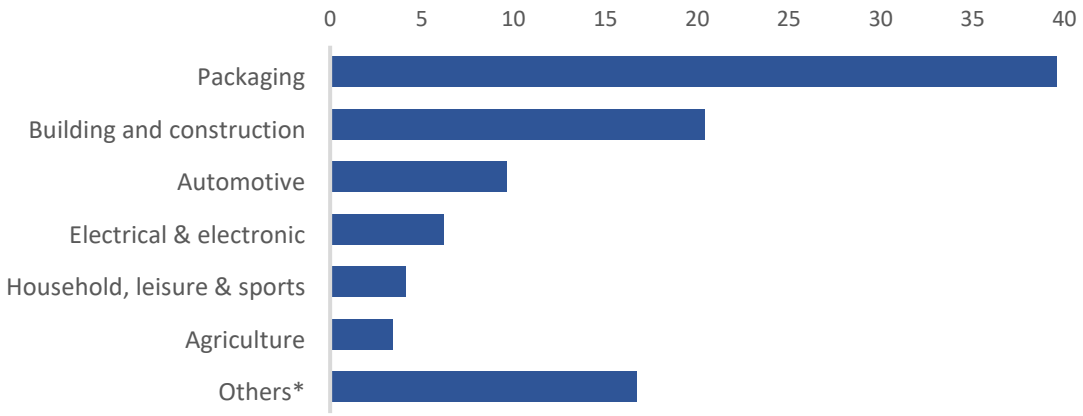

*Figure 15 - Demand for plastics in EU-28 (%, 2019. Source: Association of plastics manufacturers, Plastics Europe 2020. *Appliances, mechanical engineering, furniture, medical, etc.*

Greece has made the circular economy the focal point of its growth strategy since adopting the circular model is a requirement for moving forward on the path to prosperity and sustainable development. The country's long-term objectives were established as well as a more comprehensive strategy for accelerating the transition to a circular economy as part of the 2018–2019 plan.

Sustainable resource management, encouragement of the circular economy, and circular consumption were the plan's pillars. Actions and interventions included in the action plan included: a) regulatory and legislative reforms to support the circular economy and address bureaucracy; b) financing and financial incentives; c) improvement of knowledge, management, exchange procedures, and connection with production, economy, and society; and d) support of the circular economy and networking governance.

The 2018-2019 National Strategy, however, indicated that the implementation of the circular economic model in Greece did not go as swiftly as anticipated and is still in its infancy. This is shown by the fact that Greece's circular economy metrics are significantly lower than those of other EU nations (see Figure 16 and Figure 17).

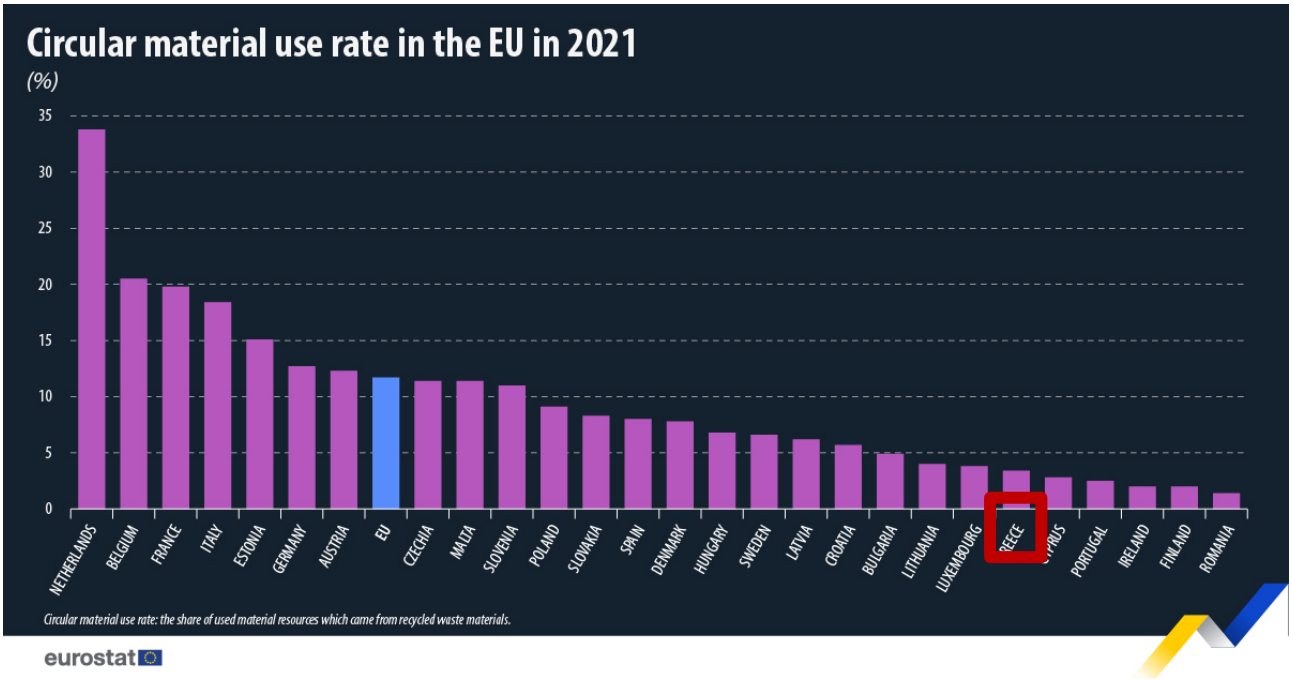

Figure 16 - Circular material use rate (%), 2021 (source: Eurostat)

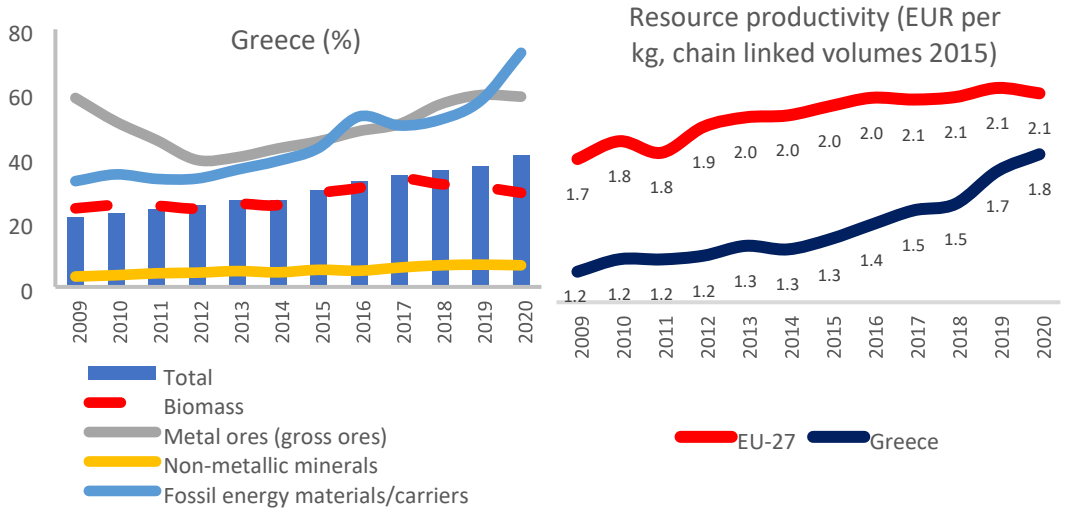

Figure 17 - Material Import dependency in Greece (source: Eurostat)

B. Construction and buildings

On a European level, the building and construction sector consumes 50% of the materials consumed by all economic sectors (Norouzi et al., 2021). It is forecasted that by 2060, 1/3 of the global material demand increase will come from this sector. Globally, construction and buildings accounted for 36% of energy consumption in 2020 (UNEP, 2022). Energy related CO2 emissions of the sector represented 37% of total emissions in 2020, down by 17% since 2015, due to energy decarbonization efforts. For 2021, GHG emissions of the sector are expected to rise due to higher construction demand (UNEP, 2021). The Ellen MacArthur Foundation (2023b) sees opportunities in circular economy practices to reduce the sector's CO2 emissions by 38% in 2050.

In Greece, the share of the construction sector in total Gross Value Added (GVA) is equal to 2% (2019), whereas the waste generated by the sector represents 5% of the total waste (2018), the 4th lowest in

the EU-27 (36%), after Bulgaria, Romania and Slovakia. GHG emissions from the sector constituted 0.5% of total emissions in 2019 (EU-27: 2%), down by 52% compared to 2009 (EU-27: -11%).

Energy efficiency of buildings is a key step in efforts to reduce GHG emissions and the use of resources.

A leading circular economy practice in the construction sector is to lower resource consumption. A key strategy to achieve this is eco-design applied through a) the design of buildings for disassembly, allowing their components to be reused after dismantling, b) sustainable sourcing of materials, such as the use of wood over steel or concrete, or the use of concrete with lower CO2 emissions. Process optimization is another key strategy that includes practices such as a) just-in-time construction with materials ordered on an as-needed basis and b) modular and prefabricated buildings that optimize material efficiency and minimize waste (Cairns et al., 2021).

Resource use optimization through intensification and maximization of product utilization, via the sharing economy, including sharing tools, materials, information and other assets, and short-term renting is also critical. It is noteworthy that in Europe, 60% of office space is unused during working hours. Circular practices also include the extension of buildings' lifetime and their redesign based on circular principles and guidelines by means of their maintenance, reparation and renovation (Cairns et al., 2021). The architecture of cities should be a focus of circular economy policy in the construction industry, with municipal plans mandating that circular economy concepts be used in the construction of new buildings. Urban extension and GHG emissions can be minimized by designing compact cities with structures that have a variety of functions and purposes.

C. Mining and metal industry

The mining and quarrying industry and the manufacture of basic metals and fabricated metal products, contributes 1.5% to the Greek GVA (2019) and nearly 10% to exports. At the same time, the sector is responsible for a considerable amount of waste, such as waste rock, emissions, water treatment sludge and leftover waste material (Author, 2016). In many European countries, waste generation from mining represents a large percentage of total generated waste, with the EU-27 average standing at 27%. Greece (56%), together with Romania (88%), Bulgaria (82%), Finland (75%) and Sweden (75%) record the largest shares of waste generated from mining. On a global scale, mineral and metal products produce over 100 billion tonnes of solid waste per year and consume large amounts of resources (Cairns et al., 2021).

Some metals and minerals, such as aluminum and steel, exhibit durability, anticorrosion, conductivity and formability properties and thus can be indefinitely recyclable so that their inherent properties are not altered. In Greece, the steel industry uses only scrap as a primary resource for its production. The demand for metals, minerals and rare earth elements is expected to increase substantially in the future, largely due to their role in the circular economy and their use in green building construction, transportation, electric vehicles and electronics. Mineral and metal production is expected to surge by 250% by 2030 to keep up with demand, and as such it will also increase raw material extraction and waste generation (Accenture, 2020).

The need of new infrastructure for renewable energy constructions will require large quantities of metals and minerals: special types of steel for the construction of pipes and pipelines, copper, aluminum and graphite for electrical cables, generators and electric motors, various non-ferrous metallic minerals for solar photovoltaic panels and so on. Indicative of the demand for metals for

renewable energy constructions are the requirements for a 3-megawatt wind turbine: 335 tonnes of steel, 4.7 tonnes of copper, 1,200 tonnes of cement, 3 tonnes of aluminum, 2 tonnes of rare earths and zinc.

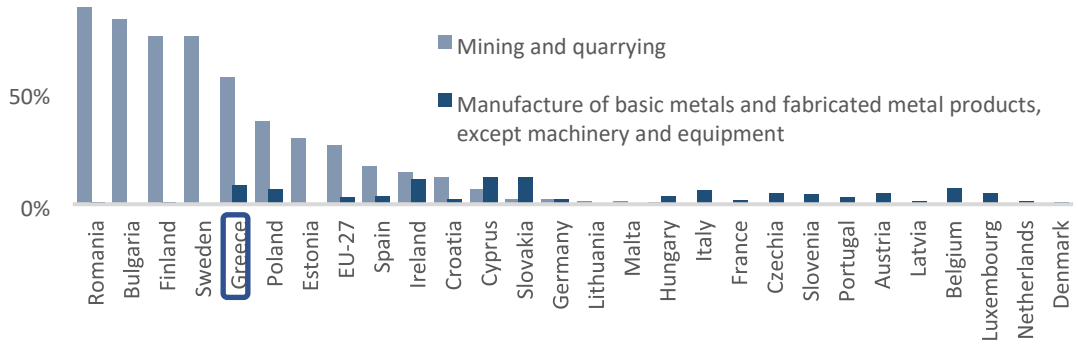

Figure 18 - Waste generation from mining, quarrying, manufacture of basic metals 100% and fabricated metal products (% of total waste, 2018). Source: Eurostat

The metal industry can play a critical role in the production of green technologies and can contribute the most to the circular economy through best practices and programs, aimed at industrial symbiosis of various mining operations (Author, 2016). The use of recovered and recycled metals, residues and waste from mining operations (e.g. mine tailings to produce renewable energy), decreased resource consumption, eco-design strategies and product life extension are among the main circular objectives of the industry (Cairns et al., 2021).

Technology and innovative methods for metal and mineral extraction are crucial for aligning with the circularity principles. The environmental impacts of extraction should be focused upon low-carbon techniques, water conservation, minimization of the produced waste and the use of harmful chemicals. Best practices also include the short-term rental of extraction equipment that can be designed for reuse, repair or refurbishment, the recovery of mine sites after the completion of all operations, as well as "environmental offsets" in order to counterbalance damages in the surrounding ecosystem.

New technologies will enable a) the recovery of valuable waste from the extraction and processing of metals and minerals and b) the use of metals and minerals in various circular applications.

D. Electronics

Electrical and electronic equipment has a significant environmental impact due to the extraction of raw materials, such as precious and rare earth metals, used for their energy-intensive production. After products reach their end-of-life, vast amounts of e-waste are created, many of which can contain various toxic and hazardous additives and substances (such as mercury, BFR plastics, CFCs and HCFCs). When handled improperly, e-waste can pose a threat to human health and the environment. E-waste raw materials' global value in 2019 was over EUR 49 bn (The Global e-waste Statistics Partnership). Over 50 Mt of e-waste are created each year: in 2019, global e-waste generation reached 53.6 Mt or 7.3 kg per capita, of which only 17.4% or 9.3 Mt was collected and properly recycled (Global E-waste Monitor, 2020).

Of the more than 80% of e-waste that is left unrecycled, 4% is thrown away as household garbage and the rest is disposed in landfills, traded or recycled in unsafe ways for human health and the environment

(Forti et al., 2020)Moreover, half of global e-waste originates from personal devices, such as cell phones (435 tonnes in 2016) (Beaule et al., 2020). However, 2/3 of European citizens would like to continue using their digital devices for longer periods, given that their performance is not largely affected.

If no action is taken to further increase the circularity of the sector, e-waste could reach 120 million tonnes by 2050 (World Economic Forum, 2019). Less waste, reuse, refurbishment and proper treatment of e-waste by setting greener targets will support circular economy objectives. The EC's "Circular Electronics Initiative" aims to extend product lifetimes and address e-waste challenges by a) providing regulatory measures for electronic devices under low-carbon and eco-design directives, b) setting electronics as a priority sector for the "right to repair", c) providing options for an EU-based "take back" scheme for old cell phones, tablets and chargers and d) reviewing hazardous substance restrictions on e-waste. The Ellen MacArhtur Institute (2023) refers to various business opportunities in the circularity of electronics and e-waste, which include: a) electronics resale platforms and marketplaces for refurbished electronic devices, b) device repair, maintenance and upgrade, c) recycling and disassembly technologies, d) access-over-ownership business models and e) reverse logistics of electronics and infrastructure for collection and sorting.

Device-as-a-service (DaaS) supply chain models are also gaining ground in recent years and especially after the outbreak of the COVID-19 pandemic. DaaS models are lease-like models in which consumers and businesses can acquire hardware without the obligation of buying, configuring or managing it. Cloud computing and the Internet-of-Things (IoT) have also supported the dematerialization of the electronics industry. By 2019, DaaS solutions were offered to customers by PC producers with an over 65% market share (from 0% in 2015) (Beaule et al., 2020). The International Telecommunication Union has set the target of the global e-waste recycling rate at 30% by 2023 (from 17.4% in 2019), while large electronics companies, such as Apple, Dell, HP, Samsung, Cisco and various other brands, are elaborating how to increase recycling and reuse of their products, by placing emphasis on eco-design and material efficiency.

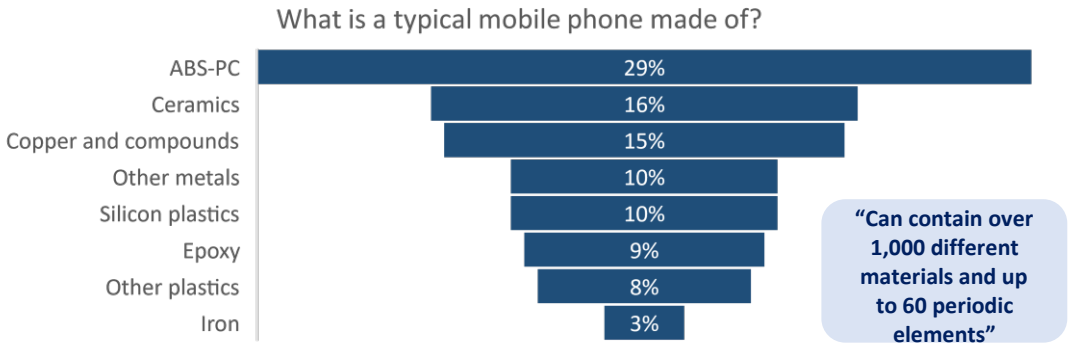

Figure 19 – What is a typical mobile phone made of. Source: World Economic Forum 2019 and Smart Prosperity Institute 2020

Although e-waste is the fastest growing waste stream with an annual growth rate of 2% and potentially harmful effects for human health and the environment, less than 40% is recycled in the EU.

E. Energy related greenhouse gas emissions and net-zero 2050

Around ¾ of GHG emissions originate from the energy sector worldwide. In the EU-27, this percentage stands at 82% and in Greece at 75% in 2019, although it has decreased cumulatively by 14% and 39%, respectively, relative to 2009. Fuel combustion in energy industries (public electricity and heat production, petroleum refining) account for 39% of total emissions in Greece, in manufacturing industries and construction for 6%, in transport for 22% and in other fuel combustion sectors for 7%.

Renewable energy sources (RES) play a catalytic role in green transition and circular economy, supporting the decarbonization of the energy sector and reducing GHG emissions from fuel combustion. Therefore, reducing emissions to net-zero up to 2050 and limiting the long-term increase of global temperature to 1.5°C is not feasible without expanding renewable energy. Policy measures to achieve that goal include the expansion of RES and the enhancement of energy use efficiency. Energy storage technologies, such as pumped hydro, batteries, thermal energy or mechanical energy storage, are key to smoothing out energy demand and reducing fossil fuels dependency.

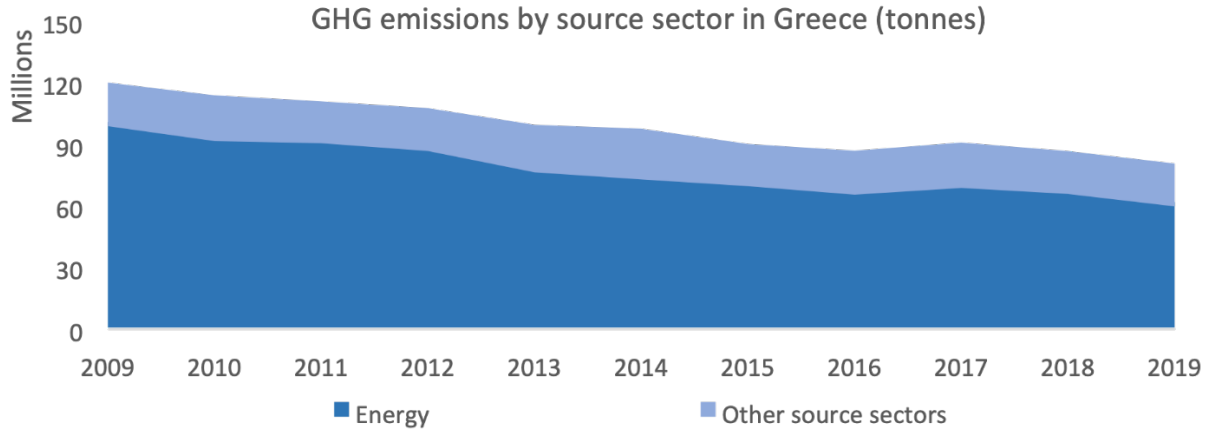

Figure 20 - GHG emissions by sector in Greece (tonnes). Source: Eurostat

F. Energy: Transport and Batteries

Transport is a key sector for a sustainable, decarbonized economy and among the sectors that will play a key role in the transition to a circular economy. To achieve that, transport will have to rely increasingly on the use of renewable fuels and electric mobility, but also on a different urban planning, on sharing vehicles, on new vehicle designs for reuse and remanufacturing and on new rules for the end-of-life vehicles.

RES used in transport (road, water, air, rail) include biofuels blended with conventional fuels, upgraded biomethane and electrification, either through battery electric and plug-in hybrid vehicles or the development of hydrogen fuel cell electric vehicles. So far transport is the sector with the lowest penetration of renewable energy. The share of energy from RES gross final consumption in transport stood at 9% in 2019 in the EU-27, increased only by 4 p.p. since 2009. In Greece, although the RES average share was increased significantly to 20% (from 9% in 2009), being equal to the EU-27 average, the share of RES in transport stood at the particularly low level of 4% in 2019.

Electrification of mobility relies heavily on the extensive use of new battery technologies that are also used in consumer electronics and renewable energy storage systems.

Batteries contain various minerals, metals, chemicals and critical raw materials, obtained under mining procedures with harmful effects for the environment. In Europe, over 1.9 million tonnes of battery waste are produced annually, with collection and recycling rates that vary according to the battery category. According to global demand projections, demand for batteries is expected to increase substantially until 2030, to over 2,000 GWh (Statista) (from 185 GWh in 2020), due to the rising demand for consumer electronics, but primarily because of the expected surge in transport electrification. Demand for lithium-ion batteries (LIBs), a rapidly growing technology that can be used in portable electronics, electromobility and stationary energy storage systems, is predicted to soar over the next decade, increasing more than 30% per year. Up to mid-century, the needs for electric vehicles and energy storage in the EU will require 60 times more lithium and 15 times more cobalt (European Parliamentary Research Service).

G. Food and agriculture

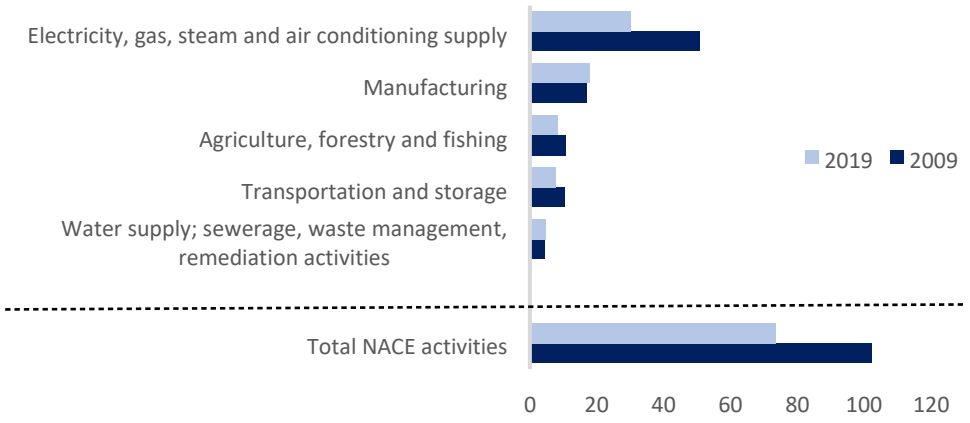

Figure 21 - The first five economic sectors with the highest GHG emissions in Greece (tonnes). Source: Eurostat, Circular economy

Food production is expected to surge by 70% in 2050 compared to 2005, as a result of markedly higher food demand due to the population growth. The agri-food sector plays a pivotal role in the Greek economy. Agriculture, forestry and fishing contributes 4% to total GVA and 3% to the manufacture of food products, beverages and tobacco products (2019). Waste generated from the agri-food sector in Greece accounted for 3% of total waste generation in 2018 (1% from agriculture and 2% from food, beverages and tobacco manufacture), same as that of the EU-27. GHG emissions from agriculture, forestry and fishing represented 11% of total emissions in 2019 in Greece, the third largest percentage after those of electricity, gas, steam and air conditioning supply (41%) and of manufacturing (25%). On the other hand, gas emissions from food manufacturing accounted for only 1% of all NACE activities emissions. On a global scale, the agri-food industry produces approximately ¼ of GHG emissions, being the second largest source of emissions after the energy sector.

Large-scale farming and especially livestock farming, is responsible for a significant amount of GHG emissions of carbon dioxide, methane and nitrous oxide, released through animal waste and the widespread use of fertilizers.

Lowering consumption of resources, a circular economy practice for the agri-food sector, can be achieved by a) eco-design, which includes the design of farms that cut down CO2 emissions and have higher energy efficiency and b) process optimization, which includes the shortening of supply chains to match consumer demand with supply, by avoiding food waste and increasing consumer awareness of

sustainable food choices. Moreover, product use intensification via a) sharing, donation and reselling of food in surplus and b) long-existing practices of providing “new life” to resources through recycling, composting or energy recovery (e.g., fertilization with manure) can lead to resource optimization. Food design, which refers to product concept, ingredient sourcing, selection and packaging is also of major importance. Food design is based on using ingredients that are recycled and/or have a lower environmental impact (Ellen MacArthur Institute, 2023b).

Furthermore, the circular economy for food also focuses on cities, since 68% of the global population is expected to live in cities and 80% of food to be consumed by urban residents by 2050 (Ellen MacArthur Institute, 2023b). Circular economy practices for food in cities can be achieved via municipal programs aimed at the education of city residents on food waste and the creation of relationships with local food producers. Cities developed under circular economy principles and designed to enhance the resilience of urban food systems, can promote local food production, urban hydroponic farms and the use of food waste. The EU member countries can achieve food waste reduction of 30% by 2025 and 50% by 2030 through a) cutting down food waste generation in primary production, processing and manufacturing, retail and other distribution of food, restaurants, food services and households, b) promoting food donation and c) developing food waste prevention programs (EC, 2018/851).

2.4. North Macedonia

2.4.1. Policy framework of North Macedonia

Research & Innovation and Economic Growth

In accordance with the Joint Research Centre's methodology and recommendations, the Republic of North Macedonia began developing its first Smart Specialization strategy in 2018. The process was seen as being of highest significance for the economy's future growth from the onset, bolstering competitiveness based on the nation's innovation potential and igniting smart growth by identifying high-priority domains in which new added value would be developed. Finding and implementing better, more innovative, and competitive solutions within the prioritized domains while taking into account the COVID-19 pandemic's obstacles as well as new difficulties posed by the digital and green transition is one of this project's core objectives.

The **Smart Specialization Strategy of North Macedonia** is still in development, and it will be published soon. Radavanovic et al. (2022) initiated a mapping of country's economic, innovation and scientific potential. An evidence-based judgment was made for the final list of priority domains that would proceed to the entrepreneurial discovery process stage at the conclusion of this stage of the Smart Specialization process. The following priority areas are included on this list:

1) Sustainable food and beverage production and value chains
2) Information and communication technology
3) Smart/sustainable buildings and materials
4) Electrical equipment and mechanical parts.

On the other hand, there are still significant structural obstacles to economic growth caused by weak state institutions, poor and declining productivity of local businesses, and flaws in investment, competition, and business regulation policies. The lack of a competitive corporate legal framework leaves the private sector vulnerable and unable to fully capitalize on the country's location. Additionally, there are concerns about budgetary sustainability, and the government has little room for fiscal expansion. Poor and unequal educational accomplishment inhibits the labor market's ability to provide workers with the skills necessary to fulfill the changing demands of the modern economy and fosters inequality in access to economic opportunities. Last but not least, urgent action is needed to address climate and environmental challenges, such as air pollution, which might halt economic expansion and reverse the reduction of poverty. This section presents the latest and most important business, sustainability-related strategies of North Macedonia; namely, the National Small and Medium Enterprise Strategy (2018-2023) and the National Energy and Climate Plan (NECP).

At its 62nd meeting in April 2018, the Government approved the **National Small and Medium Enterprise (SME) Strategy for the period 2018-2023**. The plan should serve as a framework for fostering the growth of SME's and the creation of an environment that is conducive to entrepreneurship development and the Small Business Act (SBA) of the EU. The National SME Strategy (2018-2023) intensifies efforts to boost innovation and competitiveness while continuing efforts to improve the business climate for the growth of SMEs. Therefore, the plan aims to keep the Government's reform momentum going and strengthen these reforms wherever possible (Republic of Macedonia, 2018).
The strategy proposes that SMEs become the main contributors to inclusive economic growth and the creation of stable, well-paying jobs in North Macedonia by the year 2023. It aspires to increase SMEs'

competitiveness, by creating a framework for public, corporate, and civil society players to work together in support of SME development and innovation.

The SME Strategy is anticipated to:

- Create a conducive business environment for all SMEs, including family enterprises, through a simplified legal and regulatory framework. This will foster an atmosphere where entrepreneurs and family businesses can flourish and where creativity is rewarded.
- Ensure that entrepreneurs who failed in the past will have access to new opportunities.
- Create regulations in accordance with the "Think Small First" approach; as a result, a unique regulatory impact assessment tool called the SME Test will be introduced to examine the ex-ante consequences of all legislative measures affecting SMEs.
- Improve social dialogue, data and analysis for the SME sector, strengthen the representation of the SME sector, and increase the impact of business and financial services by creating an online SME Portal
- Make it possible for the state administration to be available to meet the needs of SMEs
- Streamline access to capital for small enterprises and create a business climate that encourages prompt payment in commercial transactions
- Assist SMEs in taking advantage of the opportunities provided by the EU single market.
- Support innovation in the SME sector by enabling the development of better networks between academia and industry, including support for IR and the establishment of new science and technology parks and innovation incubators.
- Enable SMEs to capitalize on environmental opportunities by supporting the growth of "green SMEs"
- Promote a more productive and competitive SME sector by increasing support for the improvement of the internationalization of the SME sector, including enhanced access to support services for export promotion and creation of strategic alliances.

Sustainable Development

North Macedonia has had a **National Strategy for Sustainable Development** since 2009, which is based on the Millennium Development Goals and sets the following priorities (Republic of Macedonia, 2009):

- The government should have an innovative, supportive and leading role in relation to the municipalities and the private sector, which in turn have an operational role in achieving sustainable development in the Republic of Macedonia.
- To introduce E-governance (electronic) at the national and local level. This would ensure greater transparency and efficiency and would represent a good way for faster and more efficient implementation of sustainable development.
- The short-term focus should be on the highly educated workforce, in order to prevent further "brain drain" and preferably to attract Macedonians living abroad who are highly qualified, well-educated and have great potential. Furthermore, they should be the driving force that would drive development, described in detail in the NSDR, Part II: Strategic Framework and Analysis.

The country became the 30th member of the NATO Alliance, and the EU leaders formally approved the opening of EU admission negotiations as the **National Energy and Climate Plan** (NECP) was being created. The five aspects of the Energy Union—decarbonization, energy efficiency, supply security, internal energy market, and research, innovation, and competitiveness—are further discussed in the Integrated National Energy and Climate Plan. 63 specific policies and measures are suggested in the

NECP in order to accomplish the goals and targets for each of the five dimensions (Republic of North Macedonia, 2020). A few of the suggested policies and actions are connected to many dimensions. The NECP was adopted by the Government in 2022 as an Operative Strategic Planning document and covers the period from 2021 to 2030.

In terms of impact, NECP aspires:

- 82% GHG emission reduction target by 2030 compared to 1990, or 78% compared to BAU scenario.
- 38% share of energy to come from renewable sources in gross final consumption of energy by 2030
- 34.5% indicative target for energy efficiency in relation to the primary energy consumption, while for the final energy consumption is 20.8% in 2030, respectively, relative to the BAU scenario (presented in the Energy Strategy),
- 59% net import energy dependence by 2030, while improving the overall integration in European markets.
- High level of interconnectivity during the overall period in terms of internal energy market integration and
- Increased funding for research and innovation, promote clean energy technologies and improve the competitiveness.

Relevant Legislative Framework

- The Energy Law (Official Gazette 96/2018, 96/2019 and 236/2022);
- The Energy Efficiency Law (Official Gazette 32/2020, 110/2021 and 236/2022);
- With the Decision 2021/14/MC-EnC of the Ministerial Council of the Energy Community, the Contracting Parties committed themselves to transpose and implement the Governance Regulation.

Other national plans of high relevance to the implementation of NECP

- The National Energy Strategy till 2040;
- The country has so far submitted to the UNFCCC three National Communications on Climate Change and two Biennial Update Reports. The Fourth National Communication and Third Biannual Update Report (TBUR) to the UNFCCC are in the process of preparation.

The strategic plan for the decarbonization component calls for implementing all identified climate change mitigation measures that would further cut GHG emissions while also raising the proportion of renewable energy sources in gross final energy consumption in a sustainable way. The country will make an effort to maximize the reductions in primary and final energy consumption with regard to the energy efficiency component. The prediction using current policies indicates that due to continued economic expansion, primary and final energy consumption will rise by 38% and 55%, respectively, in 2040 compared to 2017. The nation wants to increase its use of renewable energy sources and energy efficiency in order to reduce its reliance on energy imports, but it also wants to diversify its supply sources by using natural gas (mainly in the industry sector).

Regarding the internal energy market, the NECP seeks to create a day-ahead market that is organised, allows for coupling with neighboring day-ahead markets, and takes part in efforts to create regional markets. The nation will work to include the energy transition technologies and measures into its research and innovation (R&I) priorities with regard to the research, innovation, and competitiveness

dimensions. Also, it intends to keep providing national support through the mechanisms of the Fund for Innovation and Technology Development (like grants, loans, etc.) for innovation activities in micro, small, and medium-sized enterprises. This support relates to funding research and innovation activities related to energy and climate. In order to maintain their competitiveness, SMEs should be supported and encouraged to broaden their offering of RES and EE services and products by way of appropriate financial and technical channels. The NECP finally highlights the necessity of routinely updating all educational levels' energy-related curricula to reflect contemporary advances in science and technology, particularly those connected to the energy transition.

2.4.2. Sustainability performance of North Macedonia

In terms of sustainability, North Macedonia is ranked 57th globally with 72.3/100 score (Jeffrey Sachs et al., 2022). In 2022, North Macedonia had achieved none of the SDGs, but is on track to achieve SDG1 "No poverty", SDG6 "Clean water and sanitation", SDG8 "Decent work and economic growth", SDG10 "Reduced inequalities" and SDG12 "Responsible consumption and production". No data were available for SDG14 "Life below water", while for SDG13 "Climate action", we see a decreasing performance.

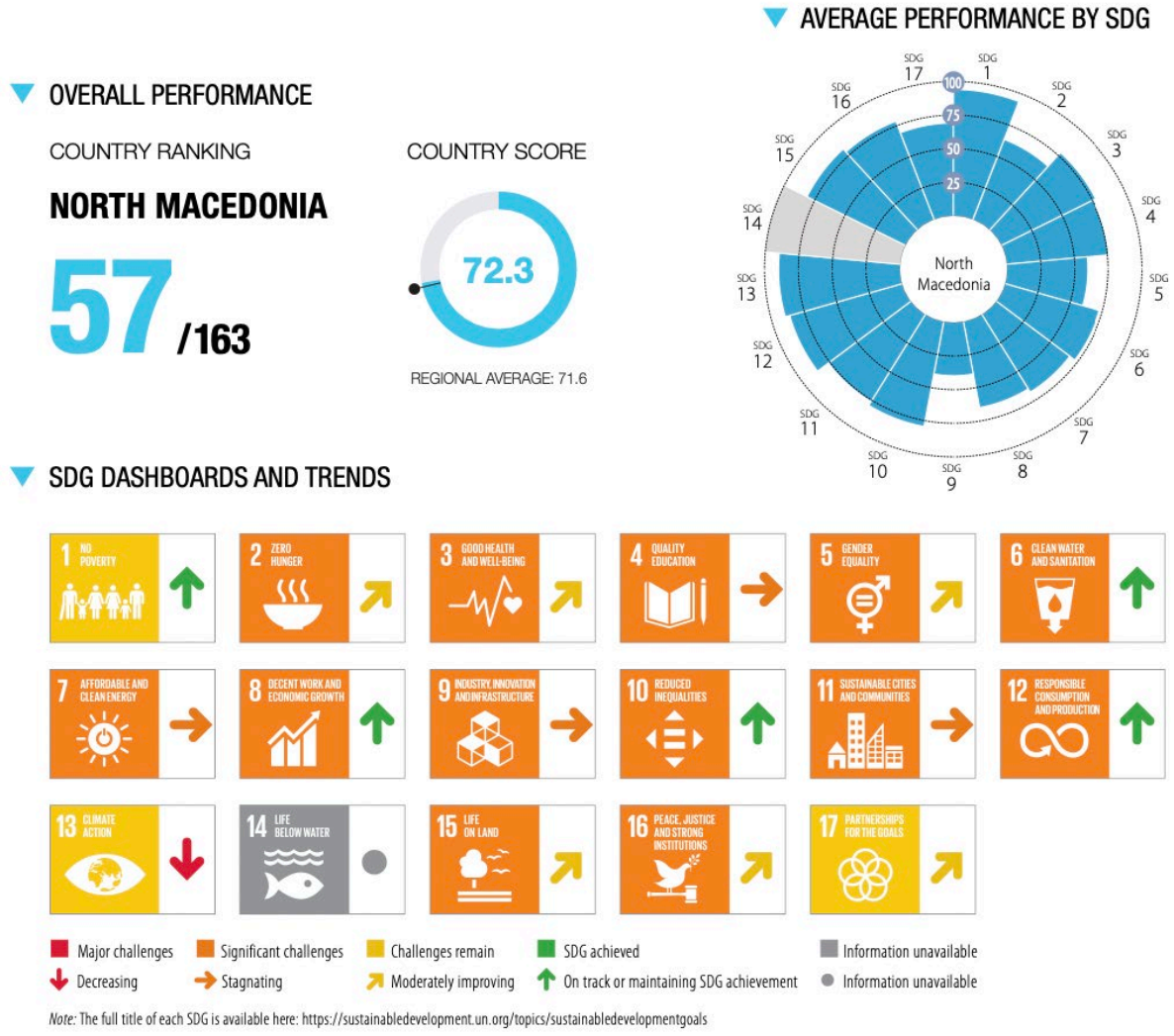

Figure 22 - Sustainability performance of North Macedonia, 2022 (Jeffrey Sachs et al., 2022)

2.4.3. North Macedonia's sectorial analysis

Since gaining independence from Yugoslavia in 1991, which resulted in the loss of the nation's important protected markets and significant transfer payments from Belgrade, the economy of North Macedonia has grown more liberalized with an improved business environment. Today, the GDP of North is around $11 billion GDP and its population is 2 million. By 2020, the nation had ratified bilateral agreements with Turkey and Ukraine as well as the CEFTA, the Stabilization and Association Agreement, and the EFTA with Switzerland, Norway, Iceland, and Liechtenstein. The value of the agricultural sector is 7.2% of the country's GDP, while energy, mainly thermal power plants, mining and metallurgy, trade and tourism contribute significantly to the economy.

The manufacturing industry is a key driver for growth closely related to creation of value-added products, technology development, new employment opportunities, innovation, skills development, increased export, etc. Manufacturing contributed 12.6% of the GDP in 2021, while construction contributed 5.4%.
Steel and iron, textiles and apparel, food processing, and tobacco have historically been the traditional industrial sectors of the Macedonian economy. However, industries including electro-mechanical, pharmaceutical, ICT, and automotive parts are seeing rapid expansion. The growth of the nation's automotive industry was aided by the entry of foreign capital, which also caused a little change in the manufacturing sector's structure and the inclusion of higher added-value goods in exports. The automotive industry (parts manufacture) as a result of FDI in TIRZ and the ICT sector, which contributes 3.8% to GDP and continues to develop, are two new industries that are expanding.

Important parts of the manufacturing sector's structure are also tied to the manufacture of building products and other associated materials, as well as metals, machinery, and other infrastructure elements.
The investment cycle in the economy is closely correlated with the construction industry. Construction will account for 55% of the total gross fixed capital creation in 2021 (Republic of North Macedonia, 2022).

Table 11 - North Macedonia Manufacturing and Construction industry overview

	Number of employees 2021	Number of active companies 2021	Contribution to North Macedonia GDP
Manufacturing	157,563	7,943	12.6%
Construction	54,380	5,487	5.4%
Total number	795,087	72,922	-

In June 2022, the main components of industrial production were manufacturing (81.55%), mining and quarrying (10.02%), and electricity, gas, steam and air conditioning supply (8.43%). The largest components in the manufacturing industry are food and beverages (14.54%), motor vehicles and semi-trailers (8.04%), textiles and clothing (12.45%), machinery and equipment and electrical equipment (12.98%). production of chemicals, chemical products and pharmaceutical products and forwarders (5.84%). The rest consists of a variety of manufactured goods.

The GDP contribution from the construction sector is 39.157 million dinars, or 5.4%. From 7.1% in 2015 to 5% in 2021, construction's contribution of the GDP has declined during the past six years. The

investments in huge capital projects in the infrastructure of the road, rail, and energy as well as in the construction of high-rise buildings are necessary for the growth of construction and the increase of its part in GDP. The value of completed construction works by types of constructions is shown on Figure 23. Pipelines, communication and electricity lines had smallest share of the total construction work in 2011 (only 0,85%) and the highest share in 2019 with 11,81% of all the construction works.

- **Transport infrastructure** follows a trend of increase in the total constriction works (from 4.91% in 2007 to 20.84% in 2020.
- **Residential buildings** have the biggest share of all the construction work. It is important to point out that even though they are still having a dominant role in the sector and the nominal value has been constant, their share has decreased over the years. Namely, in 2007 69.43% of the total value of completed construction works was in residential buildings, while in 2020 this is 31.14%.
- **Reconstruction, recovery, adaptation, capital repairs and current maintenance works in construction** have an increase in the total value of construction works in the last years, from 5.46%, in 2007 to 13.85% in 2020.
- **Non-residential buildings have the second** biggest share of all the construction works. In 2010 they had a share of 20.85% and in 2020 they have share of 17.07% of the total value of construction works.
- **Complex constructions on industrial sites** have an inconsistent share in the total value of construction works. In 2011 they had a share of 9.24%, while in 2020 they had a share of only 2.45% of the total value of construction works.

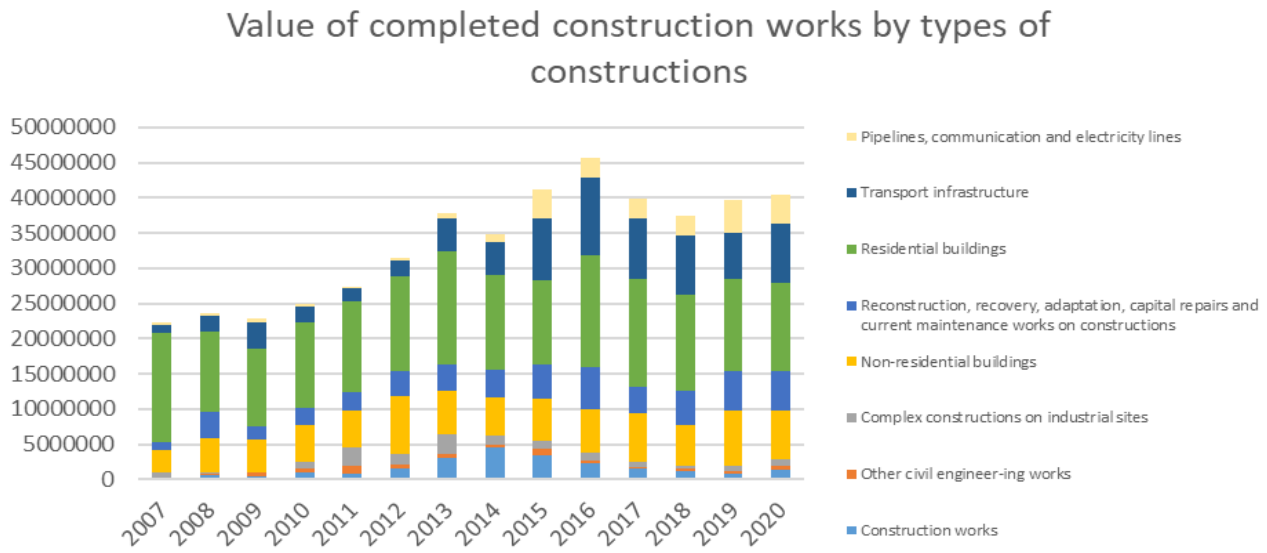

Figure 23 - Value of completed construction works by types of constructions

The number of active economic entities in the country was 72,922 in 2021. 30.0% of the companies work in the wholesale and retail trade sector; 10.9% in the production sector (manufacturing), 10.7% in the sector of professional, scientific and technical activities, 7.4% in construction, 7.6% transport and storage, 6.4% accommodation and food service activities, 3% ICT, etc. According to the number of employees, the dominant participation (81.99%) is of active business entities with employees from 1 to 9 workers, while only 4.51% confirmed that they have 10-19 workers. Active business entities with 20-49 employees are only 3.01%, with 50-249 employees are 1.95% of active companies, with more than

250 employees are only 0.32% while with 0 employees or no data about the number of employees, there are 8.20% of the total active business entities.

For the manufacturing industry of 7,943, companies according to the numbers of persons employed the structure is as follows: the dominant participation (78.09%) is of active business entities with employees from 1 to 9 workers, 7.54% confirmed that they have 10-19 workers. Active business entities with 20-49 employees are 5.95%, with 50-249 employees are 4.00% of active companies, with more than 250 employees are only 0.73% while with 0 employees or no data about the number of employees, there are 3.67% of the total active business entities. In 2019 there were 5,270 registered construction companies in North Macedonia, which is an increase of 6.72% compared to 2018. Most of the construction companies are small companies that employ 1-9 employees (83.5% in 2020). Only 1.1% of the companies employ 5-249 employees and 0.2% of the companies have more than 250 employees.

Depending on whether a sector is labour-intensive or more technically demanding, employees' educational demands will vary. However, skills are at the heart of the transition policy. Innovation and competitiveness come from the creativity and the skills of individuals. There is a global competition for talent and workforce needs to acquire new skills and continuously improve them to boost employability, take new jobs and fuel economic growth. The reconfiguration of global supply chains and investment in new technologies offer a great opportunity to re-shore manufacturing and strengthen industry 4.0 in Europe. However, increasing skills shortages, gaps and mismatches related to the green and digital transition will lead to bottlenecks. The workforce needs sector specialised skills as well as transversal skills, combining domain-specific knowledge with problem-solving and interpersonal skills such as communication, creativity, readiness to learn or critical thinking, among others. Enterprises have difficulties in finding employees with these skills and report that this is delaying their investments. Europe needs foresight and skills intelligence to anticipate and manage change, increase investment in training, nurture new types of work and strengthen social cohesion.

2.5. Portugal

2.5.1. Policy framework of Portugal

Research & Innovation and Economic Growth

The **National Policy for Smart Specialization**, which aggregates a national strategy for intelligent specialization to support innovation, is significant from a strategic perspective. It aims to be a catalyst for innovation that supports the demands and problems of the national landscape without ignoring regional differences (Alexandre et al., 2022). As a result, the strategy presented is divided into six key areas:

- ***Major Natural Assets: Forest, Sea, and Space***
- ***Digital Transition***
- ***Materials, Production Systems and Technologies***
- ***Green Transition***
- ***Society, Creativity and Heritage***
- ***Health, Biotechnology and Food.***

This strategy is anticipated to encourage the integration and optimization of value chains around a paradigm that emphasizes results, which will increase the capacity for innovation and economic growth. These effects force Portugal to change its export-oriented, competitive economic structure in order to maintain prosperity and European integration while creating endogenously dynamic competitive advantages to withstand supply and demand shocks from outside the country. The employment (profile and quality, including salaries), GDP, competitiveness, and innovation indices, as well as a higher level of environmental sustainability of the economy, must reflect these benefits. The strategy provisions actions for the period from 2022 until 2030, while its goals are summarized in Figure 24. This section presents the latest and most important sustainability-related strategies of Portugal; namely the Strategic Vision for Portugal's Economic Recovery Plan (2020-2030), Portugal's Recovery and Resilience Plan (2021-2026), Technological and Business Innovation Strategy (2018-2030), and the National Strategy for Nature Conservation and Biodiversity 2030.

Implementation Objectives

- Selectivity: to ensure concentration in the allocation of resources to projects that fit within the strategy
- Effectiveness of the selection: degree of discrimination provided by the ENEI/EEREI;
- Analysis of demand: a proxy for the assessment of the existence of critical mass and demand trends, inferring the need for adjustments in the domains;
- Participation in the entrepreneurial discovery process.

1st level objectives

- Effectiveness of the instruments
- Strengthening the presence in European value chains
- Reinforcement of university-industry collaboration
- Reinforcement of inter-company cooperation
- Increase in technological absorption capacity.

Structural Objectives

- Integration and extension in value chains
- Structural change
- Specialization

Figure 24 – Portugal's National Strategy for Smart Specialization goals

The **Strategic Vision for Portugal's Economic Recovery Plan until 2030** essentially aims to answer the question: what should be done the day after tomorrow? Covid-19 accelerated the digital transition trend, forcing companies, workers, institutions, the state, and the government to reinvent their work models and systems, making much greater use of telework. In this perspective, the focus on improving the qualifications of the active population and the digital skills of the public administration, institutions, and companies, especially SMEs, is a fundamental pillar for economic recovery. The bet on the digital skills of SMEs can have a very positive effect on the Portuguese economy. Finally, Covid-19, besides exponentiating the technological revolution already underway, had an important impact on the world energy system and CO2 emissions. In this sense, the current plan has the mission of creating conditions to build a socially fair, digital, green, and competitive economy based on a broad national consensus, which may contribute to the creation of employment and social well-being, taking safe steps towards the harmonious development of the country, reducing economic, social and territorial asymmetries (António Costa Silva, 2021).

In this sense, the current plan's goal is to establish the necessary framework for the development of a socially just, digital, environmentally friendly, and competitive economy that is based on a broad national consensus, with the goal of reducing economic, social, and territorial inequalities while also taking safe steps toward the country's harmonious development. It aims to:

1. Complete the building of a strategic network of infrastructures for energy, the environment, and transportation
2. Strengthen the Portuguese population's dedication to education at all levels
3. Bolster the National Health Service (SNS), enhancing its capacity for quick action and restructuring its structure to support the diversification and adaptability of health services
4. Make investments in the social state, helping to generate income and jobs so that those who are poor and socially excluded can live honourably and take an active part in society
5. Invest in the nation's reindustrialization and strategically develop the hydrogen, sustainable bioeconomy, mineral resources, and maritime industries while assuring the decarbonization of activities and a just transition
6. Continue with industrial reconversion and make the necessary preparations for the challenges of the future, including a circular economy, energy transition, and decarbonization
7. Increasing investments in energy efficiency and the use of renewable energy sources
8. Foster territorial coherence by implementing initiatives that protect biodiversity, value natural resources, and alter the environment while preparing for the effects of climate change and short supply and consumption chains
9. Create greener towns that encourage better communal living

It is expected that the Economic Recovery Plan will enable the creation and establishment of a network of vital infrastructures, the qualification of the population and consequent acceleration of digital transformation, investment in the health sector, more careful attention to the social state, and the reindustrialisation of the country, making it more competitive in the future. Furthermore, it is expected that this plan will boost the energy transition and electrification of the economy, greater cohesion of the territory, agriculture, and forestry, and the creation of a new paradigm for cities and their mobility.

The **National Recovery and Resilience Plan** (NRRP) for the period 2021-2026 implements a series of reforms and investments aimed at simultaneously promoting the transformation of Portugal's society and economy in order to prepare them for the challenges of the coming decade, as well as ensuring that the nation can get past the structural barriers impeding its economic, social, and territorial development in a gradual and systematic manner. In other words, Portugal’s NRRP responds to the urgent need to support a strong recovery, get ready for Portugal's future, allow for a green and digital transition, and foster social resilience following an extraordinary catastrophe brought on by the epidemic. Portugal will become more resilient, sustainable, and better equipped for the opportunities and challenges presented by the green and digital transitions as a result of the program's reforms and investments. Regarding the green transition, Portugal's strategy includes a €300 million investment program to increase the energy efficiency of residential structures. Additionally, a €600 million extension of the metro networks in Lisbon and Porto will increase the sustainability of transportation. In terms of the digital transition, there will be, for instance, lifelong learning programs, courses, and qualifications, as well as the modernization of institutions providing vocational education and training.

In terms of social resilience, the National Health Service ($1.4 billion) will be strengthened, and there will be more social housing options available for a variety of target groups. There will be initiatives to invest in fostering research and innovation in order to strengthen economic resilience (Ministério do Planeamento, 2021).

Approved by the Council of Ministers Resolution 25/2018, the **Technological and Business Innovation Strategy 2018-2030** constitutes Portugal's main benchmark for innovation policy. It has become necessary to define a national strategy to generate greater competitiveness in the Portuguese economy and the insertion of companies into international chains, namely through increased private expenditure on research and development (R&D) and greater selectivity of public expenditure, the enhancement of skilled and scientific employment, the intensification of collaboration between companies, especially small and medium enterprises, and scientific and technological infrastructures, and the incentive to apply the results of R&D activities (Presidência do Conselho de Ministros, 2018). It seeks to:

1. Achieve a global R&D investment of 3% by 2030, with a relative share of 1/3 public and 2/3 private expenditure, corresponding to a global R&D investment of 1.8 % of GDP by 2020;
2. Achieve 60 % of 20-year-olds in tertiary education by 2030, with 40 % of tertiary education graduates in the 30-34 age group by 2020 and 50 % in 2030;
3. Achieve a European leadership level of digital skills by 2030, in association with access to and use of the internet, as well as demand for markets, business development, and development of specialist skills;
4. Increase exports of goods and services, with the ambition of reaching an export volume equivalent to 50% of GDP in the first half of the next decade, focusing on the performance of the technological balance;
5. Bring the levels of investment in risk capital closer to the European average;
6. Reinforce the attraction of foreign direct investment.

It is expected that the Technology and Business Innovation Strategy will increase investment in R&D, ensuring qualified employees and the creation of 25,000 new qualified jobs, stimulate the creation and the potential of innovation in collaboration with the startups program and promote the capacity of the organisation’s development, giving training to employees to prepare them for innovation. The valorisation of innovation deserves more remarkable and systematic dissemination. Promoting the dissemination of scientific results, demonstrative examples, successful cases of creation, development, and application of new technologies and that reveal the capacity of national innovation agents (companies, innovation centres, universities, researchers) is essential for their activities to be more socially valued, attracting more interest from citizens for technological and science-based activities.

Sustainable Development

In December 2019, Portugal developed its **National Energy and Climate Plan (NECP) 2021-2030** and a few months later its **National Hydrogen Strategy (EN-H2)** (Portuguese Republic, 2019, 2020). The EN-H2 primary goal is to introduce incentives and security for the energy industry, fostering the introduction of hydrogen as a pillar of sustainability across time integrated into a more thorough transitional plan to a reduced carbon economy. It outlines the existing and potential uses of hydrogen in the energy sector and other economic sectors, while it gives a solid framework to all companies and promoters with hydrogen projects making possible to consolidate these projects into a broader and more coherent Strategy. Carbon tax exemptions for natural gas used to generate electricity (except from co-generation) will gradually be reduced starting in April 2020. Although the NECP suggests that natural gas electricity generation will be maintained until at least 2040, this is meant to favor the deployment of renewable generation.

Portugal wants to establish a carbon neutral economy and be at the forefront of the energy transformation. Portugal has pushed for higher GHG reduction goals, the incorporation of renewable energy sources into various sectors, energy efficiency improvements, and interconnectivity by the year 2030 on both a national and a European level. In order to achieve the highly considerable decarbonization of the national economy for the 2030 horizon indicated by the evolution of national emissions in distinct carbon neutral trajectories, it will be necessary to ensure that the various areas of activity contribute to this goal. In this respect, all industries have the ability to cut emissions, albeit this is not true for all industries, and GHG depend largely on the level of technological maturity and cost-effectiveness. Decarbonization is therefore anticipated to be more prominent during the following ten years in the areas of building, transportation, and power production. On a sectoral level, the following national objectives were collectively established for the year 2030. (non-ETS sectors). Portugal's NECP aims to achieve the following:

- Reduce GHG emissions between 45-55% compared to 2005 levels by 2030.
- Increase the share of RES by 47% in gross final energy consumption.
- Reduce primary energy consumption by 35%.

The NECP and EN-H2 are designed to put Portugal on a path to achieving the objectives outlined in the **Roadmap for Carbon Neutrality 2050 (RNC2050),** which calls for complete decarbonization of transportation and electricity generation by 2050 relative to 2005 levels, as well as carbon sequestration to achieve carbon neutrality (Portuguese Republic, 2018). The RNC2050 aims to reduce primary energy demand to less than 12.5 Mtoe, compared to 22.1 Mtoe in 2019, and final energy demand to less than 11.4 Mtoe, compared to 17.1 Mtoe in 2019, through the deployment of renewables to cover 86–88% of final energy demand, electrification (with electricity covering 66–68% of final energy demand), and major demand reductions.

In addition to the above, Portugal has also developed a **National Strategy for Nature Conservation and Biodiversity 2030** is based on the understanding that Portugal's natural heritage makes a significant

contribution to the international affirmation of the nation. Similar to this, according to the XXI Constitutional Government's Programme, Portugal should take the lead in the economic valuation of biodiversity and ecosystem services, recognizing them as strategic assets crucial to territorial, social, and intergenerational cohesion (Ministério do Ambiente, 2017).

The issues of employment (needs to be more qualified), wealth creation (required to be more sustainable), and an increase in well-being are at the center of the current paradigm of national environmental policy, which is based on the valorisation of the territory and the promotion of the circular economy (desired to be shared by all). It also aims to consolidate a document that can be used as a reference about the challenges facing the Portuguese Republic for the post-2020 period, within the context of its geopolitical framework. This is done by taking into consideration the commitments made under the 2030 Agenda for Sustainable Development, particularly concerning the implementation goals and targets, the Strategic Plan of the Convention on Biological Diversity, and the European Union Strategy for Biodiversity.

Finally, in 2017, Portugal published its National Circular Economy Action Plan that aims to develop new economically viable and ecologically efficient products and services, rooted in ideally perpetual upstream and downstream conversion cycles. The results are minimizing resource extraction, maximizing reuse, increasing efficiency and developing new business models. The plan presents three levels of actions to be introduced and worked on over the next three years: transversal, national actions that consolidate some of the actions of various areas of government for this transition; sectoral agendas, especially for sectors that are more intensive in the use of resources and of an export nature; and regional agendas, which must be adapted to the socio-economic specificities of each region (Ministry of Environment, 2017).

2.5.2. Sustainability performance of Portugal

In terms of sustainability, Portugal is ranked 20th globally with 79.2/100 score (Jeffrey Sachs et al., 2022). Portugal submitted a VNR in 2017 and has included them in the national budget. However, they are not integrated into sectoral action plans or a national SDG strategy yet. In 2022, Portugal had achieved SDG7 “Affordable and clean energy” and is on track to achieve SDG1 “No poverty”, SDG5 “Gender equality”, SDG6 “Clean water and sanitation”, SDG9 “Industry, innovation and infrastructure” and SDG16 “Peace, justice and strong institutions”. Nonetheless, major challenges remain at SDG2 “Zero hunger”, SDG12 “Responsible consumption and production”, SDG14 “Life below water”. Specifically, in SDG14, it noted a decreasing performance.

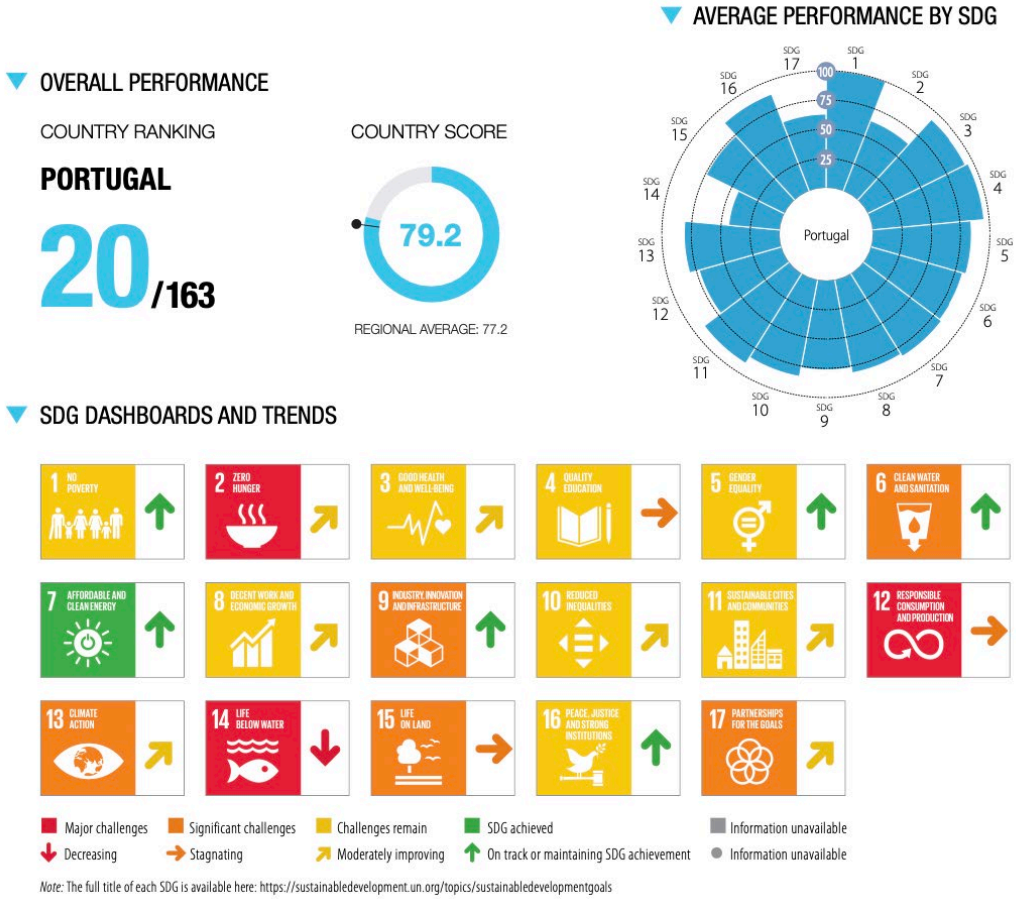

Figure 25 - Sustainability performance of Portugal, 2022 (Jeffrey Sachs et al., 2022)

Portugal is a member of the average performance category for eco-innovation. Performance in comparison to the EU has improved over time. Portugal outperforms the rest of the EU on all three **circular economy** (CE) parameters. Portugal has relative advantages in terms of socioeconomic results, whereas Portugal has relative disadvantages in terms of eco-innovation initiatives. Academic papers on eco-innovation and productivity of greenhouse gas emissions are the best performing eco-innovation indicators. Patents pertaining to eco-innovation and the number of ISO 14001 certifications are the eco-innovation indicators that are performing the worst (Pacheco, 2022). According to CE indicators, Portugal's performance reveals relative strengths in corporate operations and relative shortcomings in society behaviors. SMEs recycling waste, water, or materials for own use or sale within the enterprises by inventing and the number of eco-labeled goods and services are the strongest performing CE indicators. The proportion of businesses that repair computers, personal and household goods, and media coverage of the circular economy are the two CE measures with the worst performance.

2.5.3. Portugal's sectorial analysis

With $219 billion GDP and 11 million people, Portugal's economy is placed 34th in the 2019 Global Competitiveness Report by the World Economic Forum. The European Union (EU), whose nations received 72.8% of Portuguese exports and were the source of 76.5% of Portuguese imports in 2015, accounts for the vast bulk of Portuguese commerce. With 68.1% of the working population employed and accounting for 64.7% of the country's GDP the tertiary sector is currently the most significant sector of the Portuguese economy. It is followed by the industry sector, which accounts for 24.5% of jobs and

19.6% of GDP. Fisheries and agriculture, which made up 25% of the economy in 1960, have dramatically lost ground and currently account for only 2.2% of the GDP while still supporting 7.5% of the labor force. The main industries in Portugal today are those related to machinery, electrical and electronic equipment, automotive and shipbuilding, injection moulding, plastics, and ceramics, textile, footwear, and leather products, oil refineries, petrochemicals, cement, beverages, and food, as well as the furniture, pulp and paper, wood, and cork industries. Portugal's tourism industry has grown dramatically, with 6.3 million foreign visitors (UNWTO, 2022).

In alignment with the RIS3 priority "Materials, Production Systems and Technologies", the Portuguese **Moulds Cluster** is the 3rd largest plastic injection mould producer in Europe and the 8th worldwide with more than 70 years of experience. The automotive industry is the primary customer of Portuguese mould production, including high-quality injection parts from a broad range of polymers. However, the medical devices industry is increasing the demand for 3D printing and plastic injection solutions. An 85% export rate, its high quality, a strong specialization, and the track record of the Portuguese companies are some of the factors why one should consider the Portuguese mould industry.

The most popular method of producing plastics is called plastic injection moulding, and it has many industrial uses. Portuguese companies that create custom plastic injection moulds provide flexible, complete solutions for businesses looking to manufacture a large number of high-quality, reasonably priced components. The Portuguese mould firms support their customers from the outset of a project, taking part in every stage of the product development, with the aid of cutting-edge technology and a highly skilled and highly specialized workforce. Portuguese moulds are exceptional because of their rigorous criteria for perfection.

Continuous R&D spending by Portuguese businesses has resulted in the development of cutting-edge manufacturing techniques like liquid silicone injection (LSR), in-mould decoration (IMD), in-mould labeling (IML), ceramic injection molding (CIM), and multi-component layers that are offered to markets worldwide. The United States has historically been one of the key international markets for the Portuguese moulds industry, along with markets in Germany, Spain, France, the United Kingdom, Poland, and Mexico.

Portugal ranks eighth globally and third in Europe for producing plastic injection moulds, with more than 80% of its total production going overseas. According to research done in 2021 using data from 2019, the GDP related to the moulds sector was 0.34% of the overall GDP. The Portuguese mould industry contains about 606 businesses and employs about 11,184 people. The industry has a large export presence, with sales to foreign markets accounting for over 83,5% of total sales (VITIS, 2021). Spain, Germany, the Czech Republic, and Poland are the markets that are most pertinent.

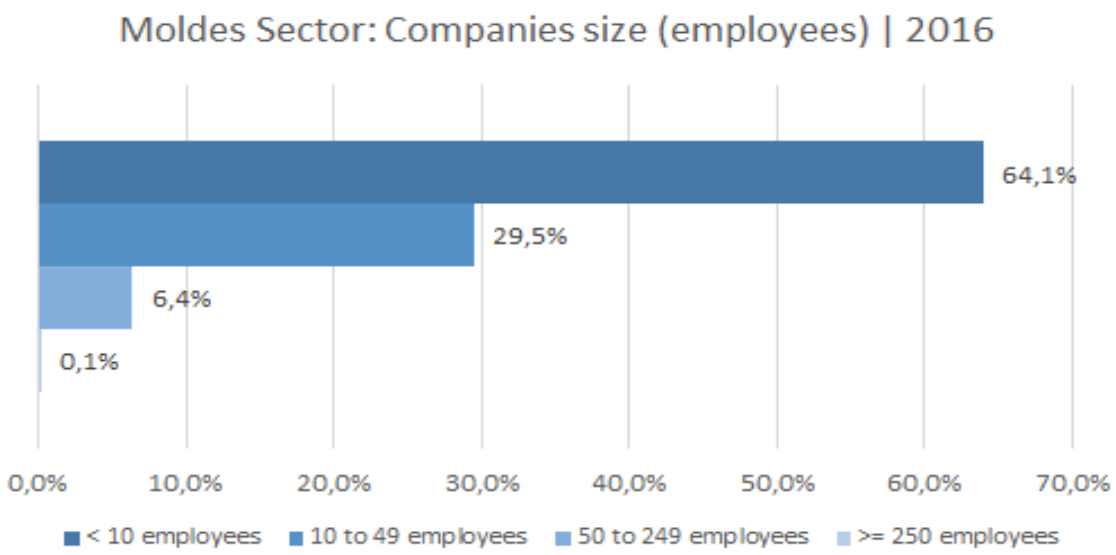

Figure 26 - Moulds Sector (Source: Sinopse 2018, by Direção-Geral das Atividades Económicas).

The automotive industry, which consumes more than 82% of national production, is the most significant client industry, followed by the packaging industry (8%). 2020 will see a 71% reduction in the automotive industry and an 11% growth in packaging. The Portuguese mould industry is mostly centered in two districts: Leiria, which has about 329 businesses (particularly the municipality of Marinha Grande), and Aveiro, which has about 166 businesses (mainly the Municipality of Oliveira de Azeméis). The industry is primarily composed of small businesses, many of which subcontract work in order to specialize in a particular production process activity. Companies are typically larger in the Aveiro region, but in recent years, regional variations in size have been waning.

In recent years, there has been a growing integration of highly qualified technicians, particularly in medium and small-sized companies. Portuguese statistics referring to the distribution of the population by qualification level confirms the increase in the level of education. The sector works with highly demanding markets that require the use of modern technologies, investment in R&I activities and training. In Portugal, there is a growing trend of investment in R&D activities, which is reflected in R&D expenses over the years. The non-existence of national statistical data available to assess the educational level in the sector confirms the need for qualification and dissemination of information, in accordance with the objectives of CATALYST.

Table 12 - Resident population, age between 16 and 89 by level of education (%) (Source: Pordata).

	NO EDUCATION LEVEL	COMPULSORY EDUCATION	UPPER-SECONDARY EDUCATION	HIGHER EDUCATION
2019	6.0	51.0	23.1	20.0
2020	5.1	49.0	24.3	21.6
2021	3.8	46.6	25.4	24.1

The mould manufacturing sector, although essentially made up of micro and small enterprises, is technologically very advanced. In addition to being an industry transversal to virtually all others, the moulds industry is structuring, as it is the basis for the development of most products. The future of the moulds industry is essentially based on the path that the sector is currently taking, which is based on technological development, correct production planning and quality control, constant modernization of equipment in use, investment in vocational training and promotion of customer/supplier (Synopsis "Indústria de Moldes, 2020").

Mould-making companies have made an appreciable investment in their upgrade, which has contributed decisively to this sector being among the most advanced in the world. Innovation and technology, along with a high production capacity and highly specialized employees, characterize the Portuguese moulds industry and gives the necessary quality to the products of a highly competitive sector in the international market.

Without a doubt, this commitment to skills development has made a difference in the positioning of this sector in the national and international panorama. Nevertheless, it continues to require a continuous, thought-and-structured effort and investment in view of the development of technical skills necessary for the quality of the outputs produced, but also of skills development of companies in the sector in the face of challenges according to Industry 4.0 concepts and technologies: Big data and analytics, autonomous robots, simulation, horizontal and vertical system integration, industrial internet of things, cybersecurity, cloud computing, additive manufacturing and augmented reality.

Most of Industry 4.0 technologies are currently installed in mould-making companies, but isolated, that is, not integrated. However, these technologies will transform industrial production through their integrated action. These changes will significantly change professional relationships within companies, as these technologies will require the intensive use of a set of skills that until recently were not worked on or developed in these companies. Technological evolution (a present factor in the daily life of mould-making companies) is a constant of our times, effectively affecting our daily lives. With industry 4.0 the skills required in the work context have been changed.

A "mould-making company" has become an engineering, product development company, where knowledge accumulated by technicians (the "know how to do") is now just one piece of a complex puzzle that requires both technical and soft skills, as presented in Table 13. The technical skills are necessary for the promotion and development of professionals for the sector, in the face of the challenges of the environment. At the same time, the teams of the present and, increasingly, of the future, will also need to create crucial foundations of development so that they can be assimilated, managed and made the most of the technological revolution that is already installed. Industry 4.0 promotes the emergence of new functions within the functional areas already known, which allows employees to combine their strengths with technology and, therefore, to reformulate their roles within organisations.

Table 13 - Skills needed in the Moulds sector

Technical skills	Soft skills
• Knowledge of mechanical engineering; • Marketing knowledge; • Integrated project management knowledge; • CAD/CAM knowledge; • Materials engineering knowledge; • Knowledge of financial management and budgetary control; • Strategy/innovation knowledge; • Knowledge of quality and optimization of work processes; • Programming/computer engineering knowledge; • Design knowledge.	• Flexibility; • Multidisciplinary; • Interpersonal relationship and competences; • Active learning and learning strategies; • Creativity, originality, and initiative; • Leadership and influence; • Emotional intelligence; • Perception of urgency; • Technical and systemic view of processes; • Collecting and analyzing data (big data & data analytics).

Technical profiles will no longer perform repetitive functions, but this does not mean, however, that employees will be eliminated from production lines, but will be concentrated on the execution of strategic tasks and control of waste. The new Industry 4.0 professionals are individuals with multidisciplinary and flexible training, in addition to mastering new tools, languages and emotional skills. They can easily adapt to a new business culture and are socially empowered to perform collaborative work. These new Industry 4.0 professionals do not perform repetitive functions, on the contrary, they deal, in a contextual and innovative way, with processes in which the activities are more complex, efficient, and creative.


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3

Bridging the gap between the market and academia

Section 3: Bridging the gap between the market and academia

The previous parts of this research included state of the art analysis and benchmarking of the industry trends in the field of sustainable management and leadership, and, on the other hand, to establish contact between interested SMEs, professionals, VET providers and business associations by creating the CATALYST Network of relevant stakeholders. This part involved field research, which analysed the needs of professionals and SMEs, assess the challenges and skills gap, and collect best practices from industry role-models. Based on the initial findings, 6 national roundtables were held in November and December 2022 in North Macedonia, Germany, Austria, Portugal and Greece.

3.1. Methodology and data collection

Athens University of Economics and Business (AUEB) and Institute for Research in Environment, Civil Engineering and Energy (IECE) supported by all CATALYST partners conducted an online survey and in person interviews between September and November 2022. Both surveys and interviews targeted professionals and SME representatives seeking to learn more about their understanding of sustainability as well as the actions and needs of their companies in complying with all three sustainability components. In addition, we aimed to identify the skills that are missing from the market and hence, ways in which the CATALYST project will be able to provide support. Finally, six roundtables (presented below) were organised in the five CATALYST Partner countries aiming to reflect on the policy and sector trends and gaps in each country, their needs and finally, training that they would be willing to undertake in order to reach the EU and national goals mentioned above.

The survey and the interview were structured as follows. The first part of the survey included several demographic questions, while the main part included questions related to sustainability and governance, which aimed to reveal the awareness on the SDGs, the actions taken related to sustainability and management and the significance and need for training on a number of topics. These topics were developed using as a base the competences identified in EntreComp and GreenComp (Bianchi et al., 2022; European Commission, 2019d). Then, the interview questions, which also included the same demographic questions as in the survey, aimed to understand more deeply the actions organisations are taking in implementing sustainability and managing their employees. It had both multiple choice and open-end questions to encourage the open dialogue between the interviewer and the participant, while keeping the format common across the five countries. A copy of the survey and the interview can be found at Annex I – Skills Gap Assessment Questionnaire (SGAQ) for professionals & SMEs and Annex II - Skills Gap Assessment Interview for professionals & SMEs.

The method used to collect the data was simple random sampling targeting business owners, business representatives from all sectors in Austria, Germany, Greece, North Macedonia and Portugal. In total, 504 professionals and employees in filled in the online survey, while we conducted 64 interviews seeking to understand deeper the priorities and challenges of the companies today. Prior to data collection, all respondents had to give a GDPR consent before participating in the study. The survey took an average of 11 minutes to complete, while the interview around 30 minutes. Both the surveys and

the interviews were conducted either in English or in local language based on the preference of the participants.

93.4% of the responses came from the five participating countries in the CATALYST project, namely, North Macedonia, Greece, Portugal, Austria and Germany (see Figure 27). The survey had about equal participation rates from men and women (48.9% vs. 49.5%). The majority of the participants were between 30-49 years old (64.5%), 25.7% were older than 50 and 9.8% were under 30 years old. 31% of the respondents were at the top management level of their company, while 28%, 26%, 7%, 6%, and 2% of respondents were professionals, managers, administrative staff, junior/entry level, and technicians. 35% and 45% correspondingly had acquired a bachelor's or master's degree, while 9% of the sample also has a PhD and 11% ended their education at the high school level (see Table 14).

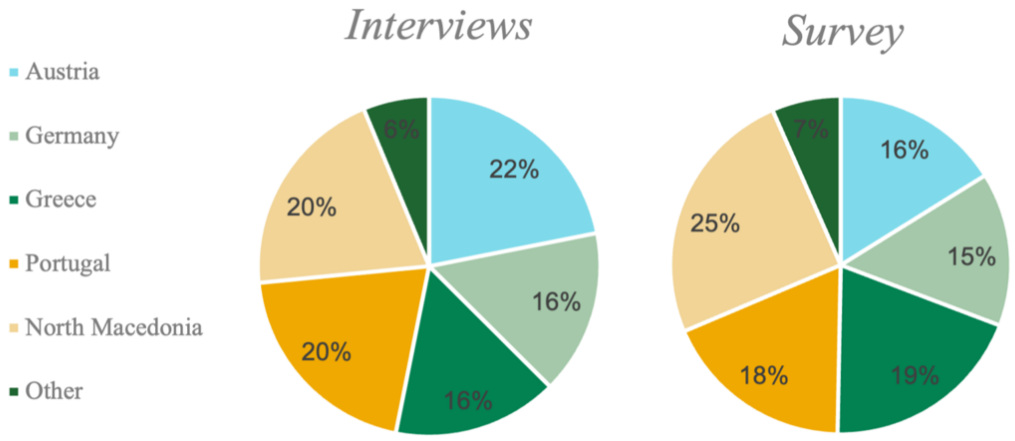

Figure 27 - Replies breakdown per country

Table 14 - Subjects characteristics

Gender	Percentage
Male	48.91%
Female	49.50%
Age	
<30	9.78%
30-39	31.14%
40-49	33.33%
50-59	18.76%
60-69	6.59%
>70	0.40%
Education	
High-school diploma	10.82%
BSc. / BA	35.07%
MSc. / MA / MBA	45.49%
PhD	8.62%
Role in the organisation	
Top Management	30.82%
Middle Management	25.65%
Junior Management	5.77%
Professional	28.43%
Administrative Staff	7.16%
Technician	2.19%

The survey was completed by SMEs and large companies, with 57% and 18% correspondingly, while the rest 26% of the replies came from universities and research institutes, VET providers, public institutions and NGOs/CSOs. OECD (2022) defines SMEs as the businesses that employ less than 250 people, which can be further subdivided into micro enterprises (fewer than 10 employees), small enterprises (10 to 49 employees) and medium-sized enterprises (50 to 249 employees). Large companies employ more than 250 people. In our sample, 48% of the replies that came from large companies employ more than 1000 people, while 52% employ between 250 and 999 people. SMEs are also distributed equally, with 29% representing medium-sized enterprises, 33% small enterprises and 37% micro enterprises. In terms of turnover, 29% of the companies made less than € 1 million, 31% between € 1 and € 10 million, and 19% more than € 10 million (see Table 15).

Table 15 - Companies' characteristics

Type and size of organisation (in terms of employees)	Percentage
Large company	17.76%
with more than 1000 employees	*48.31%*
with 250-999 employees	*51.69%*
Small-Medium Size Enterprise (SME)	56.69%
with 50-249 employees	*29.23%*
with 10-49 employees	*33.45%*
with 1-9 employees	*37.32%*
University / Research Institute	7.58%
VET provider	3.59%
Public institution	6.99%
NGO/CSO	6.59%
Size of organisation (in terms of turnover)	
less than € 1 million	28.63%
more than € 1 million less than € 2 millions	10.34%
more than € 2 million less than € 10 millions	20.48%
more than € 10 million less than € 50 millions	9.34%
more than € 50 millions	9.34%

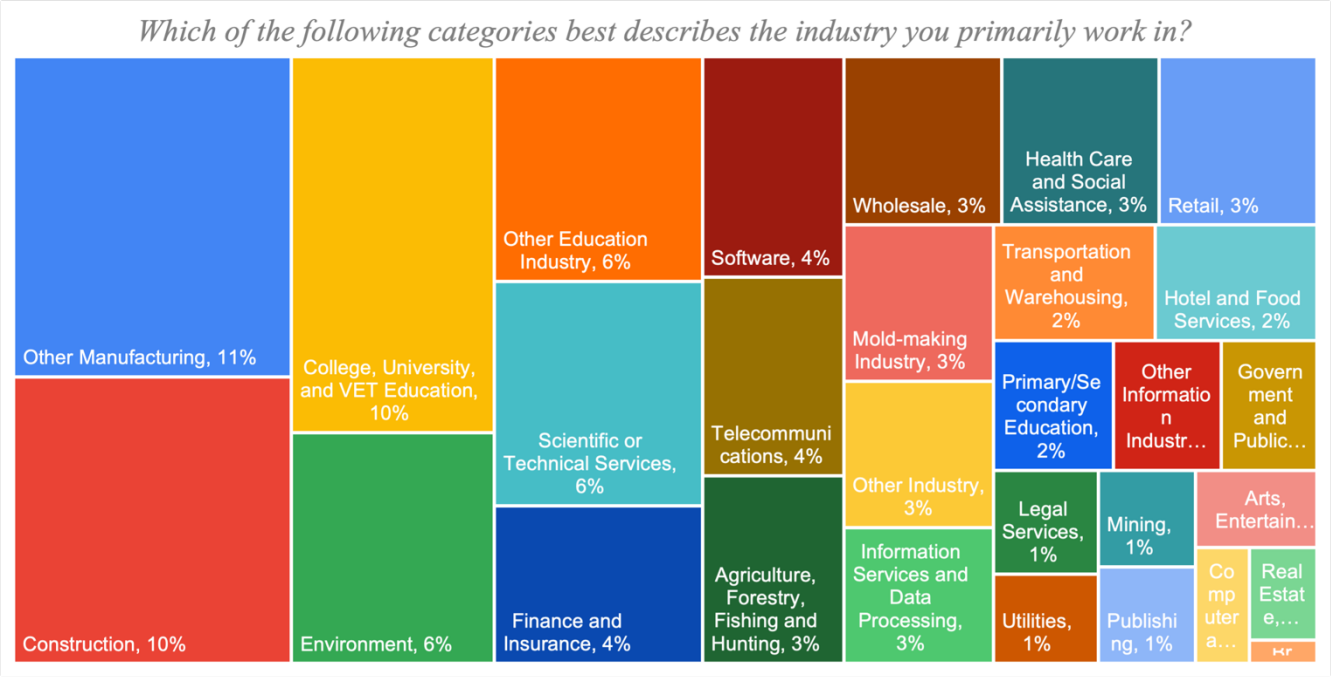

Figure 28 – Distribution of the sectors where survey respondents work in

Figure 28 presents the industries hierarchy as they participated in the study. Most replies came from manufacturing, construction, college, university, and VET education, environment, scientific or technical services, finance and insurance and software and telecommunications. This result is in alignment with the RIS3 priorities per country presented above.

Most of the companies work on SDG8 (Decent work and economic growth), SDG 5 (Gender equality), SDG 13 (Climate action), SDG 9 (Industry, innovation and infrastructure), SDG 3 (Good health and well-being) and SDG 17 (Partnerships for the goals), with 36%, 33%, 28%, 27%, 23% and 21% shares each (Figure 29).

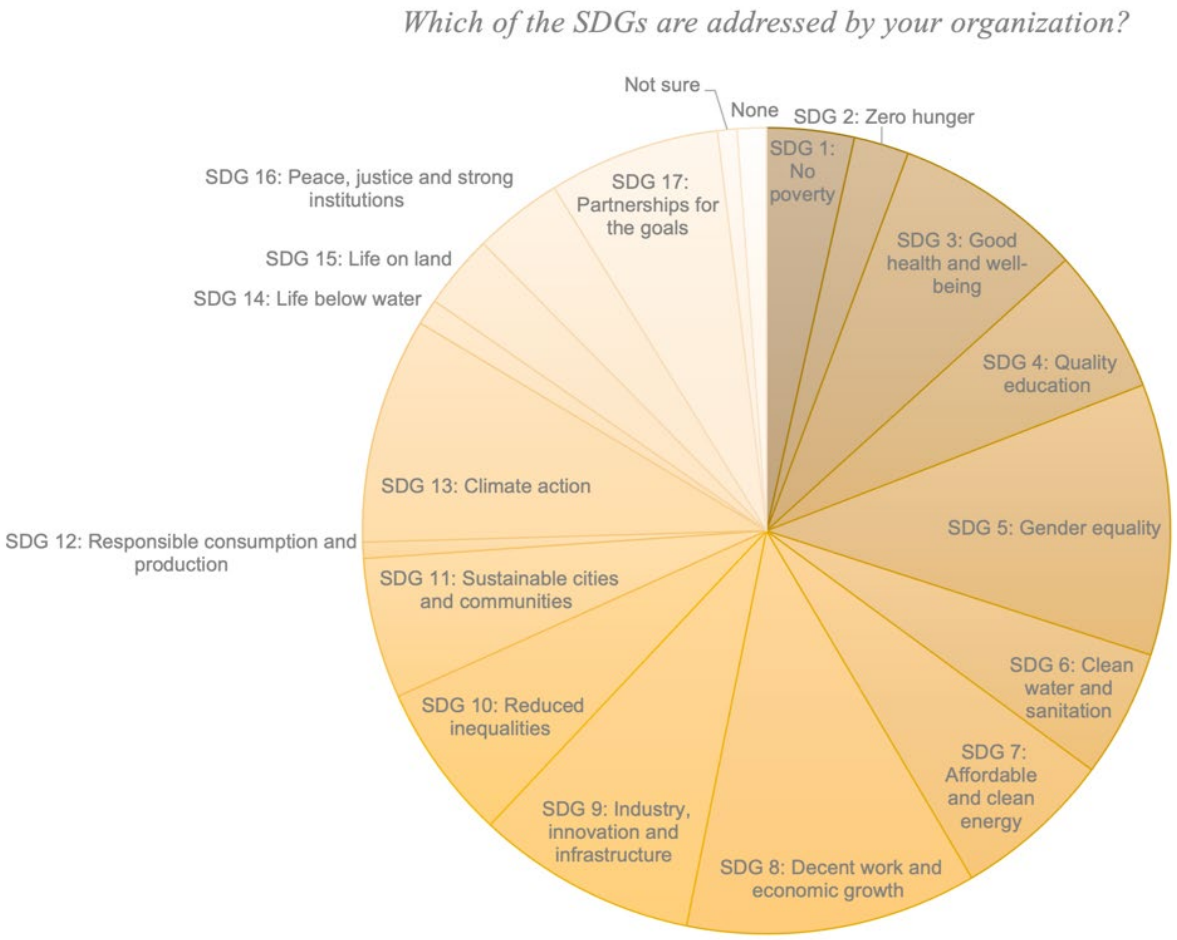

Figure 29 – Respondents and SDGs distribution

The sections below present the results of the surveys and the interviews grouped into three sections. The first one presents how companies understand and perform governance within their organisation, while the following two present the progress of these companies towards the sustainable development and the most important challenges in implementing sustainable practices. The last one discusses the upskilling needs of the employees in order to the close the gap between regulation, international trends and consumers' demand and companies' ability to meet these standards.

3.2. Governance practices

This section presents the results of the employees regarding the governance practices within their organisation. Respondents were asked to vote from 1 ("I do not agree") to 5 ("I strongly agree") the following statements. Figure 30 presents these results and as we see there is not a strong confirmation of most statements except of the final and the first one regarding the fair treatment and anti-fraud policies, with 52% and 46% each, or 78.7% and 73% if take into account those who voted 4 ("I agree") as well.

Considering together the last two votes, i.e., 4 and 5, we see that the majority confirms that the company they work for has useful and updated systems, while endorses flexibility in terms of working from home, repositioning and upskilling the employees with 60.8% and 60.7% each. Approximately 50% of the participants said that their company invests in R&D and agree that it affects the productivity of the company. More precisely, 22.8% doesn't believe in any of these two facts, 36.6% believe in either the first or the latter statement and 40.6% believes that both of them are true.

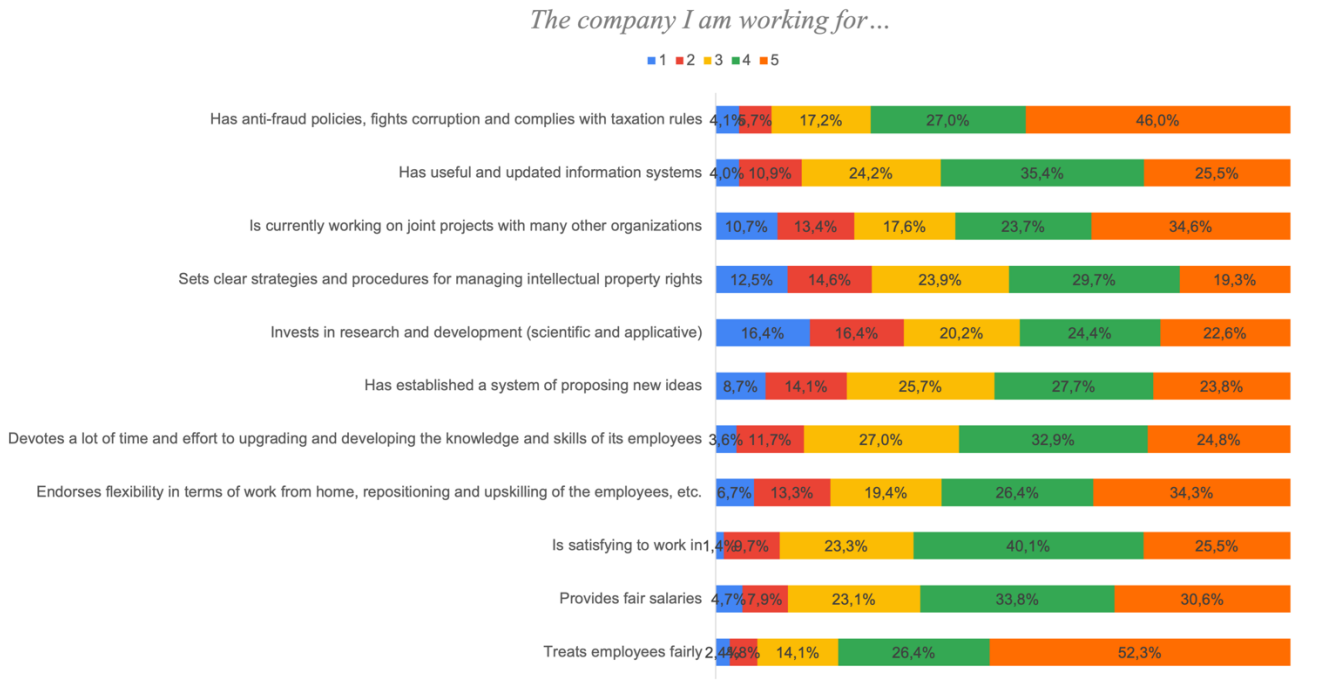

Figure 30 - Employees beliefs about the company they work for

A significant share of the survey respondents believe that they are neither satisfied, nor paid fairly, although they are treated fairly, with 25.5%, 30.6% and 52.3% claiming that they are fully satisfied, paid and treated fairly. Figure 31 presents these findings per country, as we see Greece respondents seem to have higher satisfaction levels than those coming from the other four countries, but the pattern seems to be the same in all five countries. People working for companies where decisions are made in a collegial way believe that they are treated fairly, as of 65.4%, but the other two parameters, salary and overall satisfaction, seem to remain close to the levels above (34.4% and 35.3%). Another interesting fact is that all these three aspects increase significantly for employees working in companies with less than € 1 million turnover with 72.26%, 46.32% and 44.12% believe that they are treated and paid fairly while they are fully satisfied. We get similar results when looking at the size of the company

in terms of employees. Micro enterprises seem to a more pleasant workspace for most of the respondents (see
Table 16).

Figure 31 - Employees' views on the management practices in their companies

Table 16 - Fair treatment, salaries and overall satisfaction

Size of the company (in terms of employees)	Employees are treated fairly	Employees are paid fairly	Employees are satisfied
1-9	76.9%	30.8%	53.8%
10-49	5.6%	30.%	22.4%
50-249	42.9%	21.2%	14.3%
250-999	43.8%	23.3%	17.8%
1000+	30.0%	14.0%	14,.0%
Size of the company (in terms of turnover)			
≤ € 1 million	72.3%	46.3%	44.1%
> of € 1 million and ≤ € 2 million	52.1%	30.2%	25.3%
> € 2 million and ≤ € 10 million	52.1%	30.2%	25.3%
> € 10 million and ≤ € 50 million	52.1%	30.2%	25.3%
> € 50 million	52.1%	30.2%	25.3%
Decision-making within the organisation			
By the founder and his/her family/inner circle	45.2%	31.5%	23.8%
In a collegial way	6.4%	34.4%	35.3%
By a few individuals/experts	45.7%	25.1%	16.9%

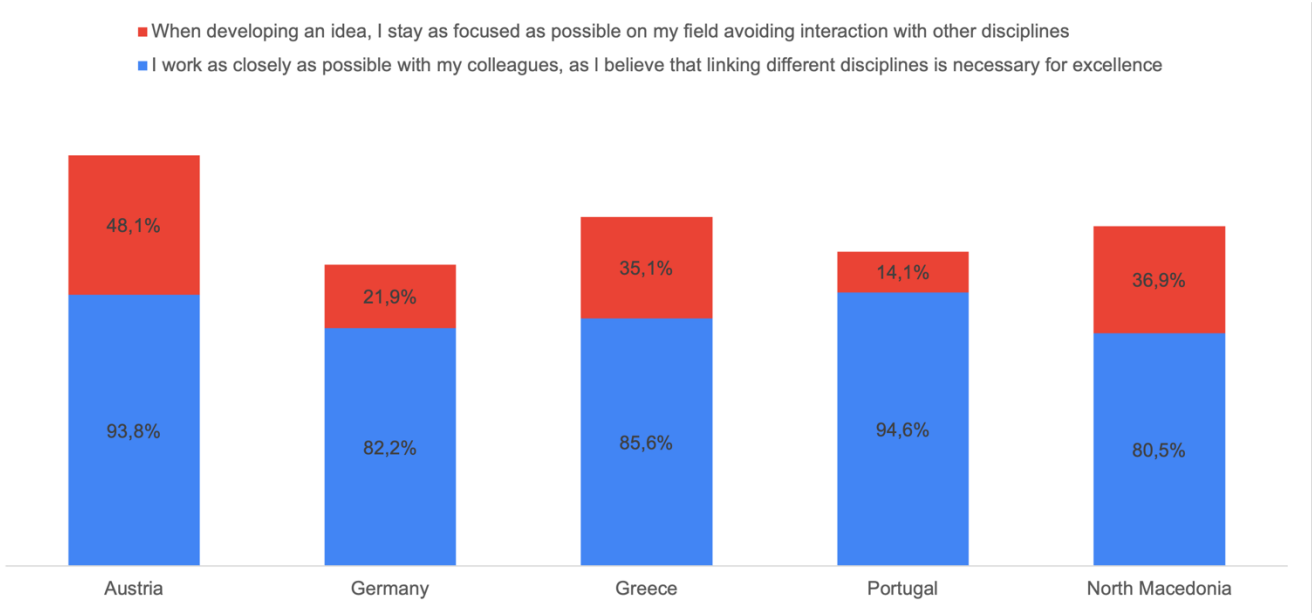

Figure 32 – Collaboration within the team

Regarding collaboration within the teams, we see on average 87% of the respondents confirm that work with teams with different background within their organisation as closely as possible. Figure 32 presents the breakdown per country. An interesting outcome is that in a few cases, although the eagerness for collaboration is significantly high, there is considerable aversion for teamwork and collaboration. For instance, in Austria, 93.8% stated that try to work closely with their colleagues and 48.1% that they avoid interaction when developing an idea.

3.3. How companies progress towards the Sustainable Development

The majority of the survey respondents (69% of them) is aware of the Sustainability Development Goals (SDGs). Figure 33 presents the SDG awareness per country. As we see, the majority of respondents (> 54%) in all countries are aware of the SDGs, with Greece lagging behind and Germany leading the sustainability awareness, with 84% of the respondents being aware of the SDGs. In addition to that, the 80.6% believes that if we all change our consumption behavior, we can mitigate climate change, while more than 65% considers themselves as capable to contribute to CO2 emission reduction, familiar to Sustainable Development European policies and environmentally friendly consumers (see Figure 34).

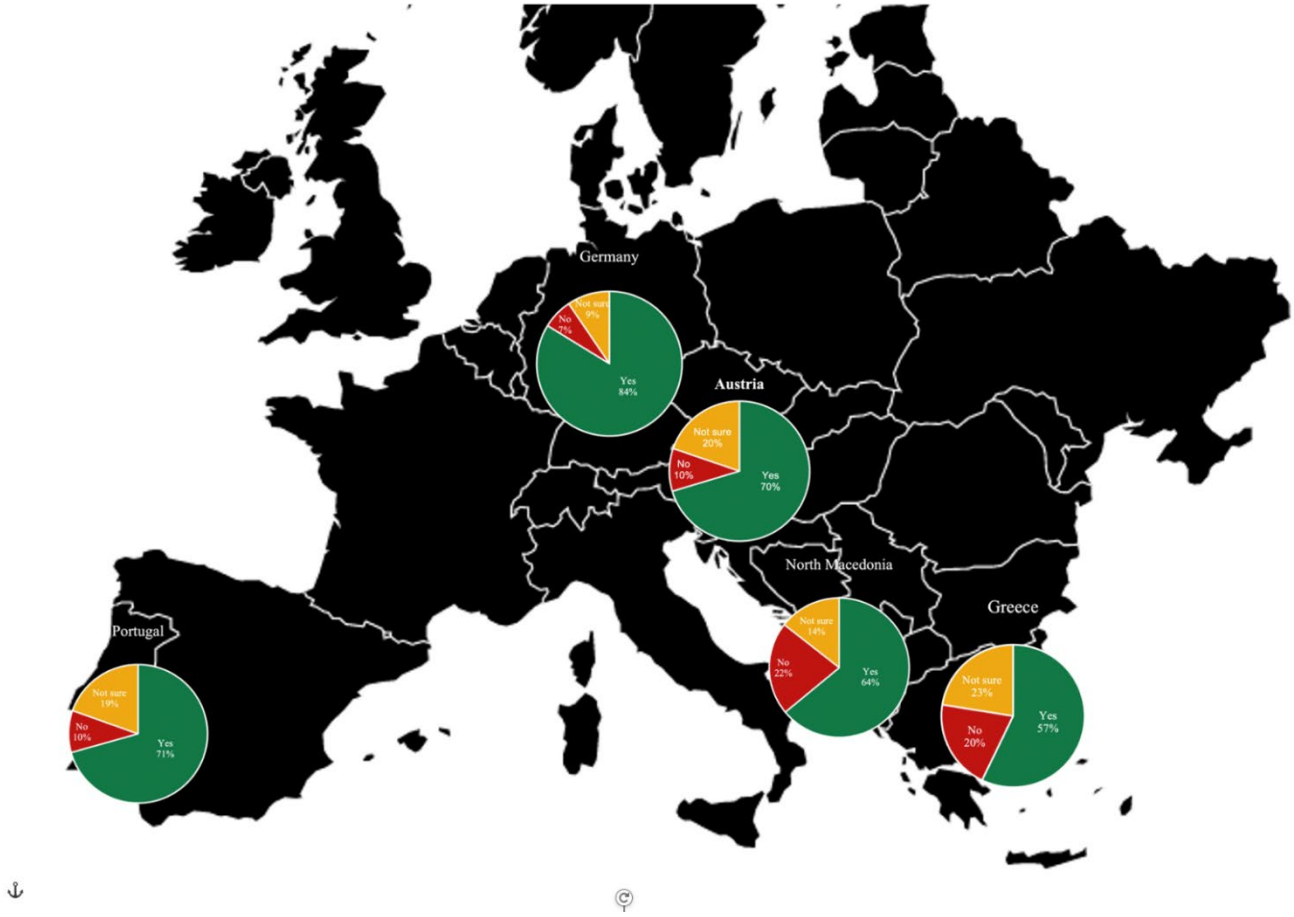

Figure 33 - Respondents' awareness of the SDGs per country

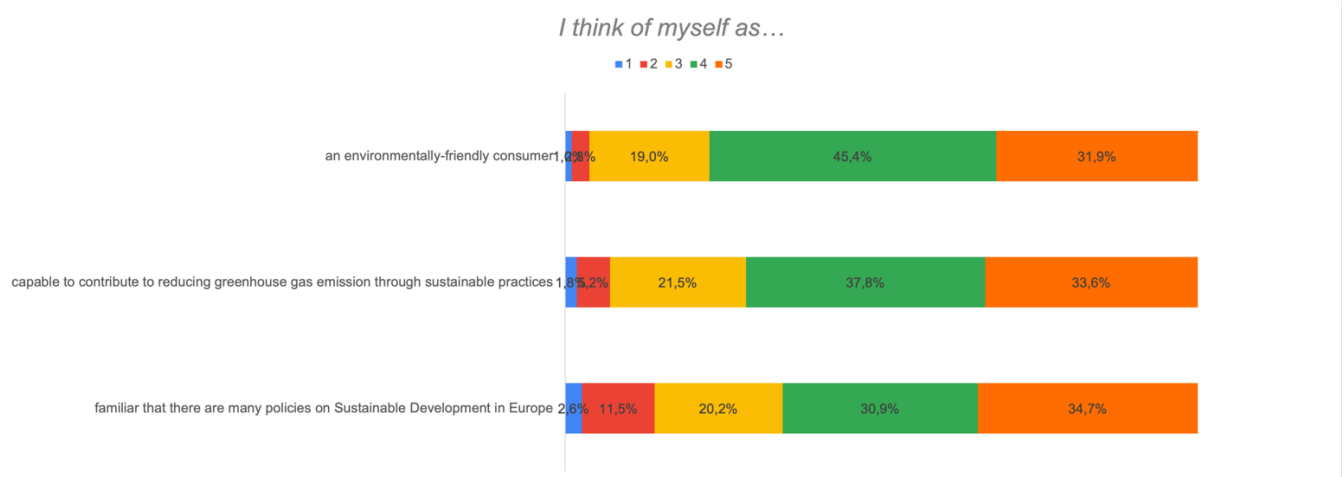

Figure 34 - Employees beliefs about themselves in terms of Sustainable Development

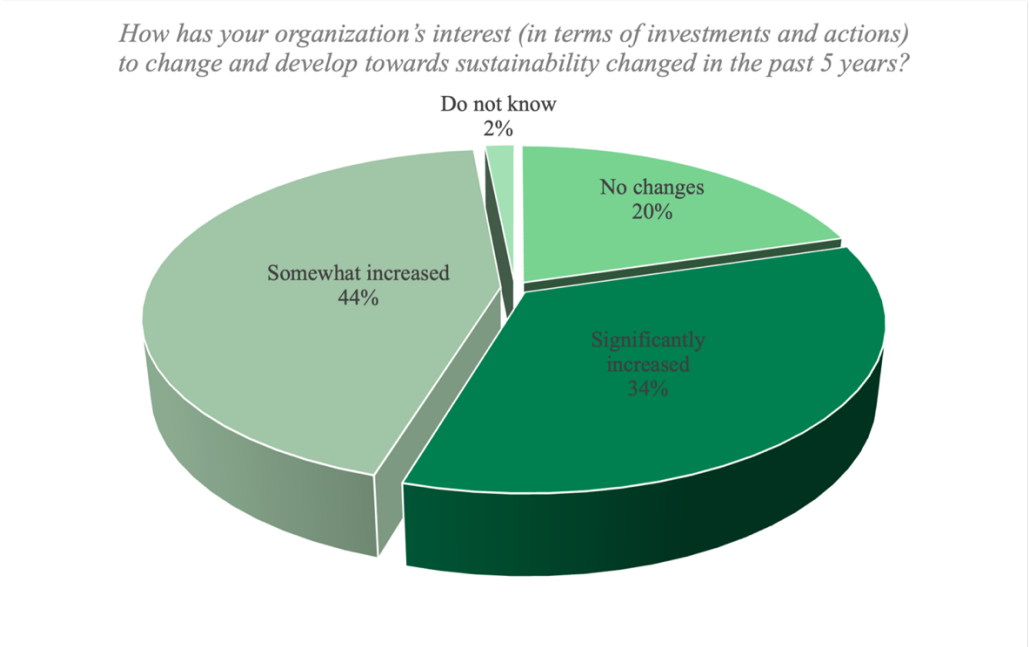

Figure 35 - Shift in organisations' interest to change and develop towards sustainability in the past 5 years

Another optimistic result comes from the willingness of the to implement sustainability practices, with 78% of the interviewees believe that their organisation's interest, through increase investments and sustainability related actions, has increased towards sustainability in the last five years (Figure 35). This is in alignment with survey and interview results (see Figure 37 and Figure 38).

Interviews enabled us to better understand what drives sustainability within the organisations. Figure 36 shows the factors that companies consider driving sustainability (in general), while Figure 37 presents the driving factors of sustainability within the organisation. It seems that in both cases the factors are prioritized as follows: economic, social (employees/customers), and environment. The companies believe that long-term (economic) sustainability of the organisation and reducing costs are of top priority when addressing sustainability, which are then followed by social and environmental aspects, such as health, safety and well-being, environmental issues and energy conservation.

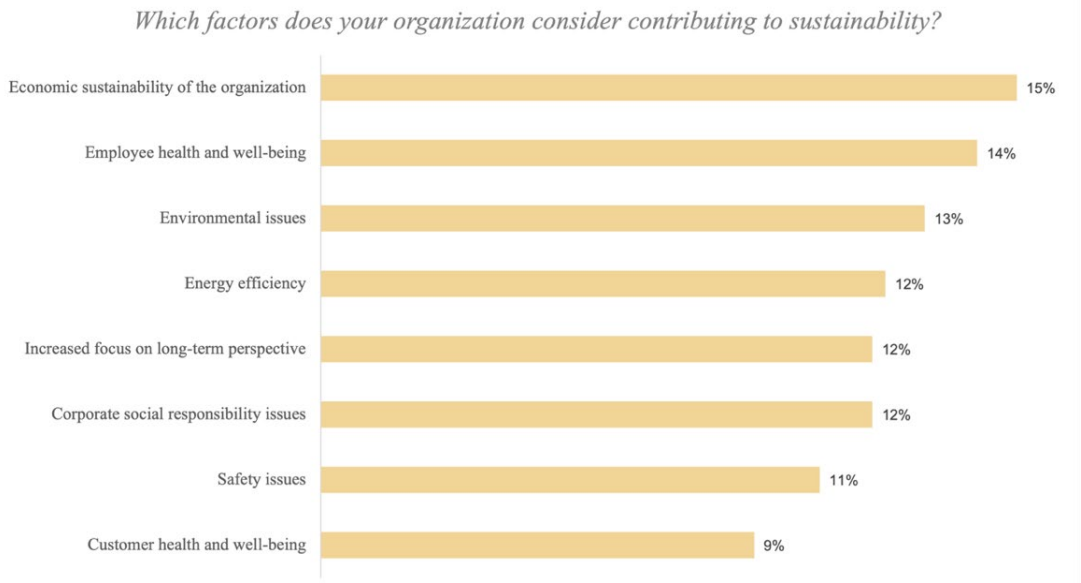

Figure 36 - Factors contributing to Sustainability

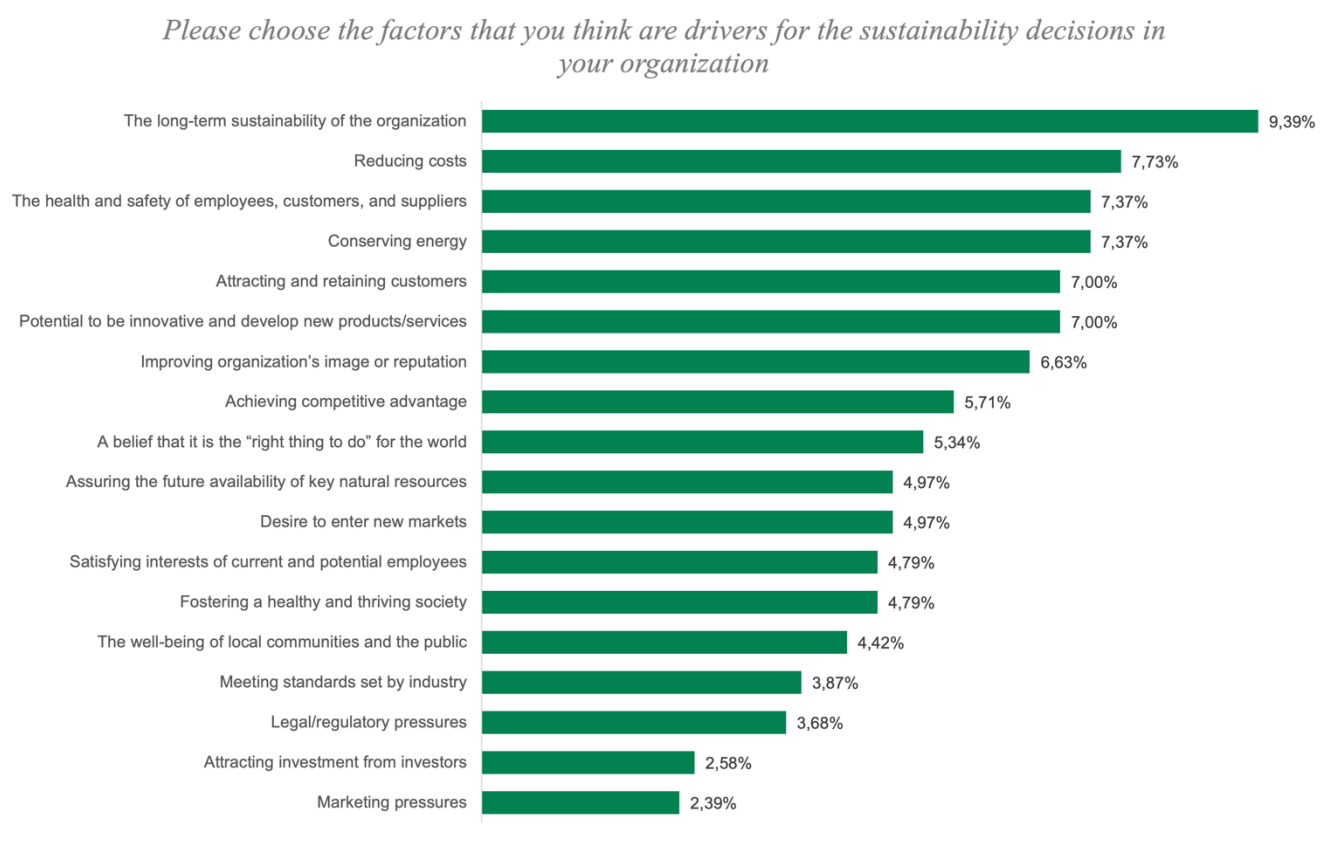

Figure 37 - Factors driving sustainability decisions with the organisation

As seen in Figure 38, the majority of the survey respondents confirms that the company they work for implements sustainability actions, such as recycling, following ESG principles, supporting local challenges related to sustainability and monitoring client satisfaction. They also confirm that their company has the ability and feels obliged to help to mitigate climate change. 59% of the respondents stated that the company they work for is currently working on joint projects with other organisations. Although customer well-being comes last in the companies' priorities (from the interviews), 71% replied that their company is constantly meeting with clients and associates to find out their needs.

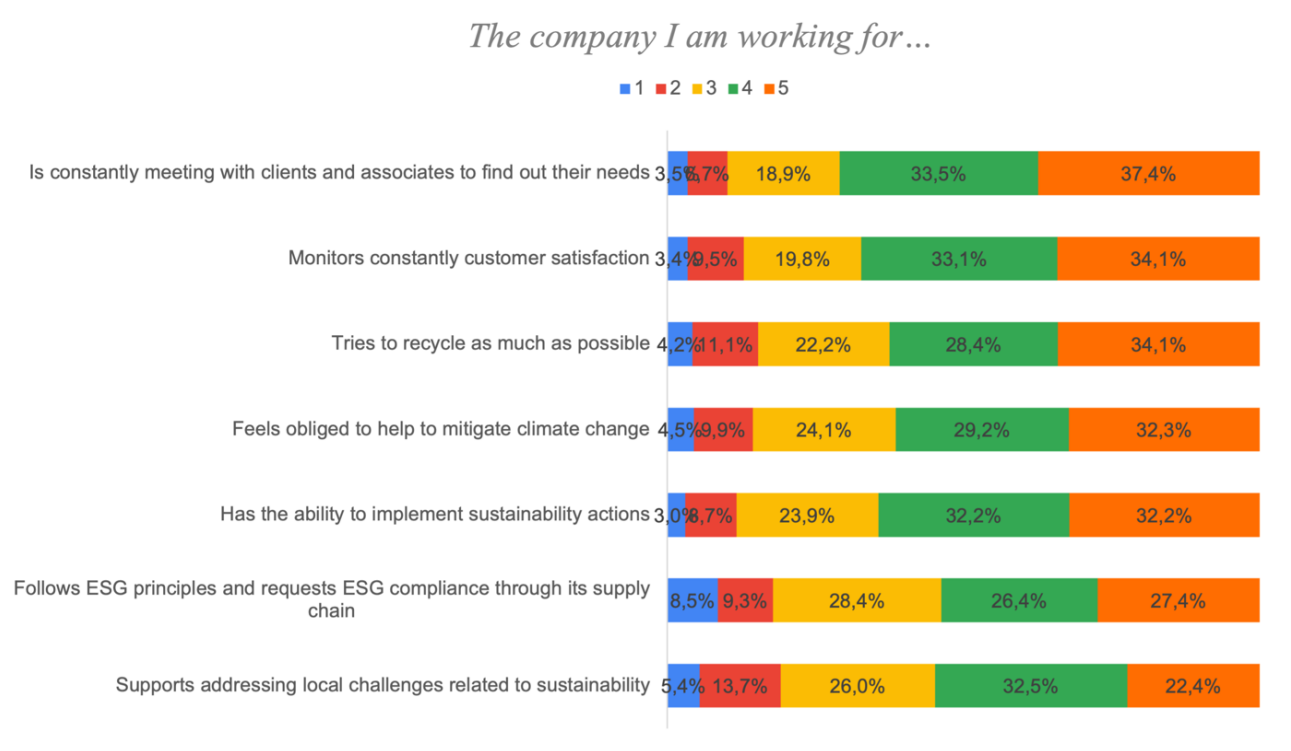

Figure 38 - Employees beliefs about the company they work for

Figure 39 – Practices that the companies already implement

Figure 39 presents the specific practices organisations implement on sustainability. Improving energy efficiency, developing new innovative and sustainable products/services, having a long-term commitment to all employees and encourage their personal and professional development through career planning, training, equal promotion opportunities, psychological support, health assurance,

safety provision etc., introducing circular economy principles (reduce, reuse, recycle) in the design, manufacturing, and waste treatment stages of production or in the daily operations (if the organisation is not a manufacturer), using energy coming from renewable sources, monitoring sustainable practices, and reaching out to external stakeholders about sustainability issues are some of the activities that companies perform to become more sustainable.

However, during the interviews, when asked if they measure the environmental footprint of their organisation, 69% of the interviewees stated that they do not measure it. Also, only 4 out of the 64 people who were interviewed confirmed that they conduct sustainability reports in their organisation and shared the relevant links.

3.4. Understanding the challenges related to implementation of sustainable practices

As expected from the results presented above, economic arguments come as top challenges in adopting/practising sustainability. Specifically, higher cost of adoption/higher running costs, customers' willingness to pay for a sustainable product/service, lack of funding mechanisms and lack of expertise/unskilled employees on sustainability practices are the most important challenges with 19%, 15%, 15% and 12% of the interviewees validating them in this order (see Figure 40).

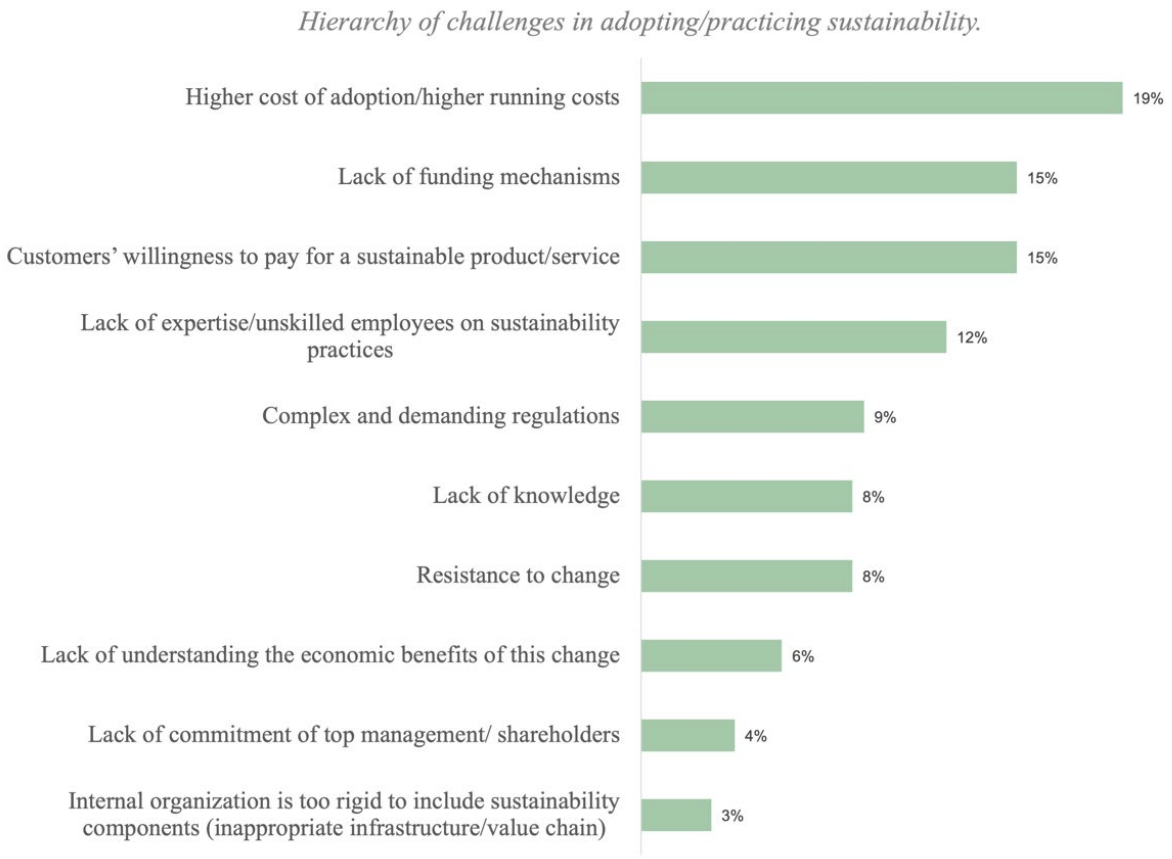

Figure 40 - Hierarchy of challenges

3.5. Closing the gap between employees and companies' upskilling needs

Only half of the participating companies confirmed to have an annual training plan. Those who have one, it usually targets one of the following:

- CSR & sustainability reporting
- Fundamentals of sustainable business partnerships and fair trade
- Leadership skills
- Digital skills (incl. Word, Excel)
- Customer relations
- Gender & diversity issues, global justice
- Social competencies, personal development and work-life balance
- Work security and safety (in terms of equipment handling)
- Languages (English, French etc)
- Project and event Management
- Etc.

Collaboration and partnerships, behaviour change and sustainability values and systems thinking seem to be the most significant fields for the companies who filled in the survey (see Figure 41). This finding is in alignment with the prioritisation presented in subsection 3.2. where the firms think that the organisation's long-term (economic) viability and cost containment should come first, followed by social and environmental concerns.

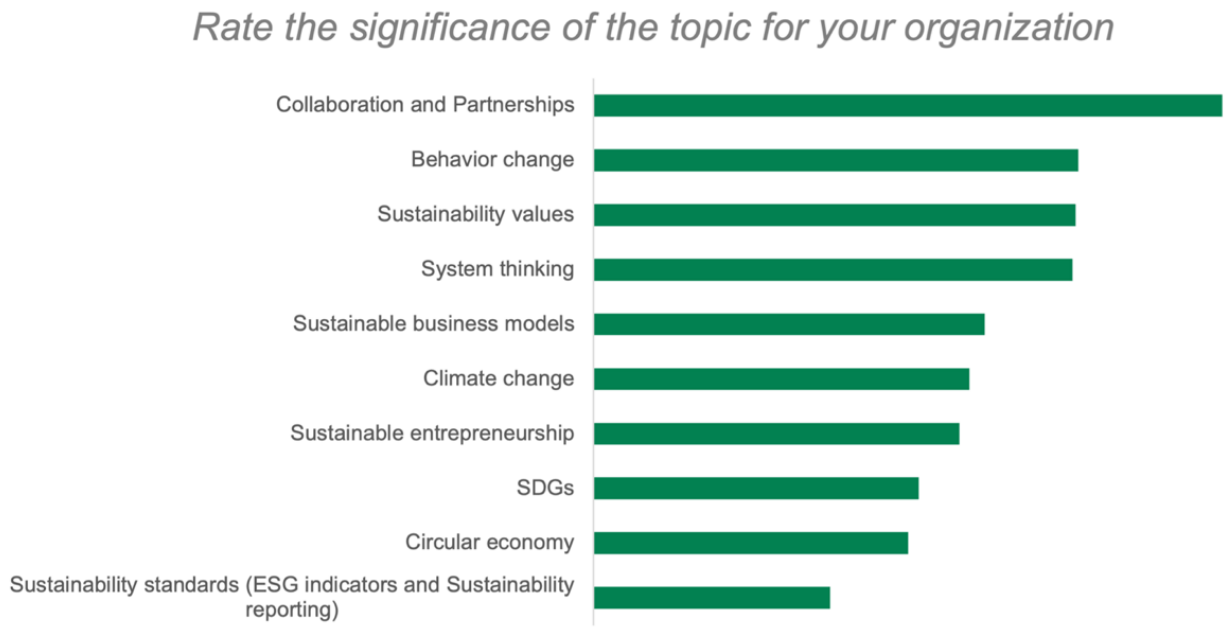

Figure 41 – Significance for the organisation

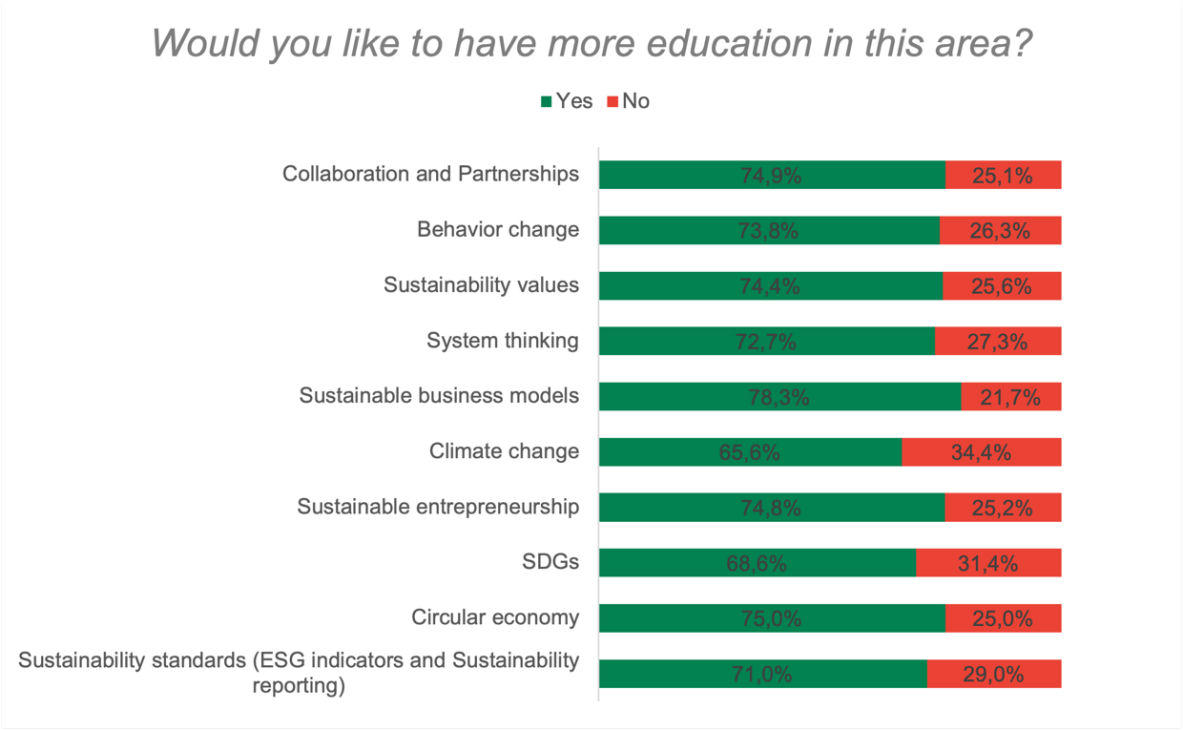

Figure 42 – Need for education

However, the majority of the respondents agreed that they would need more trainings and upskilling on all presented sustainability areas showing more preference to understanding and adapting sustainable business models and circular economy, forming collaborations and partnerships, applying sustainable entrepreneurship frameworks and embracing sustainability values and good practices (see Figure 42). This call for education for professionals ratifies the CATALYST goal to develop trainings appropriate for companies and professionals that will enable them to acquire knowledge on high-demand topics and hence, be equipped to enable climate change adaptation and mitigation.

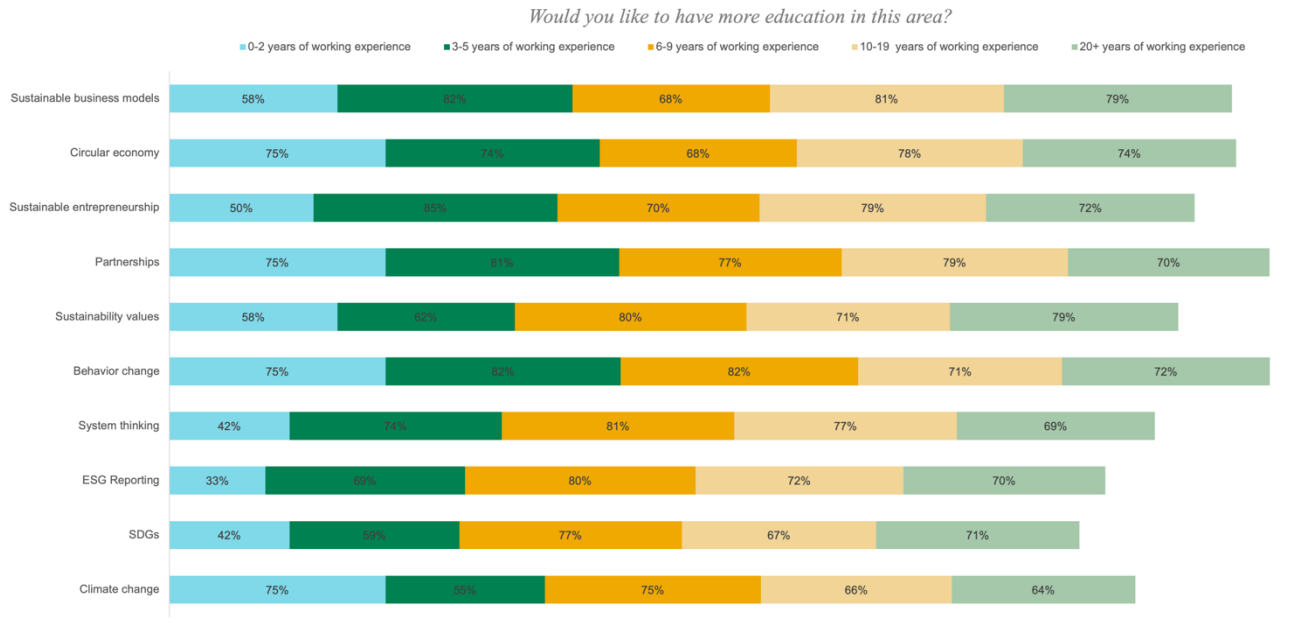

Figure 43 - Need for education per age group

Figure 43 breaks down the need for education per working experience. As we see, employees who are more responsible for managerial processes seem to have higher interest for ESG reporting than those with junior positions. However, employees with less professional experience are interested to know more about umbrella concepts, such as circular economy, climate change and behaviour change. It is also worth mentioning that sustainable business models and sustainable entrepreneurship rank significantly higher in employees with more than three years of experience. Partnerships seem to also be of high importance to more senior employees who possibly are responsible for expanding the collaborations and network of their institution.

Finally, to address all challenges that came from this study, CATALYST should also try to integrate in its training plans areas such as introduction to funding mechanisms and economic benefits of adapting early sustainable practices or explain regulation frameworks and how they are relevant to the day-to-day business of the companies. Also, it should put efforts in raising awareness seeking to both a) inspire top management and shareholders to commit to the adoption of sustainable practices and b) change the willingness of customers to pay a higher price for sustainable products/services.

4

National Roundtables on "Challenges and Perspectives in Leading Sustainable Systems and Business Transformation"

Section 4: National Roundtables on "Challenges and Perspectives in Leading Sustainable Systems and Business Transformation"

4.1. Methodology and Roundtables structure

Based on the initial findings of the field research presented above, five national roundtables on "Challenges and Perspectives in Leading Sustainable Systems and Business Transformation" were held in November and December 2022 in North Macedonia, Germany, Austria, Portugal and Greece. There was a total of six events, five of which took place on premise and one online.
Roundtables, as a technique, arose out of a need for consensus-building to identify problems and seek solutions in the relationship between formal decision makers (such as governments & judiciaries) and other sectors of society (such as environmental groups, community groups & other interest groups) during the 1980's (Cocoate, 2011).
In total, 214 people attended the events, including managers of SMEs and corporations, representatives of educational and research institutions and organisations, non-profit organisations, business associations and public institutions, distinguished experts, project managers in the field of sustainable policies and practices, the academic public, representatives of various sectors, as well as representatives of relevant institutes and state institutions (see Table 17).

Table 17 - Roundtables Participant demographics

Type of Institutions	*AT*	*DE*	*GR*	*NM*	*PT*	*Total*
Academia, Research Institute, other Educational Organisations	21	3	6	6	26	62
NGOs, Non-Profit Organisations	0	3	5	1	1	10
Companies, SMEs, Corporations	21	3	22	16	17	79
Chamber, Business, Associations	1	3	6	3	18	31
Public Institutions	5	0	4	5	9	23
Total	**48**	**12**	**43**	**40**	**71**	**217**

The frame of reference of the topic was the challenges, hindrances, and support for the sustainable transformation of organisations, with a specific focus on skills, education, and training. The goals of the events were to present an overview of the CATALYST project to possible stakeholders and to carry out a group discussion about the main challenges each group faces in their effort to implement circularity and sustainability practices.

Each roundtable followed the same methodology, defined by AUEB and IECE. The roundtables aimed to involved at least 30 participants. The target group of this discussion were managers and professionals, representatives from public institutions (policymakers), and representatives from chambers and business associations, while the focus was one or more sectors in the country that had been identified by RIS3 as of high priority. The roundtables lasted between 2-3 hours and were held either in person or online. To ensure the cohesion across the workshops, all organisers were provided agenda templates, guidelines and handouts, while they attended a "Train the Facilitator" workshop that

aimed to bring them up to speed with the tools that should be employed in the workshop. Finally, all participants were asked to fill in an evaluation form. Each roundtable was conducted in local languages. Finally, all answers were translated and organised in Miro, an online visual platform that enables to connect, collaborate with others and work together in online boards.

The discussion in the roundtables addressed three main aspects, namely, *policy frameworks, business and educational needs*. The first part aimed to familiarize the participants with the most important EU and national policies, identify any missing or upcoming policy document in their country/field of expertise and discuss the importance of these documents for the operation of their organisations. The second part classified the major challenges, hindrances and plans relevant to their organisation in implementing sustainability and management practices, while the last one focused on unfolding what skillsets are lacking in the workforce of their organisation and understand the measures taken (e.g. investments in trainings, collaborations, etc.) by the organisations to bridge the gap between employees' expertise and international and national sustainability trends.

4.2. Overall Key Points

A. European and national policies

In the roundtables held in the 5 countries of the consortium, the *European Green Deal* was widely recognized as a significant policy with a high impact, as it aims to transform the European Union into a modern, resource-efficient, and competitive economy. The *EU Taxonomy* and the *EU Action Plan on Financing Sustainable Growth* were deemed important strategic documents by all EU countries in the consortium as they provide access to green financing. However, these documents were not considered relevant in North Macedonia, which is a non-EU country with limited access to such funds. The discussions revealed a greater focus on European political strategies and laws rather than national ones across all 6 roundtables. It was noted that the complexity of the policy regulations at different levels (EU, national, and regional) can be overwhelming for companies, who require support in identifying the most relevant measures that will impact them directly.

The roundtables had different centres of attention depending on the background of the participants and their respective sectors, but the focus of all roundtables can be grouped into four main fields.

- ***Climate change:*** Agenda 2030 Sustainable Development Goals, Biodiversity Strategy, low greenhouse emissions strategy, EU strategy on adaptation to the climate change, European Climate Law, Climate Protection Act, European Climate and Energy Framework for 2030
- ***Sustainability:*** European Sustainable Development Strategy, Corporate Sustainability Reporting Directive, Circular Action Plan, New Generation EU
- ***Energy:*** Renewable Energy Directive, Directive for the deployment of alternative fuels infrastructure, EU taxonomy framework for the taxation of energy production, Directive on the promotion of the use energy from RES
- ***Skills:*** European Skills Agenda, GreenComp, Entre Comp, Osnabrück declaration of Vocational Education and Training, European agenda for adult learning.

The policies on a national level include around 70 national strategic documents, which stakeholders thought as relevant in their work. The full list of national policies is presented in the country analysis presented below.

B. Business: challenges and opportunities in implementing sustainable practices

The stakeholders who joined the roundtables detected several common challenges in the implementation of sustainable practices in their organisations. These challenges are as follows:

1. **Costs:** Implementing green practices and adopting new sustainable practices often comes with a higher price tag, which can pose a challenge for organisations in terms of financial feasibility.
2. **Resistance to change:** There is often resistance to change from both employees and consumers to adopt new sustainable practices, due to the difficulty in obtaining information and changing established habits.
3. **Lack of skilled workers and need for new competencies:** There is a shortage of workers with the necessary skills and knowledge to implement sustainable practices, which is further exacerbated by the need for new competencies as the job market evolves.
4. **Rigid structures:** Existing organisational structures and processes may be rigid and not easily adaptable to new sustainable practices, making it difficult to implement these changes.
5. **Digitalisation:** Digitalisation is increasingly important in the implementation of sustainable practices, but there may be challenges in terms of acquiring the necessary digital skills and tools.
6. **Lack of knowledge about financing options**: Companies may be unaware of the financing options available to them to support the implementation of sustainable practices, further exacerbating the financial challenges.
7. **Return on investment (ROI):** The return on investment for sustainable practices may not be immediate or easily quantifiable, which can discourage organisations from pursuing these initiatives.
8. **Greenwashing:** Finally, there is a concern about "greenwashing," or the misleading use of green marketing claims to promote environmentally friendly products and practices, which can make it difficult for companies to differentiate themselves and make a genuine impact.

The participants in the roundtables identified a multitude of future plans and solutions aimed at addressing the common challenges facing sustainability. Here we present the most commonly discussed solutions:

1. **Creating a new narrative within organisations**: Developing a company culture that values sustainability, by incorporating sustainable practices into the company's mission and values, and communicating these values to employees, customers, and stakeholders.
2. **Education for sustainable development:** Incorporating education on sustainable development into the curriculum, to raise awareness and encourage sustainable behaviour among future generations.
3. **Mobility:** Encouraging the adoption of sustainable modes of transportation, such as public transportation, cycling, and walking, to reduce the carbon footprint and improve air quality.
4. **Utilising core competencies for greatest benefits**: Leveraging a company's existing strengths and resources to maximize the benefits of sustainable practices, such as using green energy, reducing waste, and improving energy efficiency.

5. **Cooperation:** Encouraging collaboration between companies, organisations, and governments, to pool resources and knowledge, and to promote the adoption of sustainable practices on a wider scale.
6. **Process optimization**: Streamlining processes to reduce waste and increase efficiency and incorporating sustainable practices into production processes.
7. **Investment in training**: Providing training and development opportunities for employees to build the skills and knowledge needed to implement sustainable practices.
8. **Work flexibility:** Implementing flexible working arrangements, such as remote working, to reduce the carbon footprint of commuting and improve work-life balance.
9. **Energy efficiency measures:** Implementing energy-saving measures, such as energy-efficient lighting and appliances, to reduce energy consumption and costs.
10. **Use of green energy**: Encouraging the use of clean, renewable energy sources, such as solar, wind, and hydro power, and promoting the use of eco-friendly products.
11. **Installation of solar panels**: Encouraging the installation of solar panels on buildings to reduce dependence on non-renewable energy sources and lower energy costs.
12. **Managing intellectual capital:** Valuing and managing the knowledge and expertise of employees to promote innovation and sustainable practices within the organisation.
13. **A green workplace:** Creating a workplace environment that supports sustainable practices, such as recycling, composting, and the use of eco-friendly products.
14. **Training for mentors:** Providing training for mentors to support employees in the implementation of sustainable practices.
15. **Improved communication between education and business sectors**: Promoting dialogue and collaboration between the education sector and the business sector to share knowledge and resources and to promote sustainable practices.
16. **Corporate social responsibility (CSR):** Incorporating sustainable practices into a company's CSR activities to promote sustainable development and build a positive reputation.
17. **Increased information about EU funds:** Providing information on EU funding opportunities to support the implementation of sustainable practices.
18. **Eco-chain:** Encouraging the development of an eco-chain to promote the circular economy, reduce waste, and promote sustainable practices.
19. **Awareness of sustainable practices:** Raising awareness of sustainable practices among employees, customers, and stakeholders to encourage the adoption of sustainable practices.
20. **Paperless public administration**: Implementing paperless systems in public administration to reduce paper consumption, lower costs, and improve efficiency.
21. **Incorporation of economic benefits for recycling**: Encouraging the recycling of materials by incorporating economic benefits, such as tax reductions, for reusing, remaking, and refurbishing initiatives.
22. **Digital transformation for organisations:** Encouraging organisations to adopt digital technologies.

Figure 44 - Challenges and Opportunities in implementing sustainable practices

C. Education

The participants identified a need for a wide range of courses and competencies to support the transition towards sustainability (76 in total). Here, we present the most mentioned courses that were considered necessary:

1. **Sustainability:** Understanding the principles of sustainability and the role that individuals and organisations play in creating a sustainable future.
2. **Circular Economy:** Knowledge of circular economy concepts and practices, including product design, material selection, and waste management.
3. **Creativity:** Encouraging creativity and innovation to find new solutions for sustainability challenges.
4. **Digital Competencies:** Developing digital skills to support the transition towards a more sustainable future, including the use of technology for sustainability solutions.
5. **Design Thinking:** Applying design thinking principles to solve sustainability challenges and create new products and services.
6. **Knowledge Management:** Effective management of information and knowledge related to sustainability to support decision-making.
7. **Environmental Regulations:** Understanding environmental regulations and their impact on sustainability, including international and national policies and regulations.
8. **People Management:** Building competencies in managing people and teams in a sustainable and inclusive manner.
9. **Behavioural Skills:** Developing the skills required to engage and influence individuals and organisations to adopt sustainable practices.
10. **Collaboration:** Building skills to collaborate effectively with diverse groups of stakeholders to support sustainability initiatives.
11. **Critical Thinking:** Developing critical thinking skills to analyze sustainability challenges and identify effective solutions.
12. **Systemic Thinking:** Understanding the interconnections between systems and how they impact sustainability, including the social, economic, and environmental dimensions.
13. **Life-Long Learning:** Embracing a lifelong learning approach to continuously acquire new knowledge and skills related to sustainability.
14. **Green Skills:** Acquiring the skills and knowledge needed to support the transition towards a green economy and sustainability.
15. **Training of Trainers:** Building the skills needed to train others on sustainability and green skills.
16. **Cultural Intelligence:** Developing cultural intelligence to work effectively with people from diverse cultures and backgrounds in support of sustainability initiatives.

4.3. Roundtable in North Macedonia

The first roundtable "**Challenges and perspectives in leading sustainable systems and business transformation**" was held on November 29, from 12:00 - 14:00, organised by the Institute for Research in Environment, Construction and Energy, Construction Institute Macedonia AD Skopje and the Small Business Chamber. The purpose of the workshop was to establish a dialogue between companies, educational, public and civil institutions by applying the methodology for solving complex, dynamic and open problems through an interactive "living laboratory". The workshop was attended by distinguished experts, project managers in the field of sustainable policies and practices, the academic public, representatives of the construction sector, as well as representatives of relevant institutes and state institutions, who made a special contribution to mapping current challenges and future perspectives in conditions of need for business transformation and building sustainable capacities.

The selected sector in North Macedonia was the construction industry. Construction in North Macedonia is an industry that is vital for the domestic economy, given that, in addition to the direct impact on economic development, it entails the engagement of about twenty-five other industries. Development of the Smart Specialisation Strategy - S3 started in 2019 and is planned to be finalised this year. Based on the qualitative analysis of economic, innovation and scientific potential in North Macedonia, one of the selected priorities is smart/sustainable building and materials, including the concept of circular economy.

Key Findings

The key findings can be divided into three different topics – 1) political, 2) economic and 3) educational findings (see Figure 45).

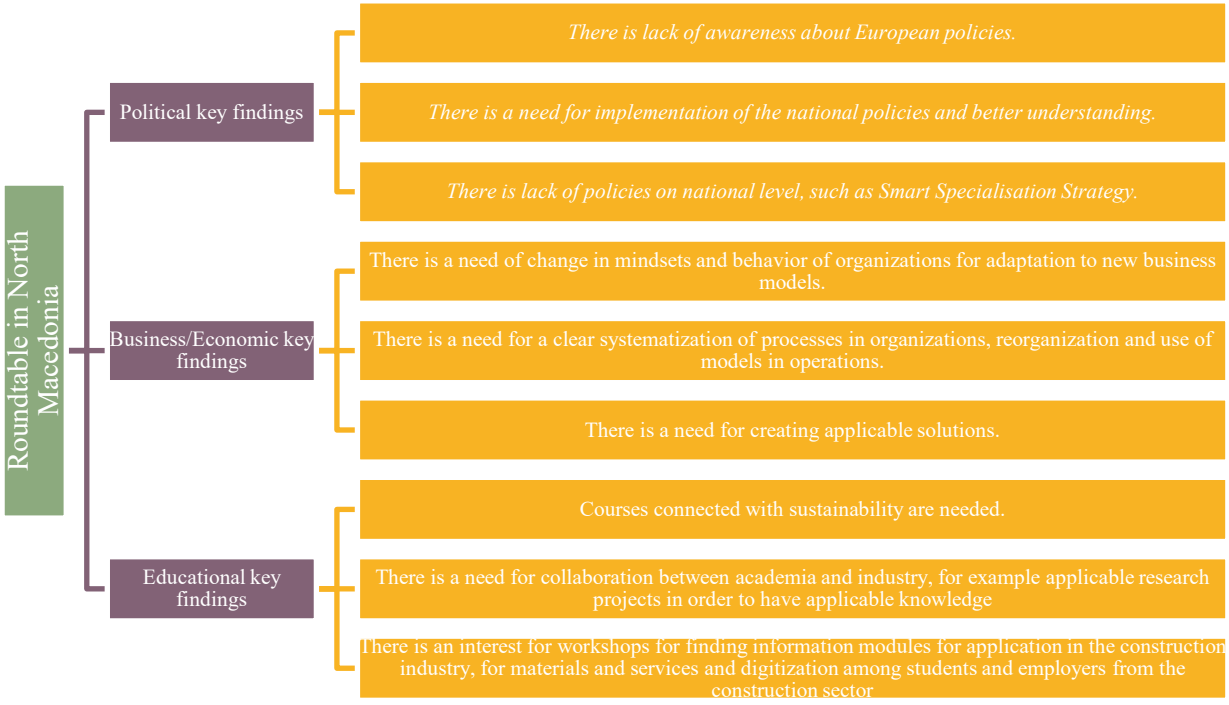

Figure 45 - Roundtable in North Macedonia - key findings

The first part of the discussion was focused on the policies on EU and national level. Participants listed a number of policies (strategies, laws, other relevant documents) which are relevant for the construction sector namely. Among the selected policies were the European Green Deal, Recovery Plan for Europe, ResPower, Renovation Wave, New European Bauhaus initiative, and other documents related to education, research and innovation. The participants shared that they have difficulties in understanding and aligning with all these documents, and would like support in this process. For many of them, especially the ones working in the real estate sector, the daily activities and the pressure they have to be productive and survive leave little space for exploring the vast number of EU policies.

Regarding the policies on national level, the participants expressed that they fully follow all the laws, regulations, and are aware of the continuous updates in these documents. This was mainly related to the documents such as: Construction Law, Law on Energy, Energy Efficiency Law, etc. Other relevant documents which were mentioned included: Strategy for small and medium enterprises, Strategy for digitization, Education and science law, etc. Participants also shared the challenge of not having long-term strategies, proper rules for financing HEIs and Science, and lack of national knowledge strategy.

During the discussion of the business aspect, several challenges related to management and operational difficulties were mentioned, including:

- Increased costs for introducing or observing sustainability practices in operations,
- Poor quality in execution, intellectual conformism and mediocrity,
- Limitation in the possibility of (timely) procurement of equipment and technology,
- Deficit of existing on merit system,
- Lack of innovative technologies in implementation compared to other countries
- Lack of capacity for investing in construction sector.

Participants shared their daily struggle to survive, facing unfair competition, frequent changes in the regulations, and lack of skills and possibilities to invest in new technologies and human capital. However, on the positive side, quite a number of good practices were shared, presenting examples of cooperation modes established between educational and business organisations, examples of companies which already excel in sustainability practices, and future plans of many others.

Some of the practices shared included:

- Managing intellectual capital
- Incentives for business investments in R&D
- Clear systematization of processes in the company
- Eco chain for purchase
- New technologies for energy production
- Compulsory adult learning
- Paperless public administration.

In the third part of the discussion, the participants focused on exploring skills needed in their environment now and in the near future. It was noted the importance of changing the current approach to work from "conventional" to contemporary-modern. The applicability of acquired knowledge and skills during the trainings was also emphasized, aiming for knowledge co-creation (collaboration with educational organisations) and collaboration between universities, companies, public sector & NGOs.

Discussion and Implications: Strengths, Challenges and Growth Areas

The workshop covered three elements: policies, laws and strategies; business aspects and a way of managing them, as well as an educational aspect for defining the necessary skills. Overall, positive practices and challenges were presented at the national and European level, in terms of existing strategic documents, directives and legislative legislation. Among the business challenges, the need for a clear systematization of processes in organisations, reorganisation and use of models in operations, as well as the need for creating application solutions, was highlighted to the greatest extent. In addition, it was initiated on the lack of technologies, coordinated teams and effectiveness in operations. According to the obtained conclusions, the need for new knowledge was seen, with an emphasis on their applicability, which is directly related to the application of new practices in education.

The project's activities so far include the analysis and mapping of the needs and challenges of employees and companies in relation to the topics of sustainability and management. According to the obtained results and recommendations, the CATALYST Center of Excellence will be set up, which will develop and pilot 70 vocational education and training courses, as well as pilot projects with companies and applied joint research projects in selected sectors according to the national strategy for smart specialization.

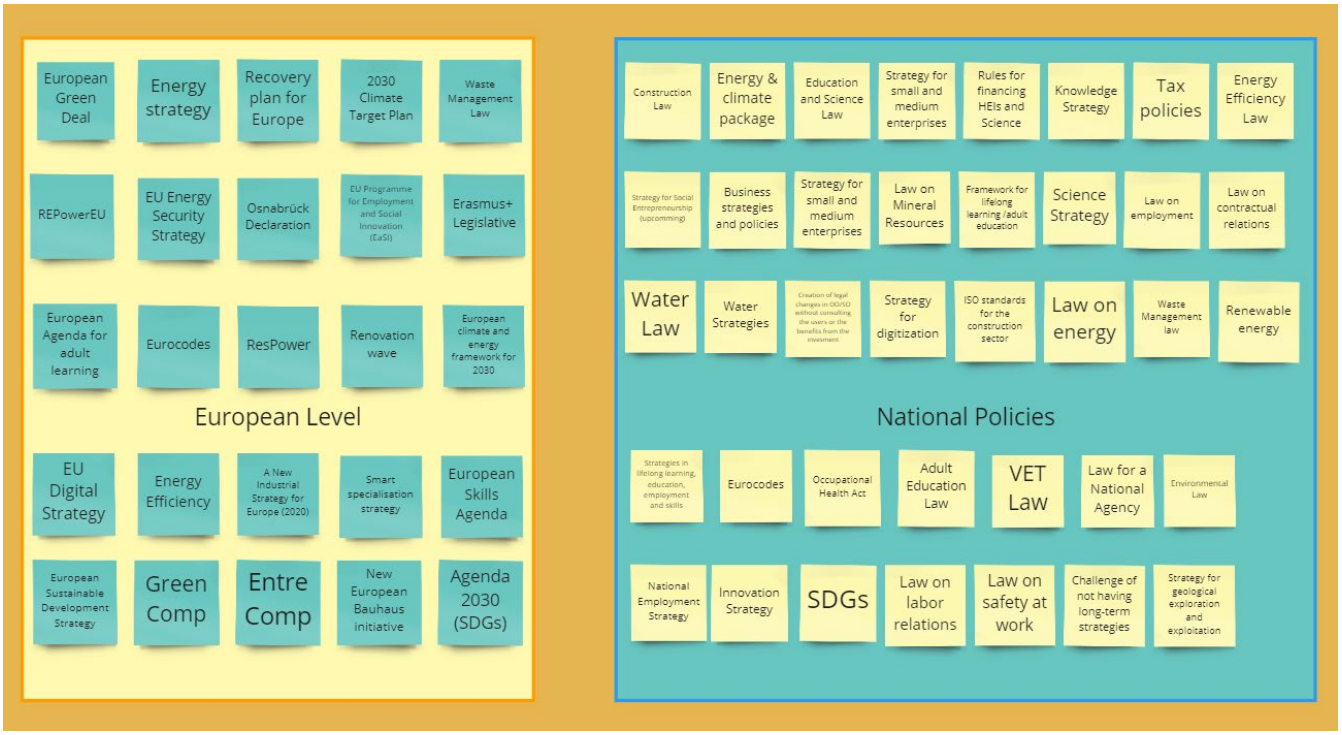

Figure 46 - North Macedonia Roundtable results - Policy side

Figure 47 - North Macedonia Roundtable results - Business side

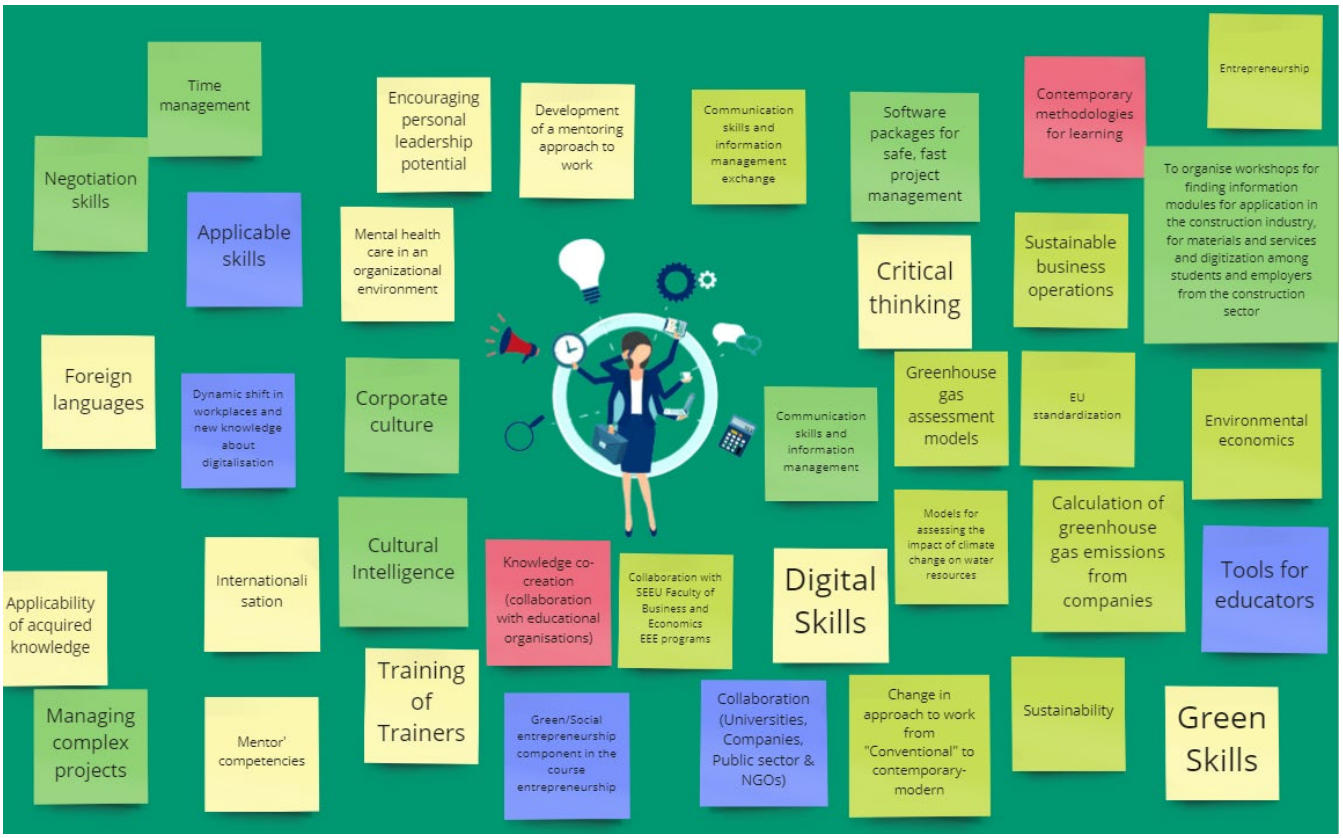

Figure 48 - North Macedonia Roundtable results - Education side

4.4. Roundtable in Germany

The first national event of the CATALYST project in Germany was held on Dec. 7, 2022 online, organised by the Bundesverband Nachhaltige Wirtschaft e.V., the Collaborating Centre on Sustainable Consumption and Production (CSCP), and bells. In total, 12 people attended the event including managers, representatives of educational institutions and education providers. The topic was on challenges on sustainable transformation of organisations.

The goals of the event were the presentation of the CATALYST project to possible stakeholders and a group discussion about the main challenges when implementing sustainability and management practices. In three 15-minute discussion rounds, all participants had the opportunity to discuss different topics with each other. The main conclusion of the event is to focus on how people approach the new sustainability landscape, especially in the light of current policy developments such as the European Green Deal, and to make appropriate investments into people and systems to achieve goals, both commercial and environmental.

Key Findings

The key findings can be divided in three different topics – 1) political, 2) economic and 3) educational findings (see Figure 49).

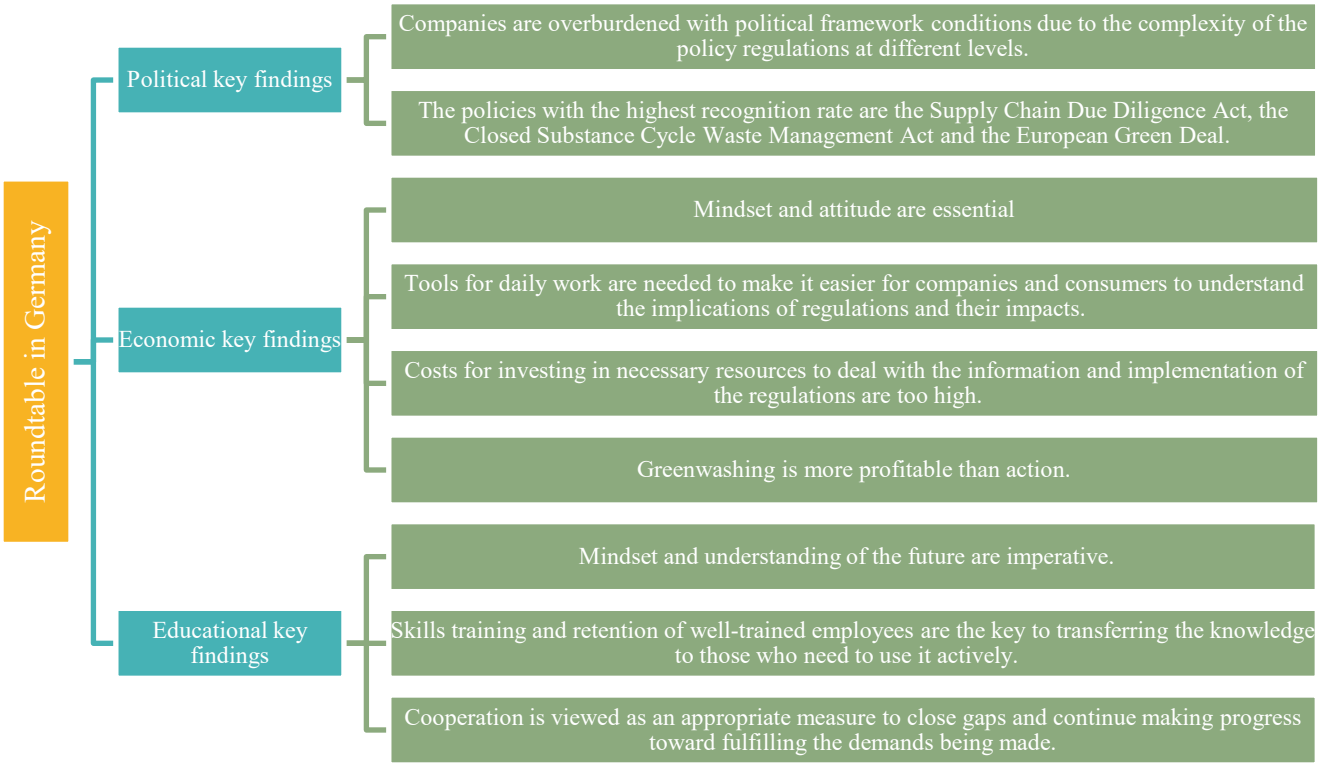

Figure 49 - Roundtable in Germany - key findings

Political key findings are:

- There is a large variety of regulations and companies are overburdened with political framework conditions due to the complexity of the policy regulations at different levels (EU – national – regional). Given the complexity of the regulations, companies need support in identifying the measures that are most relevant to them and will affect them directly.
- The policies with the highest recognition rate are the Supply Chain Due Diligence Act, the Closed Substance Cycle Waste Management Act and the European Green Deal.

Economic key findings are:

- Mindset and attitude are essential, as is knowledge building through a consolidated transfer of know-how that can be adopted by companies in their operational practice.
- Tools for daily work, including digitalization support, are needed to make it easier for companies and consumers to understand the implications of regulations and their impacts.
- Costs for investing in necessary resources to deal with the information and implementation of the regulations are too high.
- Greenwashing is more profitable than action; consumers are flooded with information and cannot make informed decisions. Not more information is necessary, but the quality of information needs to be addressed.

Educational key findings are:

- Mindset and understanding of the future are imperative.
- Skills training and retention of well-trained employees are the key to transferring the knowledge to those who need to use it actively.
- Cooperation is viewed as an appropriate measure to close gaps and continue making progress toward fulfilling the demands being made.

Discussion and Implications: Strengths, Challenges and Growth Areas

The main areas of focus can be divided into three sectors. The first is the emphasis on what information is being provided by government bodies and how companies are dealing with this information. Due to the overwhelming amount of input, it is essential that people are supported in their efforts to adjust their attitudes and mindset to learn to deal with the complexity. There is a high demand for taking theoretical ideas and transferring them into practical ones which can be taught and implemented by employees.

The second is the lack of resources for investment into new areas and the education and tools necessary to achieve the implementation of all the policies that companies are confronted with. Finding the balance between expenditures to improve the current status and staying competitive as a company is critical for companies to not only survive, but also to thrive under the new conditions.

The third is the involvement of people who are affected by the new sustainability demands. One group is the employees who need new skills, but once they have them may be enticed to work for a competitor. Handling knowledge management and providing appropriate training and retention measures is key. The other group are the customers, who need to be informed, included, and involved in the new measures to assure their comprehension of complex issues and retaining them as interested parties who are willing to support the measures the company is implementing.

Recommendations and Conclusion

Many of the attendees were aware that the demands placed on them by the new regulations were not only challenging but also essential for the future. Finding good ways to convert theory into practice and make everyone involved feel comfortable about what they need to know and how to implement this knowledge is critical for the success of both the organisations and the execution of the policies themselves.

Managing current resources and finding new ways to include the upskilling necessary for employees and the provision of ideas to customers were seen as critical tasks for the future. There was agreement on upgrading technology and processes, applying appropriate measures to be in alignment with regulations and assuring that the viability of the companies and the best interests of the consumers were not only taken into account but were actively evolved through the company's activities.

There is definitely a demand for programs and support to be provided by the CATALYST project. The development of tools and processes to enhance learning and retention of information can simplify the complexity of the new sustainability measures that companies need to comprehend, implement, and evaluate in their businesses. The high value placed on cooperation should open new avenues for supplying the needs of all the stakeholders and improving the execution of the new policies.

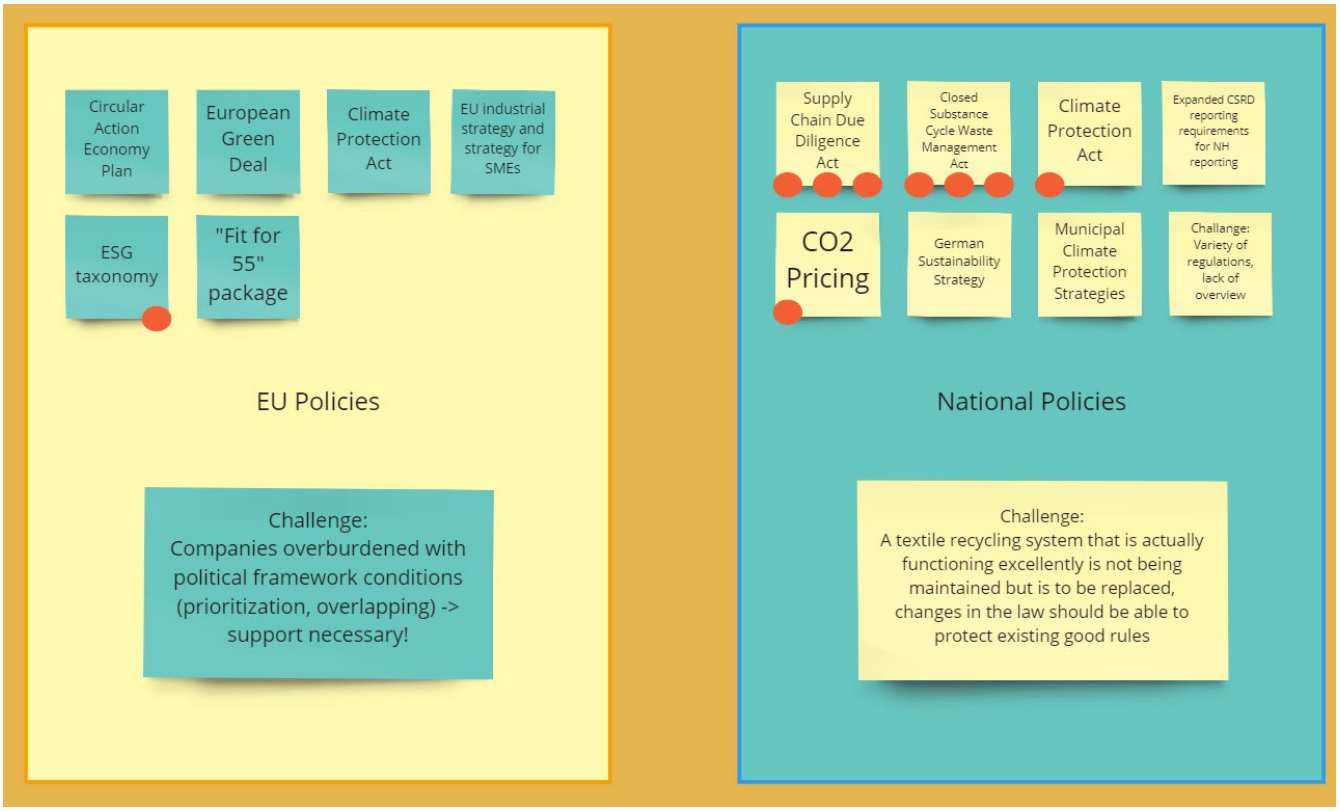

Figure 50: Germany Roundtable results - Policy side

Figure 51: Germany Roundtable results - Business side

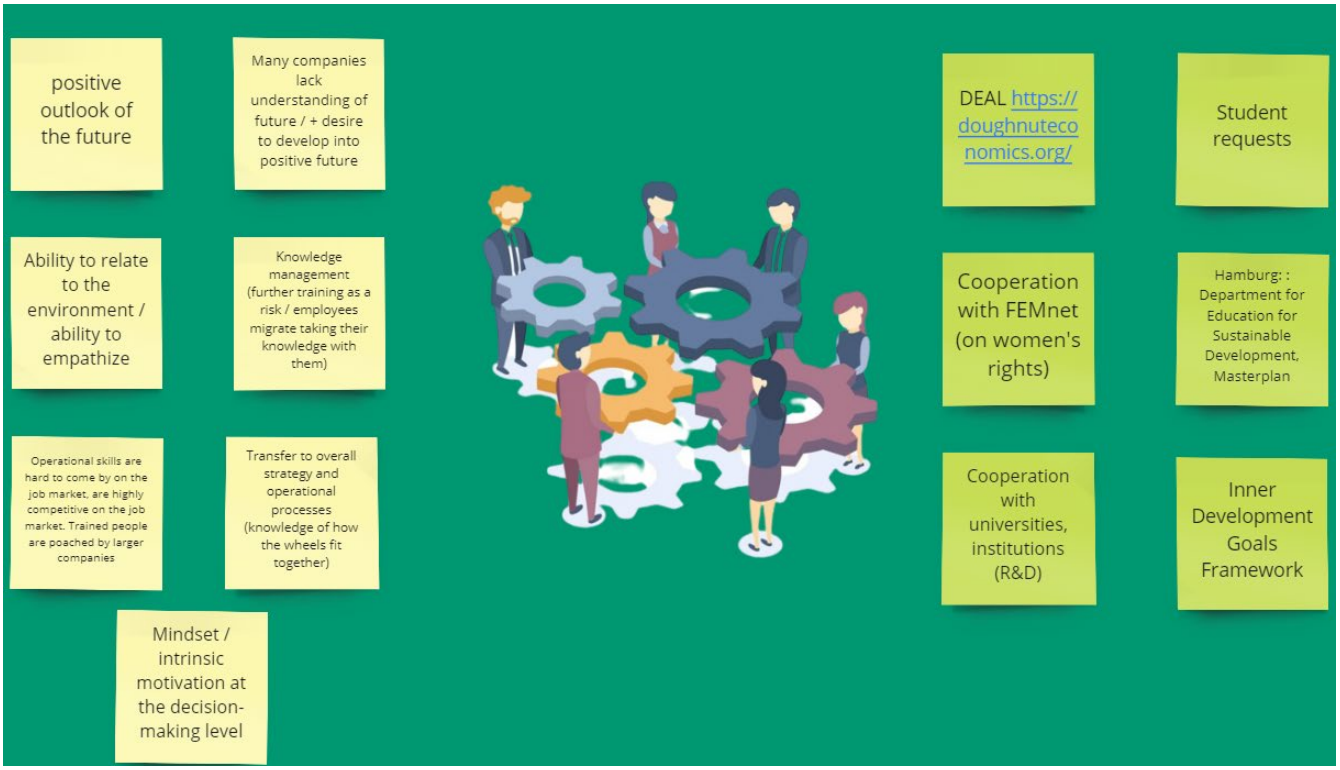

Figure 52: Germany Roundtable results - Education side

4.5. Roundtable in Austria

The first national event of the CATALYST project was held on Dec. 7 2022 at the University of Applied Sciences FH Joanneum, organised by Apflbutzn Faires Gwand OG. In total 40 people attended the event including managers, representatives of public institutions and education providers. The topic was on challenges on sustainable transformation of organisations.

The goals of the event were the presentation of the CATALYST project to possible stakeholders and a group discussion about the main challenges when implementing sustainability practices. In three 15-minute discussion rounds all participants had the opportunity to discuss different topics with each other. The main conclusion of the event is the need for a new narrative of the sustainability topic as well as a detachment of money as the only measurement.

The event targeted managers and professionals, representatives from public institutions and educational organisations. In total 40 people attended the event, including 4 persons from the CATALYST project. The event took place at the University of Applied Sciences FH Joanneum at December 7, 2022 from 4:00 – 7:30 pm (incl. approx. one and a half hours of networking).

For the workshop all questions were used as proposed by the work package leader. However, due to the high number of participants it was decided that we have three topic-tables with 15-minute discussion rounds. This world café setting was perfect to engage in lively discussions and guarantee an information exchange between the participants.

Key Findings

The key findings can be divided in three different topics – 1) political, 2) economic and 3) educational findings.

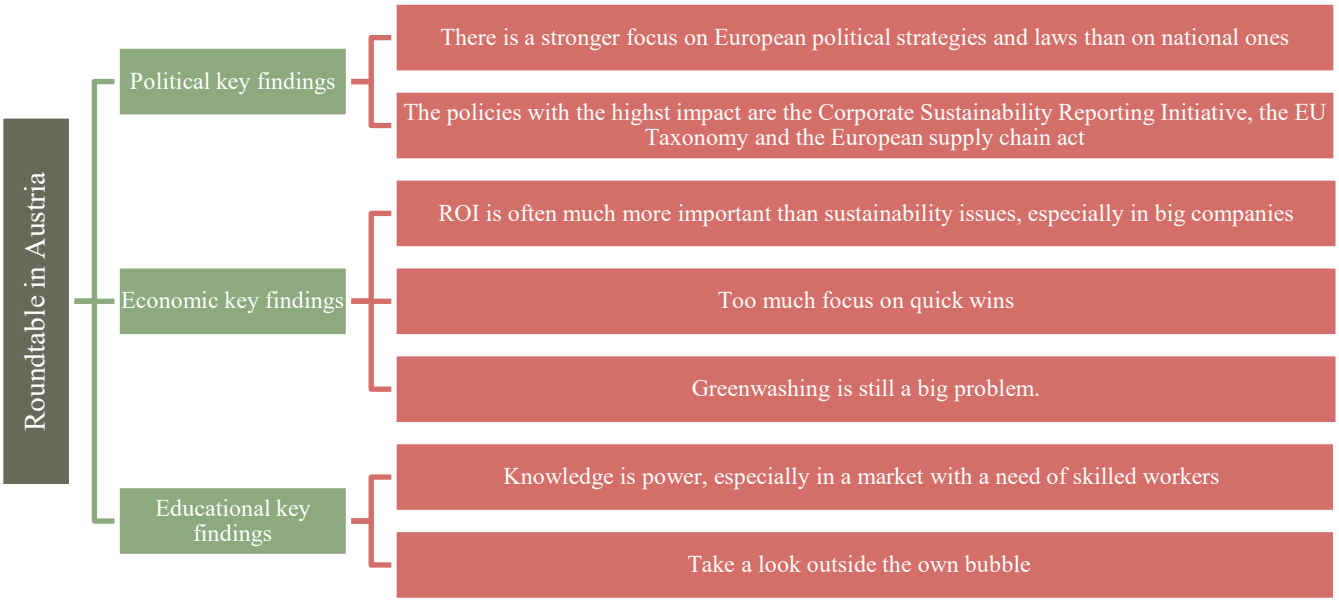

Figure 53 - Roundtable in Austria - key findings

Political key findings are:

- There is a stronger focus on European political strategies and laws than on national ones.
- Policies with the highest impact are the Corporate Sustainability Reporting Initiative, the EU Taxonomy and the European Supply Chain Act.

Economic key findings are:

- ROI is often much more important than sustainability issues, especially in big companies
- Too much focus on quick wins
- Greenwashing is still a big problem

Educational key findings are:

- Knowledge is power, especially in a market with a need of skilled workers
- Take a look outside the own bubble

Discussion and Implications: Strengths, Challenges and Growth Areas

One of the biggest challenges which was mentioned is the missing monetary value of sustainability actions. Especially for companies the only way to evaluate actions or the company itself is through monetary figures. Quite often the focus is on “quick wins” and not on long term strategies. Another challenge is to include all employees in sustainability measures and sometimes missing knowledge. In terms of needed skills, the discussion revolved around a more holistic approach. It is always necessary to have a look at the whole system. In connection with a shortage of skilled workers cooperation with educational organisations are essential. The biggest challenges with upcoming policies are concerning the corporate sustainability reporting, everything connected to the EU taxonomy and the new supply chain law. However, the participants of the discussion mentioned that most of them are well informed about these issues.

The biggest growth areas are a new narrative and knowing its own (organisations’) core competences. It is essential to start telling a “new story” which is less about waiver and more about possible gains through a transformation to sustainable organisations. Additionally, organisations should focus on their core competences and switch to sustainable areas where it is possible. For example, educational organisations should teach sustainability to all students, not just to students of specific degrees. Another mentioned growth area is ESD – Education for Sustainable Development.

Recommendations and Conclusion

Everyone at the event was aware of the necessity to act. However, there were differences in the way of acting and the challenges which need to be overcome. Almost all participants who were representatives of SMEs, big companies, educational institutions and lobbyists named the main challenge for a transformation to sustainable business models as lacking time and money. On the positive side, many participants mentioned future plans in their organisations concerning sustainability topics. Even though some plans can be seen as “quick wins”, most organisations are aware of greenwashing and the sensitivity of the topic in the public.

For the future development of the courses within the CATALYST project, it would be useful to include content about how to change the actual mindset to a more sustainable one. Additionally, the need for an alternative value system is very high. At the moment everything is based on money and a

transformation to a sustainable business model is sometimes costly. An approach with a new narrative could be very helpful for a sustainable transformation.

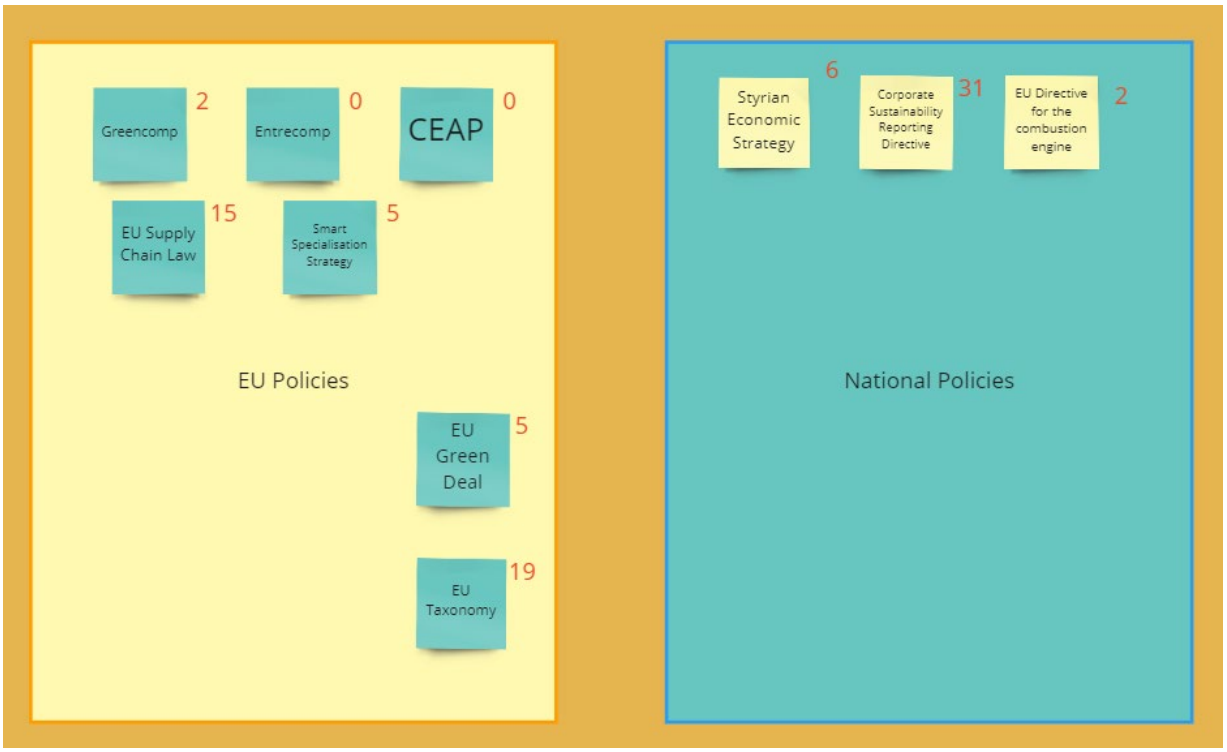

Figure 54 - Austria Roundtable results - Policy side

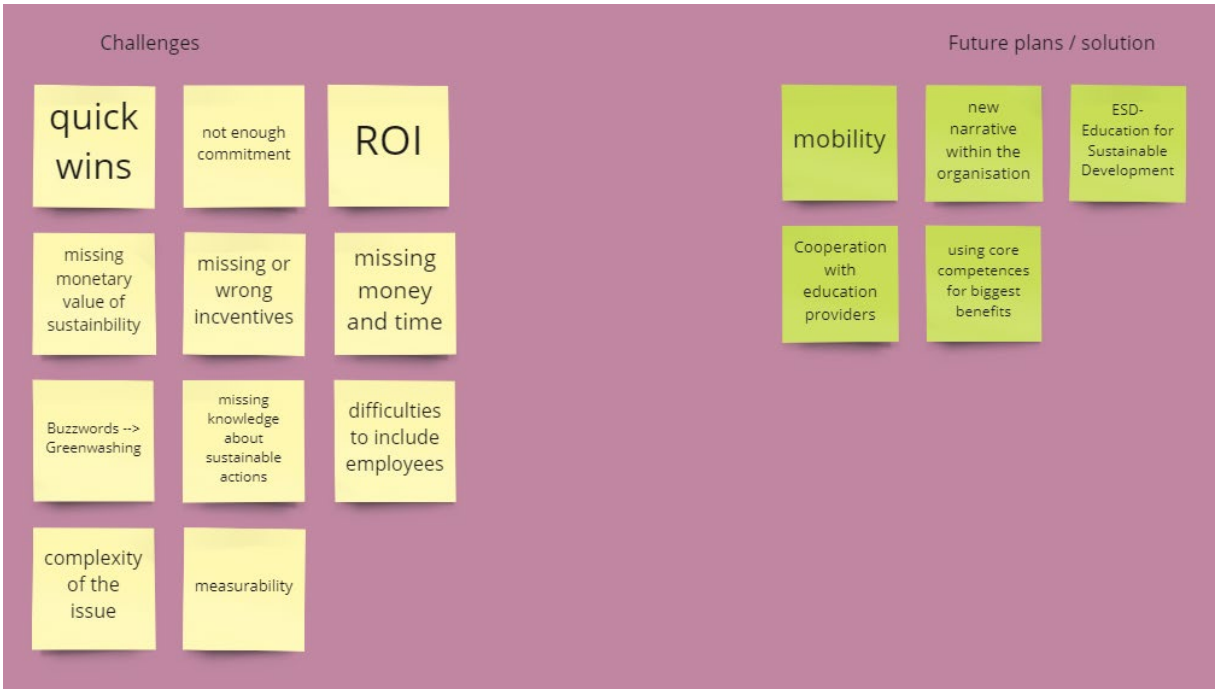

Figure 55 - Austria Roundtable results - Business side

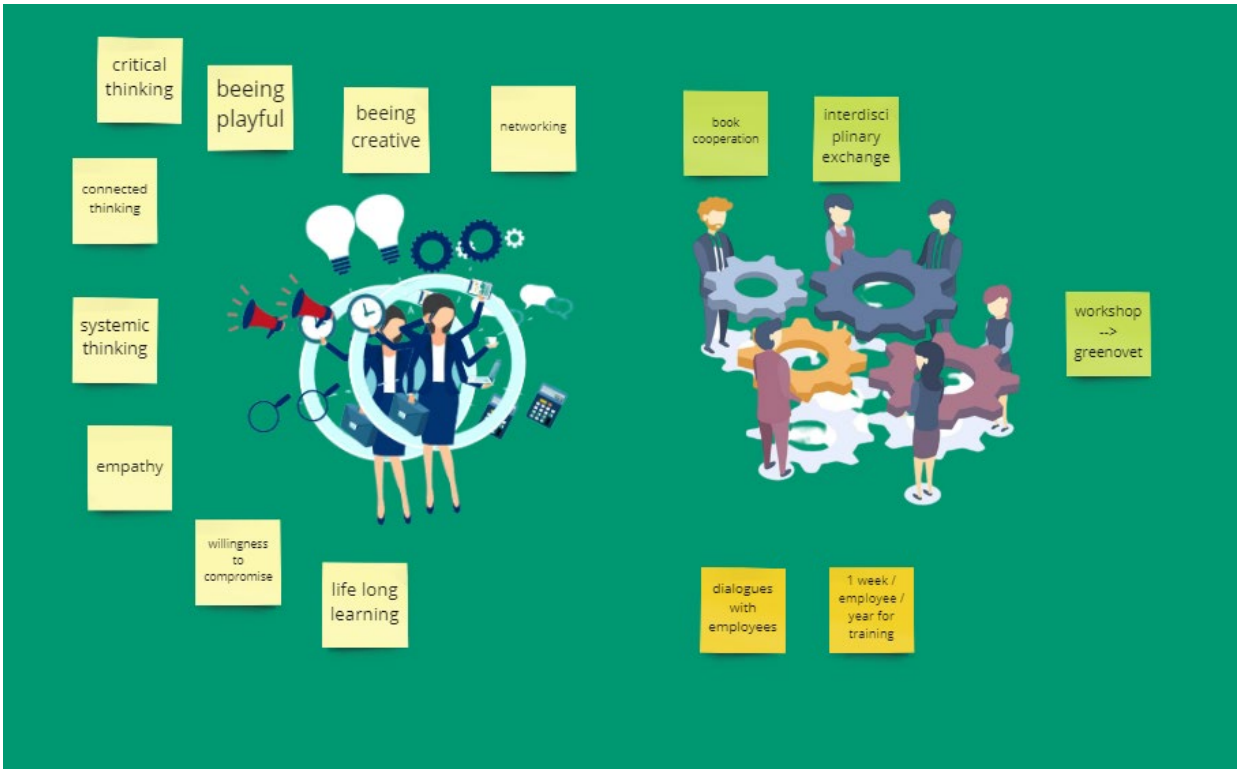

Figure 56 - Austria Roundtable results - Education side

4.6. Roundtable in Portugal (1)

The "Challenges and Perspectives in Leading Sustainable Systems and Business Transformation" roundtable was held on November 29, 2022, at Iscte-Instituto Universitário de Lisboa, between 2:00 and 3:30 pm. Professor Florinda Matos organised this roundtable within the framework of the SocioDigital Lab Conference. There were 96 people (in person and online) who attended this roundtable, representing, in the majority, the education and training sector, but also public organisations and companies. This roundtable was divided, essentially, into two parts: one being the debate between the spokesperson of the table, followed by a second part, the discussion with the attendees and the audience.
This roundtable aimed to hear different stakeholders' perspectives and establish a dialogue among them. The roundtable participants were in the academic area (represented by IST), industry (represented by CENTIMFE and PLASTOFIL company), and the public sector represented by FCT-Fundação para a Ciência e Tecnologia.

The roundtable began with a contextualisation by the panel moderator. The fast shift to a climate-neutral Europe and digital transformation is changing how we work, learn, participate in society, and conduct our daily lives. Europe can only seize these opportunities if its citizens develop the right skills. Qualification and re-qualification are crucial for long-term sustainable growth, productivity, and innovation. Therefore, a key factor for the competitiveness of SMEs, which make up most European companies, accounts for more than 60% of the jobs created. Portugal is no exception in this scenario, facing tremendous challenges aggravated by the structural fragility of our economy and productive fabric. As a part of this project, a national survey is being submitted and is currently underway. It aims to understand the development of skills in SMEs, helping and inspiring them to rethink and redesign their business models based on co-creation and sharing between the education-training system and business organisations.

The preliminary results of this research indicate that:

- About 28% of Portuguese SMEs who participated in the study, are unaware or unsure of knowing basic concepts regarding the United Nations Sustainable Development Goals (SDGs) and the sustainability of business models.
- Most of the remaining SMEs focus their sustainability practices on environmental sustainability, which also focuses, namely, on energy reduction and costs.
- For most SMEs that participated in the study, there is no strategy to adapt their business to the sustainability challenges, and there is a lack of skills to anticipate this strategy.

Subsequently, each of the participants at the roundtable was asked to comment on the results and identify the qualification needs that, from their point of view, will be fundamental to meeting these challenges. They were also asked to comment on the adequacy of public and European-level policies and the education and training system's role in overcoming the challenges presented.

Business Perspective

Regarding the business perspective, it was concluded that it is necessary to teach companies that sustainability is a concept allied to the long-term strategy – immediate actions will only have results in the future. Thus, this concept is associated with the longevity of companies. Alongside, companies listed

on the stock exchange must present their sustainability reports; there should be a simpler way for other companies to report what they are doing in this area. It is a matter that should be taught.

According to this perspective, people play a crucial role in pursuing this knowledge; they are a major factor in transformation. Since suggesting training education, people's well-being for the recognition of economic sustainability and marketing and differentiation (specifically "engineering tolling"- cluster of competitiveness), these are all important factors to bring into people's awareness and develop sustainable criteria.

Public Policy

Regarding public policy, according to the representative of the public policies, 28% of companies in Portugal are inattentive or unenlightened as far as SDGs are concerned (88% of companies are micro, small and medium companies that do not have innovation strategies and that focus on paying wages at the end of each month). Almost 90% of Portuguese companies are outside of the context of sustainability matters. Therefore, they will not be able to transform strategies and business models. Thus, public policies and regulations come into place. In the long run, the real challenge is to meet the requirements of execution, more than questioning the ability of financial aid by the public or private sector. "*Engineering tooling*" is also considered a way to measure companies' competitiveness at a sectorial level.

Education and Training

The IST representative referred to the importance of the education field to improve microbusinesses' literacy and develop strategies to enable them to create new business models (and their challenges). Regarding the lack of companies' knowledge of SDGs, the financial constraints of the case and its easier returns of effort and revenue were mentioned. The importance of studying throughout life was also mentioned, which implies motivation and willingness to be back at school that require mostly economic incentives, after briefly mentioning the courses (in a short period). The bottom line is that people need time to learn, especially if they have not done so in a considerable amount of time (whether to adapt to new technologies or retain knowledge).

Challenges and Recommendations

One of the main challenges is people adapting to new ways of working, learning at work, and continually acquiring knowledge. Additionally, from the industry perspective, there are some challenges. Firstly, at the company level, there is a dichotomy between costs and investments (which have yields that can be tangible or intangible). It would be naïve to think yields have instant returns to a company's profitability, so, in the long run, growth is possible, but it must be in the societal context which the company is in. On the one hand, there is a pedagogical dilemma and a hiatus in the company's response. One of the aspects mentioned is the sensibilisation of matters, and operationalisation is one of the more significant challenges, alongside clear information. One of the recommendations is to follow SDGs, although keeping in mind that it is extremely difficult to reach all 17 goals proposed.

In case of recommendations, raising awareness on environmental and social issues that may arise from not knowing the consequences of choosing to buy a harmful / not so ethically produced product, starting in schools and going to companies. As consumers, most of the time, we need help understanding the reasons behind it; thus, the solution must start by teaching companies a guide to

why SDGs are important. The automobile industry, for example, is reporting all CO2 emissions produced.

One of the solutions must start by teaching companies a guide to why SDGs are important, consequently, to consumers, it is easier to also understand the importance of SDGs. At the same time, public policies have a huge role in pursuing new measures on how people behave in society through financial and fiscal instruments, as well as the definition of compelling goals to move the predefined goals forward.

4.7. Roundtable in Portugal (2)

The Portuguese Roundtable of the CATALYST project was held on Dec. 16, 2022 at CENTIMFE – Technological Center for Mouldmaking, Special Tooling and Plastics Industries, organised by the CATALYST team of CENTIMFE. In total 32 people attended the event including managers, representatives of public institutions and education providers. The topic was on challenges on sustainable transformation of organisations. The goals of the event were the presentation of the CATALYST project to possible stakeholders and a group discussion about the main challenges when implementing sustainability practices. In three 15 to 25-minute discussion rounds all participants had the opportunity to discuss different topics with each other.

The main conclusion of the event is the need for a strong investment in training, for students, employees, managers and trainers, and focus not only on technical matters, but to include measures to develop corporate culture aligned with sustainable practices. It is necessary to have a continuous cooperation / collaboration between companies, associations, research centers, education entities and public sector.
The event targeted managers and professionals, representatives from public institutions and educational organisations. In total 32 people attended the event, including 5 persons from the CATALYST project, and other 4 people from CENTIMFE. The event took place at CENTIMFE on December 16, 2022 from 10:30 – 13:00 pm (incl. approx. one and a half hours of networking).

For the workshop all questions were used as proposed by the work package leader. Nevertheless, the agenda of the event included two presentations from two different public institutions, the main goal of this was to introduce the National (Portugal) and Regional (Center Region) Smart Specialization Strategies. These presentations were done by two speakers: a representative of ANI – Agência Nacional de Inovação *National Agency of Innovation*, on premise and CCDRc – Comissão de Coordenação e Desenvolvimento da Região Centro/*Central Region Coordination and Development Committee* (online).

From our experience people find it easier to express their opinions and points of view in smaller groups, so that the participants were divided into five tables, and a person from CENTIMFE was at each table support. At all the tables, the participants were asked to discuss the same questions / issues. For each panel / table (Policies, Business and Education) there were 15 to 25-minute discussion rounds.
To promote a more relaxed atmosphere, a snack (cakes and coffee) was served at each table.

Key Findings

The key findings can be divided in three different topics – 1) political, 2) economic and 3) educational findings (see Figure 57).

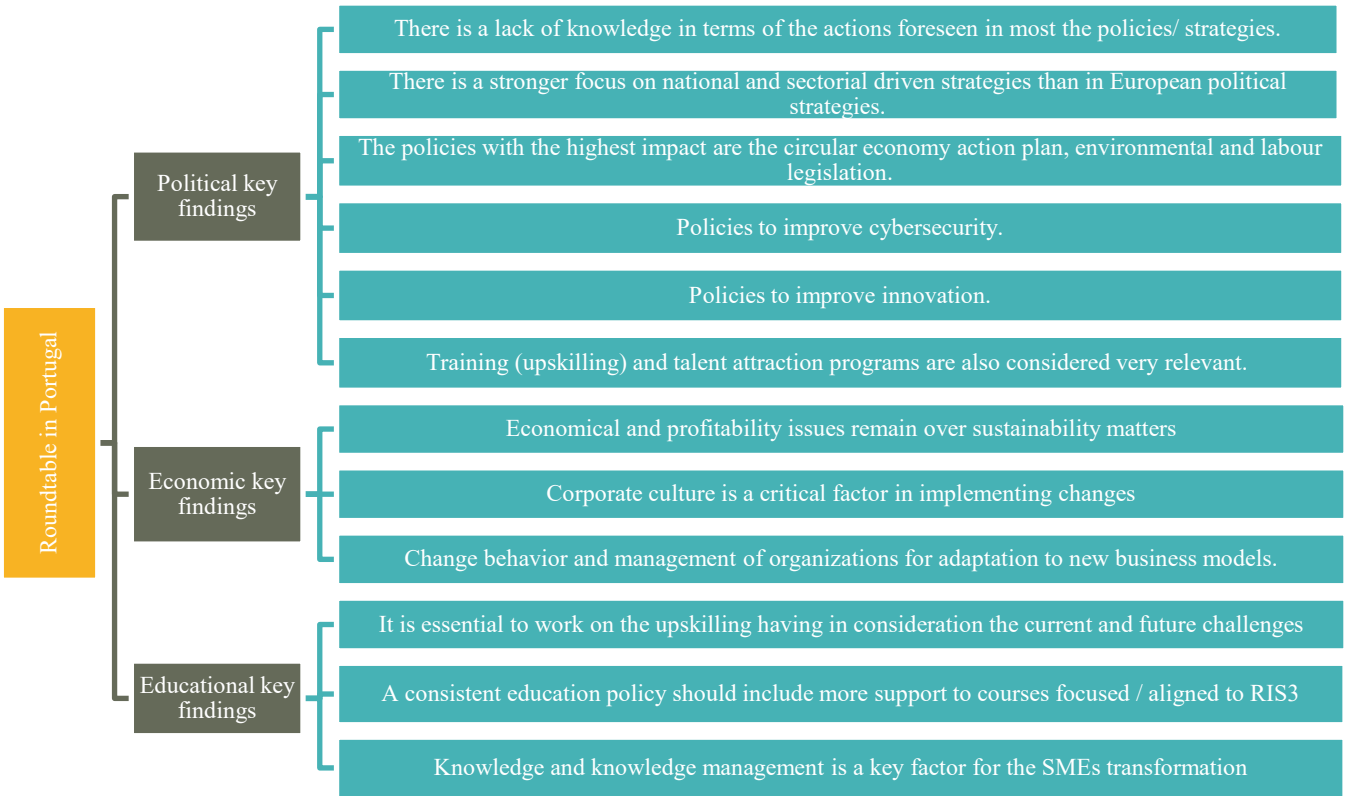

Figure 57 - Roundtable in Portugal - key findings

Political key findings are:

- There is a lack of knowledge in terms of the actions foreseen in most the policies / strategies. The best-known policies are those that guide financing programs.
- There is a stronger focus on national and sectorial driven strategies than on European political strategies.
- The policies with the highest impact are the circular economy action plan, environmental and labour legislation.
- Policies to improve cybersecurity.
- Policies to improve innovation.
- Training (upskilling) and talent attraction programs are also considered very relevant.

Business/ Economic key findings are:

- Economical and profitability issues remain over sustainability matters.
- Corporate culture is a critical factor in implementing changes.
- Change behavior and management of organisations for adaptation to new business models.

Educational key findings are:

- It is essential to work on the upskilling considering the current and future challenges, and training of trainers and managers is a key factor.
- A consistent education policy should include more support for courses focused / aligned to the Smart Specialization and Innovation Strategy.
- Knowledge and knowledge management is a key factor for the SMEs transformation

Discussion and Implications: Strengths, Challenges and Growth Areas

Two major challenges were pointed out by the participants to implement sustainable practices in their organisations: financial and human resources matter. Related to human resources, the difficulty in implementing sustainable practices due to the lack of qualifications of workers, and also resistance to change that is generally felt in organisations stand out. There are difficulties in attracting (recruitment / retention) qualified human resources, which, combined with the need for new skills in the job market, brings some difficulties to organisations, especially companies. Regarding financial issues, highlighting a statement from a company representative "sustainable alternatives are usually more expensive", it represents a major challenge to companies to be competitive and at the same time environmentally friendly. It is very difficult to implement sustainability measures and tools without commercial return if the market does not pay for it. Since the requirement to comply with regulatory requirements is not uniform at a global level, companies still feel some reluctance to go beyond what is required.

Other challenges that were quite often mentioned by the participants were teleworking and cybersecurity. In terms of the new skills that will be needed in organisations, particularly in companies, these areas were pointed out: sustainability (LCA, calculation of the carbon footprint, ESG report, environmental regulations, circular economy, energy management), digital (digital skills , data analysis, power BI), materials and production technologies, management (strategic management, business intelligence, knowledge management, human resources management, design thinking, new business models, creative skills, collaborative practices). The biggest growth areas are focused on management and analysis skills, problem solving ability and also the sustainability matters, including legislation.

Recommendations and Conclusion

Everyone at the event considered this kind of action very fruitful, in particular the opportunity to have an open discussion (conversation) with other peers and also other sectors (business, public, education). For the participants it is important to work together in order to give efficient response to the current and future challenges in terms of business transformation related to the green and digital transition. Still, referring to the skills needed, it is important to have a more holistic approach and promoting a closer cooperation between enterprises and educational organisations is essential.

Despite having different approaches, almost all participants who were representatives of SMEs, large companies, educational and public institutions pointed out the lack of competences (upskilling needs), motivation and costs issues as the main challenges for a transformation to sustainable business models. Raising human resources' awareness to sustainability issues and to provide training to meet the new competences' demands for the climate transition is necessary to empower employees to implement sustainable practices, to be agents of change and help change mindsets.

Another recommendation from our roundtable is the implementation of policies that promote collaboration between business entities, research centers and universities. In spite of having several challenges and needs to meet, there are a set of measures already in preparation or in course for the future in order to help companies become more sustainable. The use of green energies by installing renewable energies, process optimization, teleworking, training stand out as being essential.

For the future development of the courses within the **CATALYST** project, it would be useful to include content about how to change the actual mindset to a more sustainable one. Additionally, training should incorporate the presentation of demonstrative cases, examples of sustainable practices and elucidate with facts the advantages of sustainable practices.

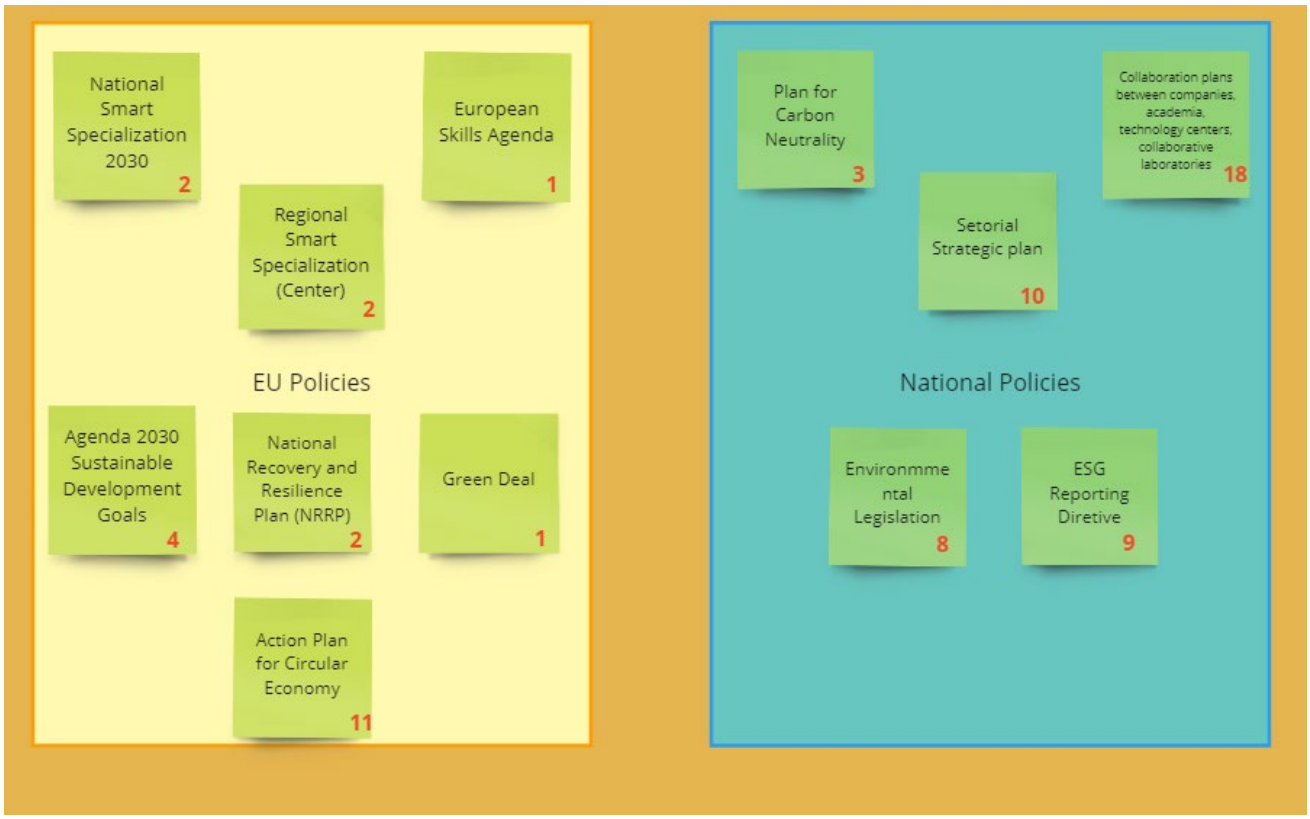

Figure 58 - Portugal Roundtable results - Policy side

Figure 59 - Portugal Roundtable results - Business side

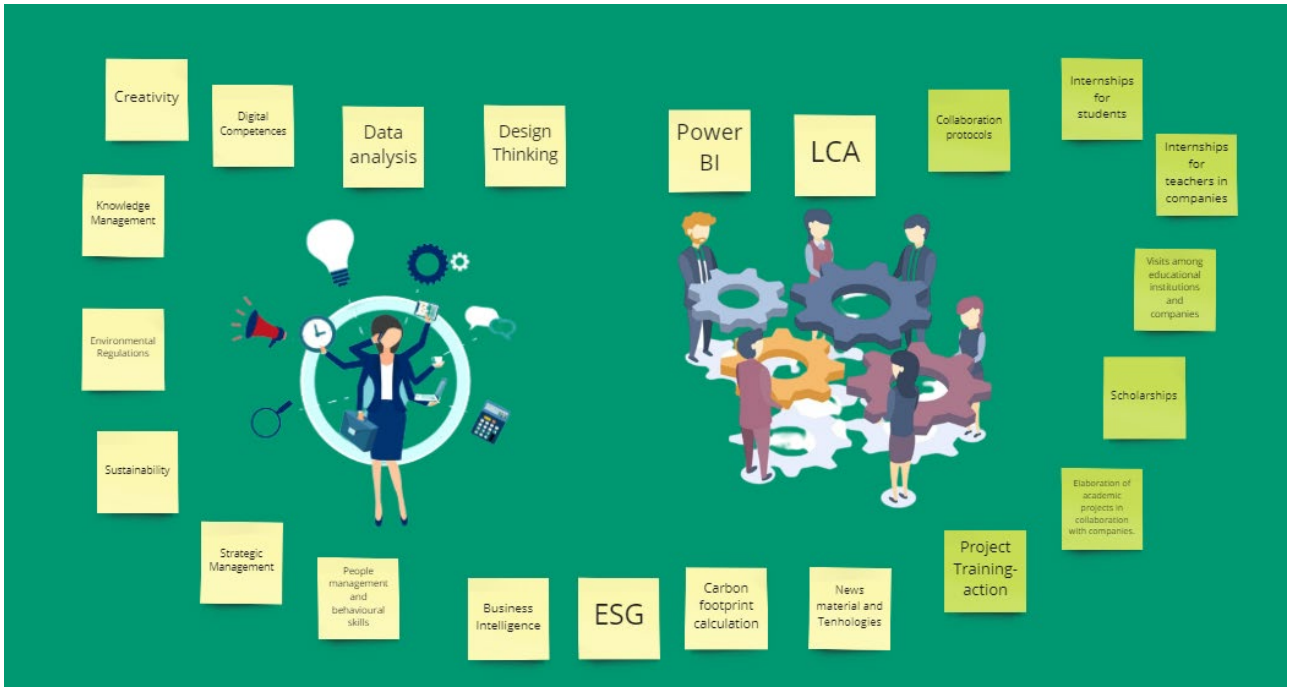

Figure 60 - Portugal Roundtable results - Education side

4.8. Roundtable in Greece

The first national event of the CATALYST project in Greece was held on Dec. 2, 2022 at Megaron Hypatia, Ipeirou 2, Athens, organised by Sporos Circular Solutions, in collaboration with AUEB and CRETHIDEV. At the exclusive workshop, a total of 44 participants attended the event, including managing partners from SMEs, representatives of public institutions, municipalities, and government, as well as students, job hunters, and education providers. The topic was framed on the challenges, hindrances and support for the sustainable transformation of organisations, with a specific focus on skills, education and training. The goals of the event were to present an overview of the CATALYST project to possible stakeholders and to carry out a group discussion about the main challenges each group faces in their effort to implement circularity and sustainability practices.

Key Findings

The key findings can be divided in three different topics – 1) political, 2) economic and 3) educational findings (see Figure 61).

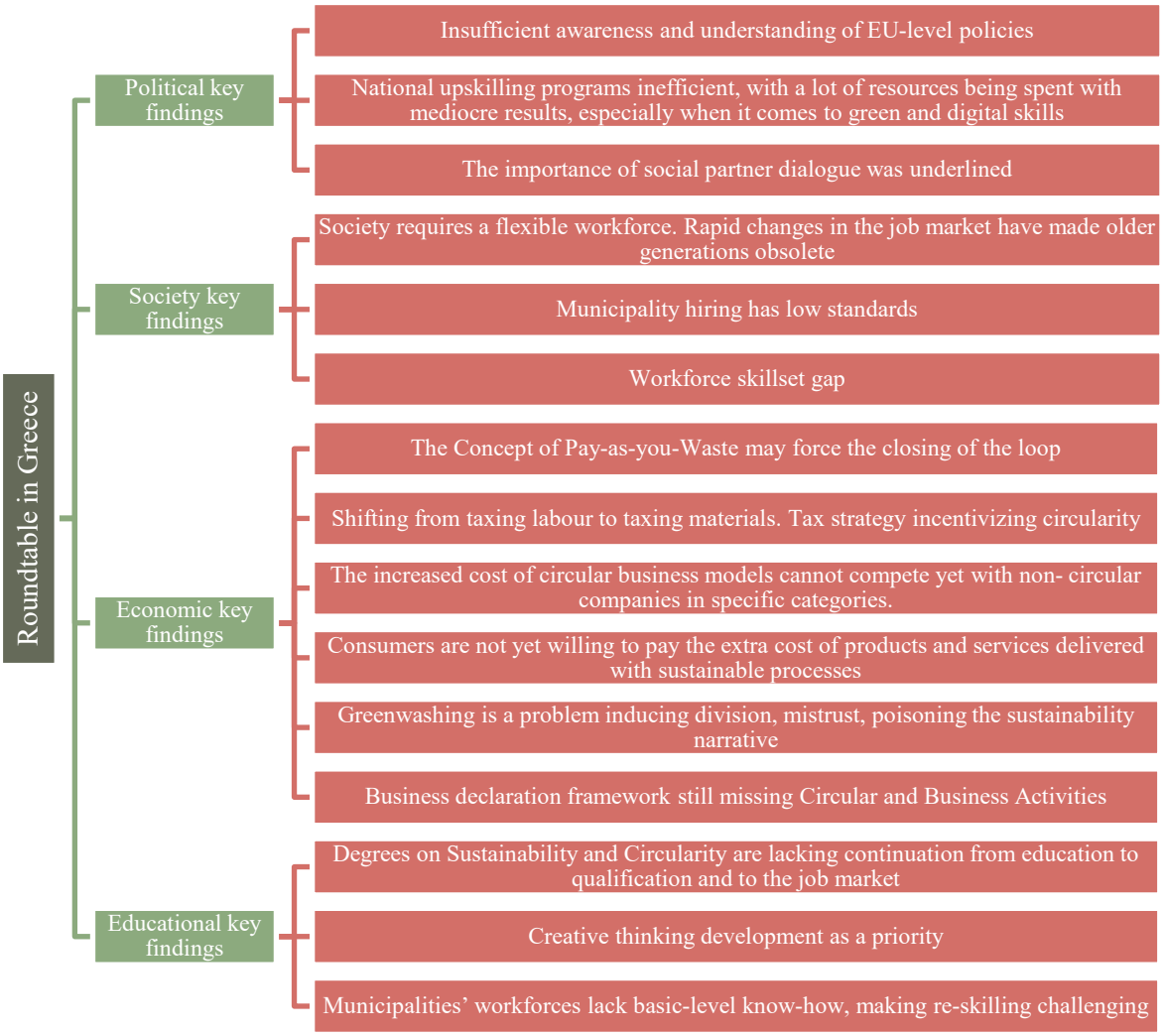

Figure 61 - Roundtable in Greece - key findings

Policy key findings:

- Insufficient awareness and understanding of EU-level policies
- National upskilling programs inefficient, with a lot of resources being spent with mediocre results, especially when it comes to green and digital skills
- The importance of social partner dialogue was highlighted

Society key findings:

- Society requires a flexible workforce. Rapid changes in the job market have made older generations obsolete
- Municipality hiring has low standards
- Workforce skillset gap

Business key findings:

- The Concept of Pay-as-you-Waste may force the closing of the loop. Link the real cost of waste back to the source. (An example that was given, trading fossils has been done without taking consideration the life cycle cost of the material, while now taxpayers are called upon to pay that cost)
- Shifting from taxing labour to taxing materials. Tax strategy incentivizing circularity
- The increased cost of circular business models cannot compete yet with non-circular companies in specific categories. The legislative and regulatory framework is not there to support growth in that direction
- Consumers are not yet willing to pay the extra cost of products and services delivered with sustainable processes
- Greenwashing is a problem inducing division, mistrust, poisoning the sustainability narrative
- Business declaration framework is still missing circular and business activities

Education key findings:

- Degrees in sustainability and circularity are lacking continuation from education to qualification and to the job market
- Creative thinking development as a priority
- Municipalities' workforces lack basic-level know-how, making re-skilling challenging

Discussion and Implications: Strengths, Challenges and Growth Areas

The first part of the discussion was focused on education, specifically on the re-skilling and upskilling of professionals to address current needs. Stakeholders from the government, the private job recruitment sector, and SMEs all expressed their thoughts on the current state of play, focusing on challenges and limitations to address these needs. SME employers expressed their difficulty recruiting workers with what they described as "basic competency" and "average-level skillsets". This statement from a macro point of view was also confirmed by the job recruitment sector, supporting that there is a high offer of upper-level degrees such as MSc's and PhD's, but very low availability of unqualified and qualified workers/technicians. Several participants emphasized that there is a shortage of skills, not of degrees.

Representatives from municipalities stated that their workforce is under skilled, lacking the educational background to build upon for contemporary roles and requirements. Some held the view that recruiting standards had been widely neglected in the previous decades, at the time of when the Boomer and GenX generations were entering the job market, with the consequence being that today, public organisations are bound to this workforce until retirement, with little opportunity for generational

change that would bring with its skillsets more in line with today's challenges. This leads to the functionality of municipalities being very rigid and non-efficient.

Following this, the discussion circulated around what the government is doing to address this so-called "skillset plague". Government representatives described a skillset market evaluation mechanism under development, whose purpose is to analyse data from governmental (Ergani.gov portal for job declaration) and private sector job sources (e.g skywalker.gr, Kariera.gr) and identify from the current job market landscape the skillsets that are most required. Results from the analysis, together with the national strategy directive for professional qualification, will produce qualifications programs. These programs in Greece are 100% subsidized and are available for unemployed/active & public/private sector professionals. The cost of tuition is covered, with an extra on-top payment by the hour for the attendants. Nevertheless, even though the availability of funds reaches €2bil, it was criticized by roundtable attendants because despite the incentivized strategy, the programs have low attendance due to perceived mediocre outcomes. Possible reasons discussed were that either the content does not reflect real market requirements or that the quality of service is low and suffering from the negative reputation of previous government programs. This resulted in making people focus on the economic gains rather the value of upskilling.

The process of upskilling and reskilling also brings in new concepts of climate change awareness. As such, the conversation shifted to the current state of play of organisations with regards to circular and sustainable initiatives. For start-ups, especially those with sustainability being part of their core mission, the environment in Greece is not yet friendly enough to create adequate pull. They also lamented that competition is strangling their efforts, delaying both plans or efforts to complete transitions. Consumers are not yet tuned to the new sustainable narrative and not yet willing to pay the extra cost. According to participants, business activities related to sustainability and circularity are not yet existent from the point of view of public authorities, which means that they cannot be tax-alleviated. The Greek ecosystem was said to be far behind in the actual execution of European and national strategies. While progress has been made with regards to single-use plastics, more specific actions are needed for all commodity sectors.

Another existent problem that was highlighted is the weak link between education and the job market. It was stated from students that there is no absorption for sustainability roles. This is a result of regulatory measures to create the pull for the arousal of these type of roles that however have yet to materialize in the national job market.

Recommendations and Conclusions

1. Significantly enhance public sector recruitment standards;
2. Connect public sector recruitment with the development of climate-change and sustainability-related academic curricula;
3. Increase the attractiveness of technical qualifications;
4. Improve governmental monitoring of skillsets needed in the job market and quick reaction with upskilling and reskilling strategies implementation;
5. Increase the effectiveness of such governmental programs;
6. Create incentives for both businesses and consumers in the taxation system;
7. Levy taxes on the carbon footprint of products and services to the consumer;

8. Address the low reputation of governmental programs through better efficiency and more relevance to job market needs;
9. Create a new narrative on sustainability;
10. Raise awareness at all levels of EU policies, their relevance to the national context, and the advantages of sustainability for businesses and consumers alike.

Table 18 - Roundtable in Greece findings

POLICY	POLICY FRAMEWORK IN THE GREEK ECOSYSTEM
✓ European Green Deal ✓ EU Taxonomy ✓ Renewable Energy Directive ✓ Green Comp ✓ Just Transition Fund ✓ Research institution for smart specialization ✓ Entre Comp ✓ Renovation for Europe greening buildings ✓ Circular action plan ✓ Osnabrück declaration of Vocational Education & Training ✓ Directive for the deployment of alternative fuels infrastructure ✓ EU action plan financing sustainable growth ✓ European green deal investment plan ✓ Directive for the use of RES in maritime transit ✓ Biodiversity strategy ✓ Low greenhouse emissions strategy ✓ New in EU ✓ EU taxonomy framework for the taxation of energy production ✓ Directive on waste management ✓ Directive on the promotion of the use energy from RES ✓ Strategy for plastics ✓ Strategies for smart specialization ✓ Industrial strategy ✓ EU strategy on adaptation to the climate change ✓ European Climate Law ✓ Framework to facilitate sustainable investment ✓ Framework for the provision of post services and common rules on financial transparency ✓ Monitoring, reporting and verification of carbon dioxide emissions for the maritime transport ✓ Commission recommendation of 14.10.2022 on energy poverty	✓ Long term strategy for climate and energy 2050 ✓ National plan for circular economy ✓ National strategy research and development for smart specialization and innovation (ESEE 2021-2027) ✓ National plan for waste management (ESDA 2020-2030) ✓ National strategy research, technology and innovation (ESETAK) ✓ National law for wastewater ✓ National plan for green public contracts (ESD-PDS) ✓ National plan for sustainable and fair development ✓ National plan for energy and climate (ESEK) ✓ National strategy for adaptation to climate change ✓ National strategy and action plan for biodiversity ✓ Landfill waste burial ✓ Wastewater and sewer management law ✓ E-waste management plan ✓ National climate law ✓ National plan for ecology innovation ✓ National law for single use plastics and packages

ORGANISATION'S FUTURE PLANS	CHALLENGES
✓ Incorporation of economic benefits for recycling ✓ Digitalization transformation for organisations to be more competitive and assist in circular transition ✓ Tax reduction for re-using, re-making, refurbishing initiatives ✓ Marketizing best sustainable practices ✓ Investing in new platforms and applications ✓ Municipality of Piraeus: Collection and refurbishment of appliances ✓ Municipality of Piraeus: Education to job market link for technical high schools ✓ Municipality of Piraeus: Re-skilling up-skilling urgently needed ✓ Municipality of Piraeus: Recruitment procedure with fewer barriers ✓ Municipality of Piraeus: Recycle and reuse textiles/plastic/metal ✓ 1bil available subsidy for upskilling and reskilling. 50% population are digitally illiterate. Upskilling programs tuned for current needs	✓ Pay-as-much-as-you-waste ✓ More available workforce ✓ No economic benefits using recycled materials ✓ No business activity register dode for recycling clothes ✓ Change of buying habits. exchange economy ✓ Consumer mindset buying sustainable products not there yet ✓ Market with low skillsets and missing know how. Reskilling and upskilling subsidization not fruitful ✓ No media support for sustainable consumerism ✓ Municipalities not flexible, limited to previous generations' mindsets ✓ Research with no continuity ✓ Raw material cost increase ✓ Mechanism for skillset evaluations from market data

4.9. Discussion and Implications: Strengths, Challenges and Growth Areas

One of the biggest challenges which was mentioned is the missing monetary value of sustainability actions. Especially for companies the only way to evaluate actions or the company itself is through monetary figures. Quite often the focus is on “quick wins” and not on long term strategies. Another challenge is to include all employees in sustainability measures and sometimes missing knowledge. In terms of the skills needed, the discussion rotated around a more holistic approach. It is necessary to always have a look at the whole system. In connection with a shortage of skilled workers, cooperations with educational organisations are essential. The biggest challenges with upcoming policies are concerning corporate sustainability reporting, everything connected to the EU taxonomy and the new supply chain law. However, the participants of the discussion mentioned that most of them are well informed about these issues.

The biggest growth areas are a new narrative and knowing an organisation’s core competences. It is essential to start telling a “new story” which is less about waiver and more about possible gains through a transformation to sustainable organisations. Additionally, organisations should focus on their core competences and switch to sustainable areas where it is possible. For example, educational organisations should teach sustainability to all students, not just to students studying for specific degrees. Another growth area mentioned is ESD – Education for Sustainable Development.

The main areas of focus can be divided into three sectors. The first is the emphasis on what information is being provided by government bodies and how companies are dealing with this information. Due to the overwhelming amount of input, it is essential that people are supported in their efforts to adjust their attitudes and mindset to learn to deal with the complexity. There is a high demand for taking theoretical ideas and transferring them into practical ones which can be taught and implemented by employees. The second is the lack of resources for investment into new areas and the education and tools necessary to achieve the implementation of all the policies that companies are confronted with. Finding the balance between expenditures to improve the current status and staying competitive as a company is critical for companies to not only survive, but also to thrive under the new conditions. The third is the involvement of people who are affected by the new sustainability demands. One group is the employees who need new skills, but once they have them may be enticed to work for a competitor. Handling knowledge management and providing appropriate training and retention measures is key. The other group are the customers, who need to be informed, included, and involved in the new measures to assure their comprehension of complex issues and retaining them as interested parties who are willing to support the measures the company is implementing.

The first part of the discussion was focused on education, specifically on the re-skilling and upskilling of professionals to address current needs. Stakeholders from the government, the private job recruitment sector, and SMEs all expressed their thoughts on the current state of play, focusing on challenges and limitations to address these needs. SME employers expressed their difficulty recruiting workers with what they described as “basic competency” and “average-level skillsets”. This statement from a macro point of view was also confirmed by the job recruitment sector, supporting that there is a high offer of upper-level degrees such as MSc’s and PhD’s, but very low availability of unqualified and qualified workers/technicians. Several participants underlined that there is a shortage of skills, not of degrees. Representatives from municipalities stated that their workforce is under skilled, lacking the educational background to build upon for contemporary roles and requirements. Some held the view that recruiting

standards had been widely neglected in the previous decades, at the time of when the Boomer and GenX generations were entering the job market, with the consequence being that today, public organisations are bound to this workforce until retirement, with little opportunity for generational change that would bring with its skillsets more in line with today's challenges. This leads to the functionality of municipalities being very rigid and non-efficient.

Following this, the discussion circulated around what the government is doing to address this so-called "skillset plague". Government representatives described a skillset market evaluation mechanism under development, whose purpose is to analyse data from governmental (Ergani.gov portal for job declaration) and private sector job sources (e.g., skywalker.gr, Kariera.gr) and identify from the current job market landscape the skillsets that are most required. Results from the analysis, together with the national strategy directive for professional qualification, will produce qualification programs. These programs in Greece are 100% subsidized and are available for unemployed/active and public/private sector professionals. The cost of tuition is covered, with an extra payment by the hour on top for the attendees. Nevertheless, even though the availability of funds reaches €2bil, it was criticized by roundtable attendees because despite the incentivized strategy, the programs have low attendance due to perceived mediocre outcomes. Possible reasons discussed were that either the content does not reflect real market requirements or that the quality of service is low and suffering from the negative reputation of previous government programs. This resulted in making people focus on the economic gains rather the value of upskilling.

The process of upskilling and reskilling also brings in new concepts of climate change awareness. As such, the conversation shifted to the current state of play of organisations with regards to circular and sustainable initiatives. For start-ups, especially those with sustainability being part of their core mission, the environment in Greece is not yet friendly enough to create the adequate pull. They also lamented that competition is strangling their efforts, delaying both plans and efforts to complete transitions. Consumers are not yet tuned to the new sustainable narrative and not yet willing to pay the extra cost. According to participants, business activities related to sustainability and circularity are not yet existent from the point of view of public authorities, which means that they cannot be tax-alleviated. The Greek ecosystem was said to be far behind in the actual execution of European and national strategies. While progress has been made with regards to single-use plastics, more specific actions are needed for all commodity sectors.

Another existent problem that was highlighted is the weak link between education and the job market. It was stated from students that there is no absorption for sustainability roles. This is a result of regulatory measures to create the pull for the arousal of these type of roles that however have yet to materialize in the national job market.

One of the main challenges is people adapting to new ways of working, learning at work, and continually acquiring knowledge. Additionally, from the industry perspective, there are some challenges. Firstly, at the company level, there is a dichotomy between costs and investments (which have yields that can be tangible or intangible). It would be naïve to think yields have instant returns to a company's profitability, so, in the long run, growth is possible, but it must be in the societal context in which the company is in. On the one hand, there is a pedagogical dilemma and a hiatus in the company's response. One of the aspects mentioned is the sensibilization of matters, and operationalization is two of the more significant challenges, alongside clear information.

Two major challenges were pointed out by the participants to implement sustainable practices in their organisations: financial and human resources matter. In relationship to human resources, the difficulty in implementing sustainable practices stands out due to the lack of qualifications of workers, and also resistance to change that is generally felt in organisations. There are difficulties in attracting (recruitment / retention) qualified human resources, which, combined with the need for new skills in the job market, brings some difficulties to organisations, especially companies. Regarding financial issues, highlighting a statement from a company representative "sustainable alternatives are usually more expensive", it represents a major challenge to companies to be competitive and at the same time environmentally friendly. It is very difficult to implement sustainability measures and tools without commercial return if the market does not pay for it. Since the requirement to comply with regulatory requirements is not uniform at a global level, companies still feel some reluctance to go beyond what is required.

Other challenges that were mentioned by the participants were teleworking and cybersecurity. In terms of the new skills that will be needed in organisations, particularly in companies, the areas of sustainability (LCA, calculation of the carbon footprint, ESG report, environmental regulations, circular economy, energy management), digital (digital skills , data analysis, power BI), materials and production technologies, management (strategic management, business intelligence, knowledge management, human resources management, design thinking, new business models, creative skills, collaborative practices) were pointed out.

The biggest growth areas are focused on management and analysis skills, problem solving ability and also the sustainability matters, including legislation.

North Macedonia

In summary, the workshop in Macedonia aimed to bring together different stakeholders from companies, educational institutions, government, and civil society to discuss sustainable policies and practices. The discussions focused on three main elements: policies, laws and strategies; business aspects and management, and education. The workshop highlighted the challenges faced by businesses, such as the need for clearer processes, better use of technology, and more effective operations. The conclusion was that there is a need for new and applicable knowledge in the area of sustainability, and this should be incorporated into education to ensure that new practices are put into action.

Germany

The attendees of the event agreed that the new sustainability regulations are both challenging and necessary for the future. They identified a need for converting theoretical ideas into practical ones, managing current resources, and involving employees and customers in the sustainability measures. There was agreement on upgrading technology and processes to be in line with regulations, and the importance of cooperation in improving the implementation of the new policies. The CATALYST project was seen as an opportunity to provide support and develop tools to enhance learning and retention of information about the new sustainability measures.

Austria

It seems like the main challenges mentioned include a lack of monetary value for sustainability actions, difficulty in engaging all employees, shortage of skilled workers, and upcoming policies. The biggest growth areas are a new narrative, focusing on core competences, and education for sustainable

development. Overall, companies in Austria face challenges in integrating sustainability into their business models, including a lack of monetary value, difficulty in engaging employees, and shortage of skilled workers. However, there are growth areas such as a shift towards a new narrative, a focus on core competences, and education in sustainability that can aid in the transformation towards sustainable business practices.

Portugal

The roundtable discussion and workshop held in Portugal concluded with the participants recognizing the importance of working together to efficiently respond to the challenges faced in implementing sustainable practices in their organisations. The participants highlighted the importance of raising awareness of sustainability issues and providing training to employees to empower them to become agents of change and help change mindsets. They also recommended the implementation of policies that promote collaboration between business entities, research centers, and universities. To address the challenges faced, the participants discussed several measures that could be taken such as the use of green energy, process optimization, teleworking, and training. They recommended incorporating content about changing the mindset to a more sustainable one in future courses within the CATALYST project. Additionally, the training should present demonstrative cases and examples of sustainable practices to emphasize the advantages of such practices.

Greece

In conclusion, the roundtable discussion in Greece revealed several key challenges and areas of growth in the education and sustainability sectors. In terms of education, stakeholders emphasized the need to improve public sector recruitment standards, connect recruitment with climate change and sustainability-related curricula, and increase the attractiveness of technical qualifications. The government also needs to better monitor skillsets in the job market and improve the effectiveness of upskilling and reskilling programs. Businesses, particularly start-ups with a focus on sustainability, are facing challenges in the Greek ecosystem and there is a need for more support and incentives to encourage growth. There is also a weak link between education and the job market in sustainability-related fields, which needs to be addressed through regulatory measures and a new narrative on sustainability. Finally, it is recommended to tax the carbon footprint of products and services to increase consumer awareness and to address the low reputation of governmental programs by improving their efficiency and relevance to job market needs. Overall, addressing these challenges via the CATALYST project is seen as a step in this direction.

5

Best Practices

Section 5: Best Practices

From July until October 2022, CATALYST partner organisations identified the following indicative best practices operating in Europe that could be transferred to one of the countries of this project or inspire the development of smart solutions able to support the transition to sustainability.

Construction Sector

- *Name: Solid – Solar Energy Systems*
- *Website: www.solid.at*
- *Location: Graz, Austria*
- *Industry: Construction sector | Energy (green) industry*
- *Short Description: SOLID is a turnkey provider for large solar heating and cooling systems (>300 kW) and thermal absorption machines. Founded in 1992, SOLID is working on the planning, construction and operation of large-scale solar thermal systems worldwide with more than 300 reference projects. The areas of application range from hot water preparation, room heating and cooling, to process heating and cooling as well as solar district heating. SOLID is manufacturer-independent and uses only state-of-the-art products.*

Manufacturing Sector

- *Name: Weitzer Parkett GmbH*
- *Website: www.weitzer-parkett.com*
- *Location: Weiz, Austria*
- *Industry: Manufacturing sector | Wood industry*
- *Short Description: Weitzer Parkett is Austria's market leader in parquet floors and wooden stairs. They have internal biomass power plant, photovoltaic systems and hydroelectric power plants, producing energy not only for Weitzer Parkett but also for more than half of the city of Weiz (> 2,000 households). They also seek short transport paths and get their resources from nearby locations.*

- *Name: Rügenwalder Mühle*
- *Website: https://www.ruegenwalder.de/*
- *Location: Bad Zwischenahn, Germany*
- *Industry: Manufacturing sector | food industry (sausages and spreads)*
- *Short Description: Rügenwalder Mühle focuses on producing meat sausages and spreads and vegan and vegetarian versions. In May 2022, for the first time in its history, Rügenwalder sold more veggie products than sausage products. They buy local meats from Denmark and Germany and provide transparency about the different ingredients that they use in their products via their website.*

- *Name: Zotter Schokolade GmbH*
- *Website: www.zotter.at*
- *Location: Weiz, Austria*
- *Industry: Manufacturing sector | food industry (chocolate)*
- *Short Description: Zotter produces bean-to-bar in 100% organic and fair quality. They buy their cacao directly from the growers and pay well above the global market rates for a high-quality product. They run the business with 100% clean energy, producing their own power with a photovoltaic generator, while they have a fleet of electric vehicles. They have created a number of development aid projects like "Cocoa not Cocaine" in South America, "Chocolate for School" in Madagascar, which finances school lunches for 770 children, planted trees in rainforests and have received the European Business Award for Sustainability in Austria and an EMAS certificate.*

- *Name: Du bist hier der Chef*
- *Website: https://dubisthierderchef.de/*
- *Location: Eltville am Rhein, Germany*
- *Industry: Manufacturing sector | food industry*
- *Short Description: It allows consumers to influence the design of the products they buy and increases transparency. The organisation conducts surveys on consumer preferences to achieve and provide knowledge for the community. This is then used to create products that cater to the community's wishes, both in quality and also manufacturing processes, animal welfare, packaging etc. Du bist hier der Chef also sells products under its own product line focusing on transparency and traceability, from origin and production to marketing.*

Services Sector

- *Name:* Madaster GmbH
- *Website:* https://madaster.com/
- *Location:* Berlin, Germany
- *Industry:* Services sector | construction industry
- *Short Description:* The Madaster Foundation provides an online platform for the registration, organisation, documentation, storage and exchange of data regarding any materials, components and products used by the construction industry at such a high level of detail that the materials consumed in the economy can remain available to future generations, through circularity and the circular economy. This information is available to a wide variety of users, such as individuals, businesses, organisations, science, education, NGOs and government authorities.

- *Name: Green Social Entrepreneurship Network*
- *Website: https://green-social-network.webflow.io/*
- *Location: Skopje, North Macedonia*
- *Industry: Services sector | energy (green) industry*
- *Short Description: It supports CSOs, entrepreneurs, institutions and communities in establishing "green" criteria and practical implementation of social entrepreneurship in project management, business processes of enterprises, structures of organisations and institutions and contributing to increasing the social and "green" social responsibility of all citizens.*

- *Name: Mushroom network*
- *Website: https://ekovita.mk/Sodrzina.aspx?jazik=1*
- *Location: Negotino, North Macedonia*
- *Industry: Services sector | agriculture industry*
- *Short Description: Mushroom network is a service for growing mushrooms, in which training will be carried out for people who belong to the categories such as young Roma, young people without parental care, young people with disabilities, young girls, young - cured drug addicts, socially endangered people and young unemployed people from rural areas. The primary goal is the creation of a motivational atmosphere, in order for people from this target group to start dealing with the organic production of various types of mushrooms, using local organic waste, which would also achieve the secondary goal, environmental protection in the region.*

- *Name: New Agriculture New Generation (NANG)*
- *Website: https://www.generationag.org*
- *Location: Athens, Greece*
- *Industry: Service sector | agriculture and food industries*
- *Short Description: NANG is a catalyst for innovation in the agrifood ecosystem in Greece. It creates opportunities for employment and entrepreneurship among youth to support and advance the Greek agrifood sector. It builds capacity, expands advisory networks, nurtures innovation, supports business development, and encourages collaboration and dialogue. Since 2018, NANG has empowered more than 29.300 young farmers, producers, and entrepreneurs, along with over 100 SMEs, family and start–up businesses and cottage industries. It has implemented more than 50 capacity building programs and supported the development of more than 80 business plans.*

- *Name: Too good to go*
- *Website: https://toogoodtogo.co.uk/en-gb*
- *Location: Copenhagen, Denmark*
- *Industry: Services sector | (food) waste management industry*
- *Short Description: Too good to go has created an online platform (app) where businesses in the food industry can register to sell their leftover items. Each business registers how many bags of food they will be able to provide at the end of the business day, which is an estimate based on their stock of food and the costumer flow.*

Users/customers of the app can then browse the different types of businesses that offer leftover food, and place orders during the day on how many bags of leftover food they want to buy. After the shop has closed, the customers come to pick up the leftover food.

- *Name: ENALEIA*
- *Website: https://enaleia.com/*
- *Location: Athens, Greece*
- *Industry:* Service sector | waste management industry
- *Short Description: ENALEIA educates fishermen about sustainable fishing techniques and trains them to participate in their actions. At each port, they have a manager who collects the amounts of marine plastic bycatches that each fishing boat brings to the port, sorts it depending on the litter's type and stores it in special containers they have placed at each operational location. Afterwards, the biggest portion of the collected marine plastic is promoted for recycling or upcycling into new products with their network's certified partners, integrating it into the circular economy. In that way, not only do they remove, recycle and upcycle plastic from the seas, but also lower unemployment through training and provide fishermen with extra income.*

- *Name: Aegean Rebreath*
- *Website: https://www.aegeanrebreath.org/*
- *Location: Athens, Greece*
- *Industry:* Service sector | waste management industry
- *Short Description:* Aegean Rebreath was formed aiming at the implementation of multiple targeted actions for the decontamination and protection of the seas. Specifically, their actions include mapping, hauling, collection and recycling and reuse of marine litter in the context of the circular economy. They include informative programs for the educational and fishing community but also the provision of know-how to the local government. They have also created the "Blue Municipalities Network", which today consists of 15 member-municipalities throughout Greece.

- *Name: Boroume (We Can) – Saving Food-Saving Lives*
- *Website: https://www.boroume.gr/*
- *Location: Athens, Greece*
- *Industry: Service sector | waste management industry*
- *Short Description: Boroume is a non-profit organisation whose mission is to reduce food waste and fight malnutrition in Greece. Through the "Saving & Offering Food" program, food is collected on a daily basis at every stage of the food chain ("Saving & Offering Food", "Boroume at the Farmers' Market", "Boroume Gleaning", "We Are Family") and offered to charities that help people who are facing food insecurity. They help the most vulnerable in our society as well as the environment by reducing organic food waste. They also raise awareness on the issue of food waste and the importance of prevention (awareness raising programs "Every Meal Matters", "Boroume at*

School", "Alliance for the Reduction of Food Waste", and certification scheme "No Food Waste").

- *Name:* Bee smart city
- *Website:* *https://www.beesmart.city/en/global-smart-city-knowledge-center*
- *Location: Bad Hersfeld*, Germany
- *Industry:* Service sector | administrative and support services industry
- *Short Description: Bee smart city connects smart cities among each other, with the best solution providers and other smart city stakeholders to share knowledge, solutions and lessons learned. It has also a networked parking system in the city center area that uses sensors to record occupied and free parking spaces increasing the quality of life and reducing costs.*

- *Name: EUREM Alumni*
- *Website: http://www.sbch.org.mk/platformi/eurem-mk*
- *Location: Skopje, North Macedonia*
- *Industry: Services sector | miscellaneous professional, scientific, and technical services industry*
- *Short Description: The Association of Energy Managers EUREM Alumni MK is a platform that brings together energy experts, aiming at joint development and participation in projects co-financed by the EU or for participation in projects of public interest funded by the state. It also provides training.*

- *Name:* Ship Cologne
- *Website:* https://shipcologne.com/
- *Location: Cologne - Ehrenfeld*, Germany
- *Industry:* Service sector | professional and business services industry
- *Short Description:* Ship Cologne brings stakeholders together in one place offering them a platform to develop their entrepreneurial spirit. It shows how innovative space design can promote working on collaborative and sustainable projects according to New Work principles.

- *Name: ENEXAN*
- *Website: www.enexan.ch*
- *Location: Zürich, Switzerland*
- *Industry: Services sector | data processing industry*
- *Short Description: ENEXAN developed a modular AI optimization platform that incorporates technology specific data and market trends to optimize development, operation, and lifetime management of the project. Decision-makers receive high-level organised information about economic projections, what-if-scenarios, price sensitivity analysis, that assist them in taking an informed decision before the deployment of a project and during its operation.*

- *Name: WATT – What About Twin Transition*
- *Website: https://watt.centimfe.com/about.html*
- *Location: Marinha Grande, Portugal*
- *Industry: Services sector | data processing industry*
- *Short Description: It promotes the valorisation, transfer and dissemination of technological knowledge through matchmaking between industry challenges and solutions created, as well as the integration of results and technologies developed in R&D, in order to increase, in qualitative and quantitative terms, the sharing of technological information aimed at the moulds, special tools and plastics industry and to promote the double transition (ecological and digital) in the companies.*

- *Name: IBP - Portuguese Benchmarking Index*
- *Website: http://www.iapmei.pt/iapmei-bmkindex.php*
- *Location: Lisbon, Portugal*
- *Industry: Services sector | data processing industry*
- *Short Description: The IBP - Portuguese Benchmarking Index is a management support tool which allows companies to assess their competitive and/or strategic position in comparison with other companies, as well as to identify opportunities for sustainable growth.*

- *Name: Intellectual Capital Management: ICScoring*
- *Website: https://www.icscoring.pt/*
- *Location: Santarém, Portugal*
- *Industry: Services sector | data processing industry*
- *Short Description: The ICScoring is a tool that allows companies to carry out their self-diagnosis of intangible asset management, with a view to competitiveness and focus on sustainability objectives. This tool allows a company to position itself in the market, in view of the use of sustainable practices of intellectual capital management. Its main instrument is a questionnaire that allows to periodically collect the opinions of managers about the management of organisational intellectual capital.*

Conclusions

The goal of the CATALYST project is to work with universities and research centres to provide students with the up-to-date skills needed for the transition to sustainability. Material about how to alter one's actual mindset to one that is more sustainable would be helpful for the future development of the courses in the CATALYST project. Furthermore, there is a critical need for an alternative value system. Everything is currently focused on money and switching to a sustainable business strategy can often be expensive. For a shift that is durable, a new narrative approach may be highly beneficial.

The study's participants attest that they were aware both of the sustainability trends (including the SDGs) and the new legislation's expectations, which are not only difficult but also crucial for the future. For the organisations to succeed and for the policies to be carried out effectively, it is crucial to find effective ways to put theory into practice among all parties involved about what they need to know and how to apply this knowledge.

Managing current resources and finding new ways to include the upskilling necessary for employees and the provision of ideas to customers were seen as critical tasks for the future. There was agreement on upgrading technology and processes, applying appropriate measures to be in alignment with regulations and assuring that the viability of the companies and the best interests of the consumers were not only taken into account but were actively evolved through the company's activities.

Raising awareness on environmental and social issues that may arise from not knowing the consequences of choosing to buy a harmful / not so ethically produced product, starting in schools, and going to companies. As consumers, most of the time, we need help understanding the reasons behind it; thus, the solution must start by teaching companies why SDGs are important. The automobile industry, for example, is reporting all CO2 emissions produced. For consumers, it is easier to also understand the importance of SDGs. At the same time, public policies have a huge role in persecuting new measures on how people behave in society through financial and fiscal instruments, as well as the definition of compelling goals to move predefined goals forward.

Engaging stakeholders from an early stage of the project is a critical milestone for the success of the project. Everyone who participated at the five national roundtables considered this kind of action to be very fruitful, in particular the opportunity to have an open discussion (conversation) with peers and also other sectors (business, public, education). For the participants it is important to work together in order to give efficient response to the current and future challenges in terms of business transformation related to the green and digital transition. Still, in reference to the skills needed, it is important to have a more holistic approach and promoting a closer cooperation between enterprises and educational organisations is essential.

Another recommendation from our roundtables is the implementation of policies that promote collaboration between business entities, research centers and universities. In spite of having several challenges and needs to meet, there is a set of measures already in preparation or on course for the future in order to make companies more sustainable, such as the use of green energies by installing renewable energies, process optimization, teleworking, and training.

Business: challenges and opportunities in implementing sustainable practices

1. **Costs:** Implementing green practices and adopting new sustainable practices often comes with a higher price tag, which can pose a challenge for organisations in terms of financial feasibility.
2. **Resistance to change:** There is often resistance to change from both employees and consumers to adopt new sustainable practices, due to the difficulty in obtaining information and changing established habits.
3. **Lack of skilled workers and need for new competencies:** There is a shortage of workers with the necessary skills and knowledge to implement sustainable practices, which is further exacerbated by the need for new competencies as the job market evolves.
4. **Rigid structures:** Existing organisational structures and processes may be rigid and not easily adaptable to new sustainable practices, making it difficult to implement these changes.
5. **Digitalisation:** Digitalisation is increasingly important in the implementation of sustainable practices, but there may be challenges in terms of acquiring the necessary digital skills and tools.
6. **Lack of knowledge about financing options**: Companies may be unaware of the financing options available to them to support the implementation of sustainable practices, further exacerbating the financial challenges.
7. **Return on investment (ROI):** The return on investment for sustainable practices may not be immediate or easily quantifiable, which can discourage organisations from pursuing these initiatives.
8. **Greenwashing:** Finally, there is a concern about "greenwashing," or the misleading use of green marketing claims to promote environmentally friendly products and practices, which can make it difficult for companies to differentiate themselves and make a genuine impact.

Potential solutions to support the organisation in the green transformation:

1. **Creating a new narrative within organisations**: Developing a company culture that values sustainability, by incorporating sustainable practices into the company's mission and values, and communicating these values to employees, customers, and stakeholders.
2. **Education for sustainable development:** Incorporating education on sustainable development into the curriculum, to raise awareness and encourage sustainable behaviour among future generations.
3. **Utilising core competencies for greatest benefits**: Leveraging a company's existing strengths and resources to maximize the benefits of sustainable practices, such as using green energy, reducing waste, and improving energy efficiency.
4. **Cooperation:** Encouraging collaboration between companies, organisations, and governments, to pool resources and knowledge, and to promote the adoption of sustainable practices on a wider scale.

5. **Investment in training**: Providing training and development opportunities for employees to build the skills and knowledge needed to implement sustainable practices.
6. **Use of green energy**: Encouraging the use of clean, renewable energy sources, such as solar, wind, and hydro power, and promoting the use of eco-friendly products.
7. **Managing intellectual capital:** Valuing and managing the knowledge and expertise of employees to promote innovation and sustainable practices within the organisation.
8. **Improved communication between education and business sectors**: Promoting dialogue and collaboration between the education sector and the business sector to share knowledge and resources and to promote sustainable practices.
9. **Awareness of sustainable practices:** Raising awareness of sustainable practices among employees, customers, and stakeholders to encourage the adoption of sustainable practices.
10. **Digital transformation for organisations:** Encouraging organisations to adopt digital technologies.

A wide range of courses and competencies to support the transition towards sustainability were recommended. Some of the future skills addressed are:

1. **Sustainability**
2. **Circular Economy**
3. **Creativity**
4. **Digital Competencies**
5. **Design Thinking**
6. **Knowledge Management**
7. **Environmental Regulations**
8. **People Management**
9. **Behavioural Skills**
10. **Collaboration**
11. **Critical Thinking**
12. **Systemic Thinking**
13. **Green Skills**
14. **Cultural Intelligence**

Our results from the field study reaffirm CATALYST's mission to create trainings that will enable the job market to “clear” and the students to learn about in-demand subjects and, as a result, be prepared to enable climate change adaptation and mitigation. They show that collaboration and partnerships, behaviour change, sustainable ideals, and systems thinking appear to be the most important areas. The majority of respondents, however, acknowledged the need for additional training and upskilling in all of the sustainability-related topics presented, with a preference for understanding and implementing sustainable business models and the circular economy, establishing partnerships and collaborations, utilizing sustainable entrepreneurship frameworks, and embracing sustainability principles and best practices.

There is a demand for programs and support to be provided by the CATALYST project. The development of tools and processes to enhance learning and retention of information can simplify the complexity of the new sustainability measures that companies need to comprehend, implement, and evaluate in their businesses. The high value placed on cooperation should open new avenues for supplying the needs of all the stakeholders and improving the execution of the new policies. Additionally, training should incorporate the presentation of demonstrative cases, examples of sustainable practices and elucidate with facts the advantages of sustainable practices.

Having in mind the analysis, conclusions and recommendation from this report, the CATALYST CoVEs will be positioned on national and united through the platform and the Network on European level, with the aim to address these pressing societal challenges, and providing innovative approaches in enabling VET learners (professionals and students) to have high quality education and get the needed support and inspiration to help SMEs in their business transformation.
At the core of the CATALYST CoVEs there are two components: 'Enable' and 'Inspire', both complex and providing the necessary resources and activities for its users.
The 'Enable' component concerns with the CATALYST necessity to support professionals and students to constantly gain and share novel skills and relevant experiences in topics related to sustainability, management, leadership and transversal skills. Therefore, the activities stemming from this component encompass strategic conceptualisation of online VET Program "Leading Sustainable, Systems and Business Transformation" for EQF levels 4 – 8, consisted with at least 70 courses. The 'Inspire' component will consist a portfolio of instruments and services which aims to support the SMEs and enable business-education partnerships.
The 'Inspire' component targets the dedication to implement the new skills in real life scenarios, working closely in collaboration with SMEs. This opportunity will be especially valuable for students, who through these experiences will gain practical knowledge and enhance their employability.
The desired impact is the established CoVEs to be 'catalyst' on national, regional and European level, 'enable' change and 'inspire' and transformation of individuals and SMEs toward more sustainable systems and societies.

Our team

P13 - Athens University of Economics and Business (AUEB) and P1 - Institute for Research in Environment, Civil Engineering and Energy (IECE), supported by all CATALYST partners (North Macedonia, Greece, Portugal, Austria and Germany), developed and implemented the methodology of this study.

The CATALYST partners who contributed to this study were:

- P2 - Civil Engineering Institute Macedonia (North Macedonia),
- P3 - Small Business Chamber (North Macedonia),
- P4 - Collaborating Centre on Sustainable Consumption and Production (Germany),
- P5 - Bells (Germany),
- P6 - Federal Association of Green Businesses (Germany),
- P7 - BEST Institute (Austria),
- P8 - FH JOANNEUM University of Applied Sciences (Austria),
- P9 - Apflbutzn (Austria),
- P10 - University Institute of Lisbon (Portugal),
- P11 - Intellectual Capital Association (Portugal),
- P12 - CENTIMFE (Portugal),
- P14 - Creative Thinking Development (Greece),
- P15 - Sporos Circular Solutions (Greece)
- P16 - SDSN Network (France).

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Annex I – Skills Gap Assessment Questionnaire (SGAQ) for professionals & SMEs

Google form

This **Skills Gap Assessment Questionnaire (SGAQ)** is designed to capture and analyse your needs in terms of sustainability and management. The overall purpose of this assessment is to establish a dialogue between SMEs, VET (Vocational Education and Training) providers and public institutions by mobilising the relevant stakeholders.

This SGAQ is produced under the **ERASMUS+ CATALYST: European VET Excellence for Leading Sustainable Systems and Business Transformation** project (Ref. number 101056114 — CATALYST — ERASMUS-EDU-2021-PEX-COVE), which aims to tackle personal and organisational development, embrace transformation in SMEs, enabling and inspiring them to re-think and re-design their business models, co-creating and sharing between educational and business organisations.

Disclaimer

The European Commission's support for the production of this publication does not constitute an endorsement of the contents, which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

SECTION 2

Human Subjects/Privacy Policy

Important Human Subject and Privacy Policy Notice
Athens University of Economics and Business Privacy Notice
Participants and Collaborators

Introduction

All personal data processing during the ERASMUS+ CATALYST: European VET Excellence for Leading Sustainable Systems and Business Transformation project for the period 2022-2026, is in accordance with General Data Protection Regulation (EU) 2016/679 and Regulation (EU) 2018/1725 of the European Parliament and of the Council of 23 October 2018 on the protection of natural persons with regard to the processing of personal data by the Union institutions, bodies, offices and agencies and on the free movement of such data, which repealing Regulation (EC) No 45/2001 and Decision No 1247/2002/EC.

The Athens University of Economics and Business (AUEB) is updating its procedures and organisational processes in order to comply with the Regulations, and you may receive further updates regarding your data protection. AUEB ("We", "Us", "Our") is committed to protecting your personal information. We want to assure you that we take the responsibility of protecting your privacy and personal data seriously, and have in place reasonable physical, technical and administrative safeguards designed to prevent unauthorized access to or use of your information. AUEB aims to conduct research to the highest standards of research integrity.

Data Controller

The Athens University of Economics and Business (AUEB) is the Data Controller for your information and this data Protection Notice explains the way Data Controller processes your data and what your rights are.

What is Personal Data

The GDPR defines "personal data or personal information" as any information relating to an identified or identifiable natural person (a "data subject"); an identifiable natural person is one who can be identified, directly or indirectly, in particular by reference to an identifier such as a name, an identification number, location data, an online identifier, or to one or more factors specific to the physical, physiological, genetic, mental, economic, cultural, or social identity of that natural person. This includes information which may not explicitly identify you (e.g., where your name has been removed) but which does make it possible to identify you if it is combined with other information that is readily available. For example, this might be because the information available contains a postcode, your gender and date of birth; in these circumstances, it might be possible to identify you by using this in conjunction with other information available elsewhere.

Purpose of Processing

Personal data means any information relating to an identified or identifiable natural living person. The Athens University of Economics and Business (AUEB), as an Erasmus+ CATALYST Partner University, acquires the personal data of survey participants, i.e. SMEs and Professionals. The Athens University of Economics and Business will process your personal information in order to perform its analysis. Your data will be stored and processed by electronic and non-electronic means.

What personal data do we collect about you

In this survey, you are asked to provide personal data about yourself in order to participate in the research. The categories below illustrate the personal data that you will be requested to provide:

- Gender
- Age
- Educational level
- Role in the industry
- Working Experience
- Opinions

Duration of the processing

This processing will take place before, during and after the duration of the Catalyst project (June 2022-May 2026). The data will be kept as part of our documentary obligations and may be used in the future. Therefore, data will be stored for an undetermined period of time unless specified otherwise by Erasmus + programme.

Data transmission and Recipients

Personal data shall be processed solely in connection with the implementation and follow-up of the agreement by the sending university, the Hellenic National Agency and the European Commission, without prejudice to the possibility of passing the data to the bodies responsible for inspection and audit in accordance with EU legislation (Court of Auditors or European Antifraud Office).

Legal Basis

The legal basis for processing personal data is consent, as per Article 6(1)(a) of GDPR.

The right to withdraw consent

The declaration of consent to data processing can be revoked at any time, in writing by sending a relevant form or electronically. Withdrawal of consent does not affect the lawfulness of processing based on prior consent.

Your Rights

You have the right, on written request, to be informed about your data processing and access all personal data that is registered in the above electronic application. You maintain the right to rectify inaccurate personal data concerning yourself. You should address any questions regarding the processing of your personal data to the sending university and/or the Hellenic National Agency. If you think your data protection rights have not been respected, you may lodge a complaint against the processing of your personal data with the National Supervisory Authority for data protection, to the Hellenic National Agency or to the European Data Protection Supervisor with regard to the use of the data by the European Commission.

Supervisory Authority

In Greece, the competent Supervisory Authority that you can communicate to submit questions or complaints related to personal data processing issues subject to its responsibilities according to the applicable GDPR provisions is the Hellenic Data Protection Authority (www.dpa.gr).

Data Controller

Ms Lydia Papadaki (Principal Investigator: Prof. Phoebe Koundouri)

76, Patission Street, 104 34 Athens, Greece

email: papadakilyd@aueb.gr

Data Protection Officer

Maria Antonopoulou

e-mail: dpo@aueb.gr

I declare that I have been informed about the processing of the Personal Data concerning me and I give my free, specific, explicit and fully informed consent to the researcher Lydia Papadaki, in order to process this data, in accordance with the provisions of the General Data Protection Regulation EU 679/2016 and the National Legislation as amended and in force, for the purposes mentioned above.

Yes/No

Demographic questions

1. **Which of the following best describes your role in the industry?**
   - Top Management
   - Middle Management
   - Junior Management
   - Professional
   - Administrative Staff
   - Technician
   - Other

2. **Type of organisation**
   - SME
   - Large company
   - University/Research Institute
   - VET provider
   - Public institution
   - NGO/CSO
   - Other _____

3. **Number of employees**
   - 1-9
   - 10-49
   - 50-249
   - 250-999
   - 1000+

4. **Size of the company in terms of turnover**
   - ≤ € 1 million
   - > of € 1 million and ≤ € 2 million

- > € 2 million and ≤ € 10 million
- > € 10 million and ≤ € 50 million
- > € 50 million
- Not sure

5. **How are decisions made in your organisation?**
   - In a collegial way
   - By a few individuals / experts
   - By the founder and his family / inner circle

6. **Which of the following categories best describes the industry you primarily work in?**

Agriculture, Forestry, Fishing and Hunting	Mining
Utilities	Construction
Computer and Electronics Manufacturing	Other Manufacturing
Wholesale	Retail
Transportation and Warehousing	Publishing
Software	Telecommunications
Broadcasting	Information Services and Data Processing
Other Information Industry	Finance and Insurance
Real Estate, Rental and Leasing	College, University, and VET Education
Primary/Secondary Education	Other Education Industry
Health Care and Social Assistance	Arts, Entertainment, and Recreation
Hotel and Food Services	Government and Public Administration
Legal Services	Scientific or Technical Services
Environment	Other Industry

7. **In which country is your organisation (headquarters or operations activities) located?**

8. **Gender**
   - Male

- Female
- Prefer not to say

9. **How old are you?**
   - < 30
   - 30-39
   - 40-49
   - 50-59
   - 60-69
   - > 70
10. **What is your highest education level?**
    - High School
    - BSc. / BA
    - MSc. / MA / MBA
    - PhD
11. **Years working within the organisation**
    - 0-2
    - 3-5
    - 6-9
    - 10-19
    - 20+
12. **Total working experience**
    - 0-2
    - 3-5
    - 6-9
    - 10-19
    - 20+

Sustainability and Management related questions

1. **Are you aware of the Sustainable Development Goals (SDGs)?**

- Yes
- No
- Not sure

2. **If you know the SDGs: Which of the SDGs are addressed by your organisation? (Multiple choice)**

   - SDG 1: No poverty
   - SDG 2: Zero hunger
   - SDG 3: Good health and well-being
   - SDG 4: Quality education
   - SDG 5: Gender equality
   - SDG 6: Clean water and sanitation
   - SDG 7: Affordable and clean energy
   - SDG 8: Decent work and economic growth
   - SDG 9: Industry, innovation and infrastructure
   - SDG 10: Reduced inequalities
   - SDG 11: Sustainable cities and communities
   - SDG 12: Responsible consumption and production
   - SDG 13: Climate action
   - SDG 14: Life below water
   - SDG 15: Life on land
   - SDG 16: Peace, justice and strong institutions
   - SDG 17: Partnerships for the goals
   - None
   - Not sure

3. **Please give us your opinion on the following sentences using a score from 1 (I DO NOT AGREE) to 5 (I STRONGLY AGREE)**

   a) In the company I am working for, employees are treated fairly.

b) In the company I am working for, employees are paid fairly.
c) In the company I am working for, employees are satisfied.
d) I think of myself as an environmentally friendly consumer
e) I'm able to contribute to reduce greenhouse gas emission through sustainable practices
f) I work as closely as possible with my colleagues, as I believe that linking different disciplines is necessary for excellence
g) I'm familiar that there are many policies (Directives, Strategies and Laws) on Sustainable Development in Europe
h) When developing an idea, I stay as focused as possible on my field avoiding interaction with other disciplines
i) If we all change our consumption behavior, we can mitigate climate change
j) My company feels obliged to help to mitigate climate change
k) My company has the ability to implement sustainability actions
l) The company I'm working for endorses flexibility in terms of work from home, repositioning and upskilling of the employees, etc.
m) My company supports addressing local challenges related to sustainability
n) My company tries to recycle as much as possible
o) My company devotes a lot of time and effort to upgrading and developing the knowledge and skills of its employees
p) My company has established a system of proposing new ideas
q) Creation and innovation by employees affect the company's market value (share value)
r) The company invests in research and development (scientific and applicative)
s) The research and development of my company affects the productivity of the company
t) The company sets clear strategies and procedures for managing intellectual property rights
u) The company is currently working on joint projects with many other organisations
v) The company's marketing activities affect the brand and image of the company
w) In my company there is constant monitoring of customer satisfaction
x) My company is constantly meeting with clients and associates to find out their needs
y) My company has useful and updated information systems
z) My company has anti-fraud policies, fights corruption and complies with taxation rules
aa) My company follows ESG principles and requests ESG compliance through its supply chain

4. **Rate the significance of the topic for your organisation (from 5 – very important to 1 – not important)**

- Sustainability values
- Behavior change
- System thinking
- SDGs
- Sustainability standards (ESG indicators and Sustainability reporting)

- Sustainable business models
- Circular economy
- Sustainable entrepreneurship
- Climate change
- Collaboration and Partnerships

5. **Would you like to have more education in this area? (Yes/No)**

- Sustainability values
- Behavior change
- System thinking
- SDGs
- Sustainability standards (ESG indicators and Sustainability reporting)
- Sustainable business models
- Circular economy
- Sustainable entrepreneurship
- Climate change
- Collaboration and Partnerships

During the CATALYST project, we will develop numerous educational courses and applied research projects, and establish an innovative and collaborative online platform for academic and business organisations.

Would you like to be informed and get invited to the upcoming learning opportunities on the topics of sustainability and management, take part in the online platform which will be created as a result of the project, have new networking possibilities and the potential to collaborate with national and international experts and organisations?

- Yes
- No

If yes, please leave your contact details so we can contact you for future activities. Name and E-mail:

Annex II - Skills Gap Assessment Interview for professionals & SMEs

Google form

This **Skills Gap Assessment Interview (SGAI)** is designed to capture and analyse your needs in terms of sustainability and management. The overall purpose of this assessment is to establish a dialogue between SMEs, VET (Vocational Education and Training) providers and public institutions by mobilising the relevant stakeholders.

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Yes/No

SECTION 3

1. What is the main activity of your organisation?

2. Does the vision and mission of your organisation include a sustainability term? If yes, can you please name it?

3. Has your organisation developed any strategic development documents (e.g. Growth Strategy, Knowledge Management, Human Resources etc.)? If yes, can you please state them below? (If they are confidential documents, you can only state their titles and a short description)

4. Does your organisation have a written policy, commitment or vision stating that it will operate in a sustainable manner?
   Yes/No/Not sure

5. If yes, Is this statement publicly available? (Please share the link)

6. Which factors does your organisation consider sustainable? (Please choose all that apply)

   - Increased focus on long-term perspective
   - Economic sustainability of the organisation
   - Corporate social responsibility issues
   - Employee health and well-being
   - Environmental issues
   - Customer health and well-being
   - Safety issues
   - Energy efficiency
   - None of these
   - Other

7. How has your organisation's interest (in terms of investments and actions) to change and develop towards sustainability changed in the past 5 years?

   - Significantly increased
   - Somewhat increased
   - No changes
   - Somewhat decreased
   - Significantly decreased
   - Do not know

8. Please choose the factors that you think are drivers for the sustainability decisions in your organisation

   - A belief that it is the "right thing to do" for the world
   - Assuring the future availability of key natural resources
   - The health and safety of employees, customers, and suppliers
   - The long-term sustainability of the organisation
   - Satisfying interests of current and potential employees
   - Attracting and retaining customers
   - Improving organisation's image or reputation
   - Reducing costs
   - Conserving energy
   - Legal/regulatory pressures
   - Meeting standards set by industry
   - Marketing pressures
   - Desire to enter new markets
   - Potential to be innovative and develop new products/services
   - Achieving competitive advantage
   - The well-being of local communities and the public
   - Attracting investment from investors
   - Fostering a healthy and thriving society

9. Which of the following practices does your organisation implement?
   - Mitigating Climate Change, i.e., directly reducing green-house gas emissions
   - Adapting to Climate Change, i.e., investing in resilient solutions
   - Introducing Circular Economy principles (reduce, reuse, recycle) in the design, manufacturing, and waste treatment stages of production or in the daily operations (if the organisation is not a manufacturer)
   - Reducing water use
   - Improving energy efficiency
   - Using energy coming from renewable sources
   - Developing new innovative and sustainable products/services
   - Monitoring sustainable practices
   - Assessing the financial payoffs of sustainability investments
   - Developing strategies, public annual reports and press releases on its sustainability performance

- Reaching out to external stakeholders about sustainability issues
- Having a long-term commitment to all employees and encourage their personal and professional development through career planning, training, equal promotion opportunities, psychological support, health assurance, safety provision etc.
- Sponsoring and supporting community activities related to sustainability
- Applying sustainability criteria when making purchasing decisions or selecting project partners and subcontractors

10. Please choose which of the following challenges are relevant to your organisation in adopting/practicing sustainability.

- Lack of knowledge
- Higher cost of adoption/higher running costs
- Lack of funding mechanisms
- Lack of expertise/unskilled employees on sustainability practices
- Internal organisation is too rigid to include sustainability components (inappropriate infrastructure/value chain)
- Lack of understanding the economic benefits of this change
- Customers' willingness to pay for a sustainable product/service
- Resistance to change
- Complex and demanding regulations
- Lack of commitment of top management/ shareholders
- Other

11. What is in your opinion (from your experience) the main advantage of implementing sustainable business practices (i.e. practices that address the economic, social and environmental aspects)? Please provide some examples from your organisation.

12. Do you track/measure the environmental footprint of your organisation? If yes, can you please share a link to the official report/website?

13. Does your organisation have an annual training plan?

14. If yes, what type of skills are being enforced through the training courses?

15. Do you conduct sustainability reports in your organisation, and if so, please provide us with the link.

16. On a personal level, do you feel free to implement sustainable solutions in your organisation? If not, what kind of limitation do you experience?

17. Are employees encouraged and rewarded for putting their individual knowledge at the organisation's service?

18. Is teamwork stimulated and encouraged, and if yes, how?

19. In your organisation, are the organisational processes systematised (i.e. there are set rules and employees follow the same organisational procedures such as saving important information or handling complaints)?
Yes/No/Not sure

20. Is important organisational knowledge managed, recorded, and shared?
Yes/No/Not sure

21. If yes, please indicate which instruments/tools are used in these practices.

Demographic questions

3. Which of the following best describes your role in the industry?

- Top Management
- Middle Management
- Junior Management
- Professional
- Administrative Staff
- Technician
- Other

4. Type of organisation

- SME
- Large company
- University/Research Institute
- VET provider
- Public institution
- NGO/CSO
- Other _____

5. Number of employees

- 1-9
- 10-49
- 50-249
- 250-999
- 1000+

6. Size of the company in terms of turnover

- ≤ € 1 million
- > of € 1 million and ≤ € 2 million
- > € 2 million and ≤ € 10 million
- > € 10 million and ≤ € 50 million
- > € 50 million
- Not sure

7. How are decisions made in your organisation?

- In a collegial way
- By a few individuals/experts
- By the founder and his family / inner circle

8. **Which of the following categories best describes the industry you primarily work in?**

○ Agriculture, Forestry, Fishing and Hunting	○ Mining
○ Utilities	○ Construction
○ Computer and Electronics Manufacturing	○ Other Manufacturing
○ Wholesale	○ Retail
○ Transportation and Warehousing	○ Publishing
○ Software	○ Telecommunications
○ Broadcasting	○ Information Services and Data Processing
○ Other Information Industry	○ Finance and Insurance
○ Real Estate, Rental and Leasing	○ College, University, and VET Education
○ Primary/Secondary Education	○ Other Education Industry
○ Health Care and Social Assistance	○ Arts, Entertainment, and Recreation
○ Hotel and Food Services	○ Government and Public Administration
○ Legal Services	○ Scientific or Technical Services
○ Environment	○ Other Industry

9. In which country is your organisation (headquarters or operations activities) located?

10. Gender

- Male
- Female
- Prefer not to say

11. What is your age?

- < 30
- 30-39
- 40-49
- 50-59
- 60-69
- > 70

12. **What is your highest education level?**

- High School
- BSc. / BA
- MSc. / MA / MBA
- PhD

13. Years working within the organisation

- 0-2
- 3-5
- 6-9
- 10-19
- 20+

14. Total working experience

- 0-2
- 3-5
- 6-9
- 10-19
- 20+

During the CATALYST project, we will develop numerous educational courses and applied research projects, and establish an innovative and collaborative online platform for academic and business organisations.

Would you like to be informed and get invited to the upcoming learning opportunities on the topics of sustainability and management, take part in the online platform which will be created as a result of the project, have new networking possibilities and the potential to collaborate with national and international experts and organisations?

- Yes
- No

If yes, please leave your contact details so we can contact you for future activities. Name and E-mail:

CATALYST

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