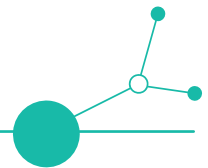


D.1.2.1 Decarbonisation of manufacturing SMEs in Central Europe Report

WP1



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LIST OF ACRONYMS

ACRONYM	Full word
CE	Central Europe
CREDIT4CE	Carbon Reduction & Innovative Transformation
EC	European Commission
EEA	European Environment Agency
EIB	European Investment Bank
EIBIS	EIB Investment Survey
ERDF	European Regional Development Fund
EU	European Union
EUR	Euro
GDP	Gross Domestic Product
GHG	Greenhouse Gas
IEA	International Energy Agency
ISPRA	Istituto superiore per la protezione e la ricerca ambientale
OECD	Organisation for Economic Co-operation and Development
PES	Public Employment Service
POs	Policy Objectives
R&I	Research and Innovation
SDGs	Sustainable Development Goals
SMEs	Small and medium-sized enterprises
STEM	Science, technology, engineering and mathematics
VET	Vocational Education and Training



LIST OF PARTNERS

PARTNERS	Full word
CONFEMI	Confindustria Emilia Area Centro
GFO	G-Force
GREENTECH	Energy and Sustainable development Cluster
PPNT	Adam Mickiewicz University Foundation
PTP	Primorksa Technology Park
REGEA	North-West Croatia Regional Energy and Climate Agency
SIEA	Slovak Innovation and Energy Agency
UASB	University of Applied Sciences Burgenland
WUST	Wroclaw University of Science and Technology
ZICER	Zagreb Innovation Centre



EXECUTIVE SUMMARY

The deliverable 1.2.1 “Decarbonisation of manufacturing SMEs in Central Europe Report” contains the results of the research work carried out to construct a comprehensive mapping of the situation of manufacturing SMEs in all 6 partner country territories of the Interreg Central Europe project ‘CREDIT4CE’ (Carbon Reduction & Innovative Transformation) regarding the topic of decarbonisation.

The present work was carried out within the framework of Activity 1.2 ‘Mapping the decarbonisation readiness of manufacturing SMEs’ foreseen in Work Package 1 ‘Establishment of the Decarbonisation Hub’ carried out between M1 (June 2024) and M6 (November 2024).

The main objective of this deliverable is to present the mapping and research conducted by CONFEMI in cooperation with all other project partners on the awareness and situation of manufacturing SMEs in Austria, Croatia, Italy, Slovakia, Slovenia and Poland concerning decarbonisation. In particular, the document provides a comprehensive overview of their current climate footprint, their approach to decarbonisation strategies and possible roadmaps, needs and challenges that SMEs are facing to be able to define pathways and implement actions with a high positive impact on the climate and for effective emissions reduction.

The document is organised according to the following structure: after a preliminary introduction of the CREDIT4CE project, the purpose and structure of this work and the presentation of the methodology adopted to collect the information and elaborate this report, chapter 1 ‘The state of the art of decarbonisation in Central Europe’ presents a brief overview of the main financing opportunities for companies in Europe today to implement decarbonisation projects and more specifically an analysis of the context, initiatives, measures, policies and investments currently in place to support the green transition and decarbonisation in the 6 countries investigated.

Chapter 2 ‘Mapping of decarbonisation levels among SMEs of the 6 countries’ shows the description of the collected and elaborated results of the survey conducted with manufacturing SMEs from Austria, Croatia, Italy, Slovakia, Slovenia and Poland.

Finally, Chapter 3 focuses on a comparative analysis and final considerations on the two-phase research works, thus providing a final comprehensive overview of the decarbonisation awareness of Central Europe manufacturing SMEs and useful insights for subsequent project activities.



INTRODUCTION AND METHODOLOGY

The CREDIT4CE project

CREDIT4CE (Carbon Reduction & Innovative Transformation), project supported by the Interreg Central Europe Programme 2021-2027, aims to strengthen the CE region's capacity to meet climate targets by helping manufacturing SMEs to follow decarbonisation pathways, enhancing the region's historically insufficient technology transfer capacities, and accelerating the development and adoption of innovative technologies needed for Net Zero.

Slovak Innovation and Energy Agency (SIEA) is the Lead partner in partnership with G-Force (GFO), Primorksa Technology Park (PTP), University of Applied Sciences Burgenland (UASB), Confindustria Emilia Area Centro (CONFEMI), Wrocław University of Science and Technology (WUST), North-West Croatia Regional Energy and Climate Agency (REGEA), Energy and Sustainable development Cluster (GREENTECH), Zagreb Innovation Centre (ZICER), Adam Mickiewicz University Foundation (PPNT).

The project consortium represents the following countries: Austria, Croatia, Italy, Slovakia, Slovenia and Poland.

In particular, in strengthening innovation capacities in Central Europe, the CREDIT4CE project aims to create a Virtual Decarbonisation Hub, a unique platform that connects SMEs looking for support in their decarbonisation journey with companies providing solutions to address this issue.

In order to achieve its objective, CREDIT4CE uses an innovative and transnational approach that brings together three distinct but complementary key pillars, i.e.: (1) manufacturing SMEs representing the demand for decarbonisation solutions, (2) competitive growth on the supply side of decarbonisation solution providers, both established innovative SMEs and start-ups, (3) the commercial and venture upskilling of R&I actors to enable efficient technology transfer of the latest innovations to the market.

CREDIT4CE's ambition to accelerate the uptake of the most innovative and transformative decarbonisation solutions to maximise their impact relies on access to an international market, sharing a distinct range of knowledge, insights and expertise of key actors in each region and creating strong links and partnerships in the process.



Purpose and objectives - Scope of the document

The present report has been elaborated as deliverable 1.2.1 within project's activity 1.2 'Mapping the decarbonisation readiness of manufacturing SMEs' of Work Package 1 'Establishment of the Decarbonisation Hub'. This document summarises and presents the main results of the activities carried out in the context of activity 1.2 during the first project period between M1 (June 2024) and M6 (November 2024).

Activity 1.2 consisted of undertaking a comprehensive mapping of the state of affairs of manufacturing SMEs in all 6 partner countries (Austria, Croatia, Italy, Slovakia, Slovenia and Poland) in respect to the topic of decarbonisation, in particular the objective was to try to investigate and understand SMEs' knowledge of their current climate footprint, the presence of a decarbonisation roadmap or targets, awareness of available resources and financing options, and confidence in taking actionable steps to reduce their climate impact, also identifying what may be the main needs and potential challenges for companies in the field of decarbonisation.

The purpose of this deliverable is to present the mapping carried out through the involvement of the 150 manufacturing SMEs interviewed and the parallel research conducted, thus providing a solid understanding of the challenges faced by manufacturing SMEs in reducing their climate impact, which will contribute and be useful to the creation of the infrastructure and building blocks of the Decarbonisation Hub.

This deliverable also intends to emphasise the barriers and opportunities for effective carbon reduction and identify the areas where SMEs need more support, training and resources to succeed in this endeavour. It also serves as a tool to facilitate transnational collaboration and the sharing of best practices, thereby also contributing to the building of a more resilient and innovative industrial ecosystem in Central Europe.

Structure of the document

The first chapter concerns the presentation of the information gathered from the desk research conducted on the state of the art of Central European manufacturing SMEs in respect to awareness and the situation at national level regarding decarbonisation and the green industrial transition issues.

Chapter 1 provides an in-depth analysis conducted on the context, initiatives, measures, policies and investments currently in place in the 6 countries represented in the CREDIT4CE project to support the green transition and decarbonisation roadmap of manufacturing SMEs. In particular, the main topics covered by the analysis are:

- Climate Footprint: understood as industrial performance in terms of energy use, transport and logistics, waste management, supply chain and materials, carbon emissions;
- Decarbonisation Roadmap: understood as investments in net zero, climate transition situation, energy efficiency investments, green investments and circular economy;



- Availability of resources and financial options: understood as country-system measures to support enterprises, calls, policies, challenges, rates of utilisation of EU Life funds etc.;
- Skills & Competences: such as training, green training investments.

The second chapter mainly consists of a description of the analysis of the results of the survey submitted to manufacturing SMEs in Austria, Croatia, Italy, Slovakia, Slovenia and Poland to map their readiness for decarbonisation and gather information on their approaches and input on particular needs and challenges.

Finally, a conclusive chapter (Chapter 3) provides a comprehensive comparison between the results highlighted and the considerations emerged from the two analyses conducted and presented in the previous chapters. In this section, the most comprehensive and exhaustive overview of convergences, best practices and mechanisms as well as possible barriers, gaps and challenges in terms of decarbonisation strategies of manufacturing SMEs and the 6 countries analysed is offered.

This will make it possible to formulate recommendations and provide useful input for the subsequent activities and future action programme of the project and will further inform the work and topics covered in WP2.

Overview of target groups

The deliverable takes into consideration a wide variety of subjects corresponding to the target groups of the CREDIT4CE project. The identification of these project target groups is a process that began during the proposal phase of the CREDIT4CE project. The partners, under the guidance of CONFEMI, have organized an activity to identify the main categories involved, which could potentially be targeted by this document.

The categories of entities are numerous and can be summarized as follows: SMEs, Higher Education and Research Organizations, Enterprises, Sectoral Agencies, Business Support Organizations, Interest Groups including NGOs, National Public Authorities, Regional Public Authorities, and the General Public. Each of these target groups may find value in consulting this document, particularly SMEs, which will have the opportunity to determine whether the data presented is representative of their situation or if there are substantial differences in the levels of decarbonisation achieved by SMEs in the same country or in other countries considered. The other categories presented here have been identified as targets due to the fundamental contribution and acceleration they can provide to the decarbonisation process of products and processes for SMEs in Central Europe. This can be achieved through identifying support pathways, training activities, building partnerships, defining policies and support programs, implementing mentoring activities, and providing complementary services to the needs of SMEs.

The identification of the needs of SMEs primarily targeted manufacturing SMEs from any sector, from the six partner countries involved, represented by the CREDIT4CE project partners, namely Austria, Croatia, Italy, Slovakia, Slovenia, and Poland.



Methodology

The preparation of this deliverable and the structuring of the "Mapping the decarbonisation readiness of manufacturing SMEs" activity required the organisation of work into several phases:

- Phase I: Organisation of desk research;
- Phase II: Identification of key information to request from manufacturing SMEs;
- Phase III: Definition and distribution of the survey;
- Phase IV: Analysis of the results;
- Phase V: Structuring and drafting of this document.

Phase I: Organisation of desk research

The partners deemed it essential to set up a desk research activity to analyse existing information related to the contexts of manufacturing SMEs and the countries considered in the project activities. The analysis was conducted using various sources, reports, official publications, and public databases.

Phase II: Identification of key information to request from manufacturing SMEs

CONFEMI, with the support of the partners, compiled a list of key information to be obtained from the manufacturing SMEs involved in the activity. This information was shared with the partners and subjected to review and/or integration. Subsequently, the identified questions were organised into sections and streamlined to facilitate and encourage the completion of the survey by the target companies.

Phase III: Definition and distribution of the survey

The survey was finalised and validated by all partners. Using Microsoft Forms, an online form was prepared for digital completion. Each partner activated their networks to ensure the widest possible dissemination of the survey. Each partner used their direct communication channels with manufacturing SMEs, including social media channels, and shared the survey invitations via the project's social media platforms.

Where necessary, each partner was available to support the SMEs in their country with completing the survey and translating the initial English questions into the local language.

Phase IV: Analysis of the results

Once the survey was closed, the results collected were analysed by the CONFEMI team. The information was organised and compared with the findings from the previous phase of desk research to provide an overview of the decarbonisation levels in each country and make them comparable with the existing context and supportive policies in each country.

Phase V: Structuring and drafting of this deliverable

The drafting of the deliverable was led by the CONFEMI team, with a sharing process involving the project partners before proceeding with its publication.



Chapter 1 - The state of the art of Decarbonisation in Central Europe

1.1 - European Funding Programmes

The European Union wants to become the first climate-neutral continent by 2050 and intends to do so through the European Green Deal to reduce greenhouse gas emissions and promote the energy transition and circular economy in various sectors.

The EU provides a series of key instruments with which it supports economic, environmental and social development, including strong support for small and medium-sized enterprises (SMEs), as well as collaborations with universities and research centers. These include Horizon Europe, Life Program, European Regional Development Fund.

The benefits of participating in these programs are many. First of all, they guarantee access to public capital, through which SMEs can receive sufficient resources to participate in research and innovation projects. Such projects are often oriented toward achieving a twin transition, both green and digital, which allow SMEs to increase competitive growth and their economic development. Furthermore, the resilience of organizations to global challenges is increased through the integration of advanced knowledge and innovative technologies.

1.1.2 - Horizon Europe

Horizon Europe is the EU's ambitious research and innovation programme for 2021-2027, with a budget of €95.5 billion. The programme finances research and innovation or R&I support activities, mainly through open and competitive calls for proposals, achieving scientific, technological, economic and social impact from EU investment in research and innovation, to:

- strengthen the Union's scientific and technological bases and promote its competitiveness in all Member States;
- Implement the Union's strategic priorities and contribute to the implementation of European policies, helping to address the global challenges of our time, set out in the Sustainable Development Goals (SDGs) of the United Nations 2030 Agenda and the Paris Climate Agreement;
- Strengthening the European Research Area.

It is structured into three pillars divided into specific programmes and themes, and a transversal programme, as shown below:

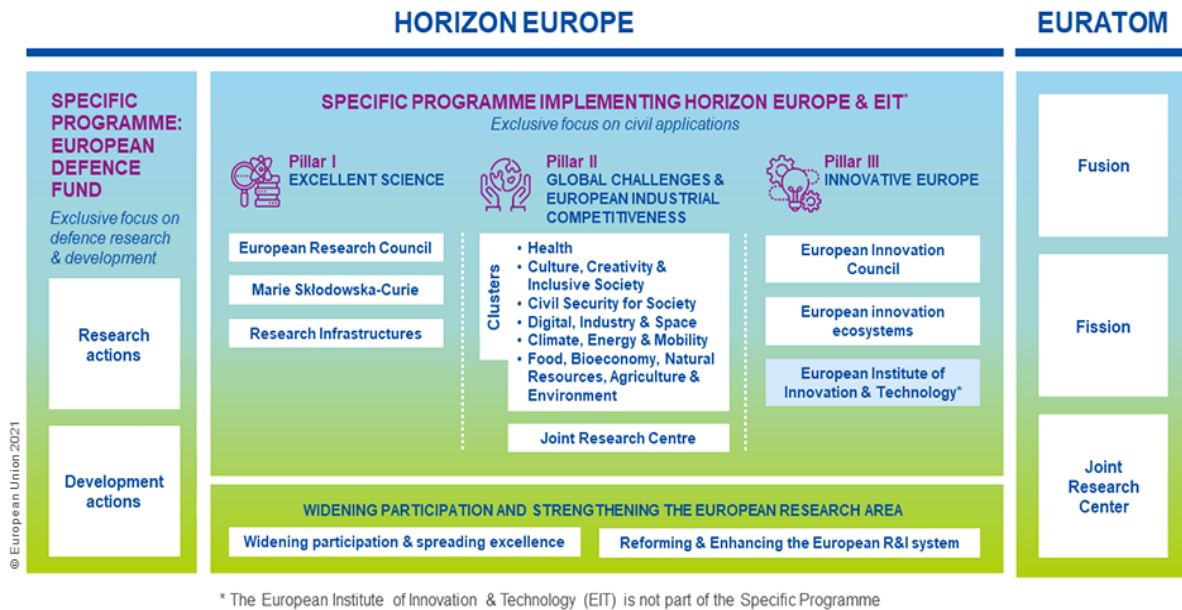


Figure 1 - Horizon Europe 2021-2027
Source: [Horizon Europe - European Commission](#)

Horizon Europe is a mission-driven programme, which follows a set of objectives related to key societal challenges to be achieved with project portfolios. Five mission areas have been identified to help address some of the world's biggest challenges:

- Conquering Cancer;
- Accelerating the transition to a climate-ready and climate-resilient Europe;
- Regenerating our oceans and waters;
- 100 Climate Neutral Cities by 2030;
- Caring for the soil is caring for life.

1.1.2 - LIFE Programme

The LIFE programme is the EU's funding instrument for the environment and climate action. The budget increased to EUR 5.4 billion between 2021 and 2027. The LIFE programme (2021- 2027) covers the following areas:

- Nature and biodiversity;
- Circular economy and quality of life;
- Climate change mitigation and adaptation;
- Clean energy transition.



The LIFE Programme helps companies (mainly SMEs) bring their green products, technologies, services and processes to the market. These so-called close-to-market projects launch innovative, demonstrative solutions that offer clear environmental and/or climate benefits. The main topics are related to waste management, the circular economy, resource efficiency, water, air or climate change mitigation. These projects also have a high level of technical and business readiness. This means that solutions could be implemented in close to-market conditions (at industrial or commercial scale) during the course of the project or shortly after its completion.

1.1.3 - European Regional Development Fund (ERDF)

The European Regional Development Fund (ERDF) aims to strengthen economic and social cohesion in the European Union by correcting imbalances between its regions. Particular attention is paid to regions which suffer from severe and permanent natural or demographic handicaps, such as the northernmost regions, which have very low population densities, and island, cross-border and mountain regions. Support for SMEs and the low-carbon economy are two key priority areas and ERDF has funded many SME energy efficiency projects.

The European Regional Development Fund (ERDF) was created in 1975 and is one of the main financial instruments of the EU's cohesion policy. Its goal is to contribute to reducing disparities between the development levels of European regions and to improving the living standards of the least favoured regions, with a special focus on regions suffering from severe and permanent natural or demographic handicaps, such as the northernmost regions, which have a very low population density, and island, cross-border and mountain regions.

In the period 2021-2027, five policy objectives (POs) are foreseen for the ERDF from the Cohesion Policy, the European Social Fund+ and the Cohesion Fund:

- A smarter Europe - innovative and smart economic transformation (PO1);
- A greener, low-carbon Europe (PO2);
- A more connected Europe - mobility and regional ICT connectivity (PO3);
- A more social Europe - implementing the European Pillar of Social Rights (PO4);
- A Europe closer to citizens - sustainable and integrated development of urban, rural and coastal areas through local initiatives (PO5).

In particular, each region and Member State is required to allocate at least 30% of its ERDF allocation to PO2, i.e. a greener, low-carbon transition to a net-zero carbon economy and a resilient Europe. The EU has dedicated more than EUR 392 billion to cohesion policy for the 2021-2027 programming period, of which around EUR 226 billion for the ERDF (European Commission, 2024).



1.2 - Country profiles

1.2.1 - AUSTRIA



AUSTRIA

Climate Footprint

Climate change is increasingly felt by Austrian companies. In according with EIBIS 2023, climate change is having a major impact on the activities especially of manufacturing companies (74%) (EIB, 2024).

Energy use: the largest source of energy consumed is oil products (37.8%), followed by electricity (21%), natural gas (17.5) and biofuels and waste (15%). While the total energy supply since 2000 is mainly represented by 34.7% oil, 21.7% biofuels and waste and 19.4% natural gas (IEA, 2023).

Transportation and Logistics / Supply chain and sourcing strategy: the Austrian economy is very export oriented. Logistical/transportation problems (73%) and limited access to components (71%) were the biggest obstacles for most Austrian companies. In order to cope disruptions in the supply chain, Austrian companies seem to be more inclined than EU companies to invest in increased inventory and warehousing (47% vs. 31%) or in digital monitoring of stocks and production. In addition, the majority of companies in each sector have changed or are planning to change their sourcing strategy, except for the infrastructure sector (EIB, 2024).

Waste management and circular economy: the total raw material consumption in Austria was 209 million tons in 2019 and the circularity rate registered was 9.7% (Circle Economy, 2019)

Carbon footprint: GHG emissions in Austria in 2022 were 72.6 MtCO₂-eq. and the largest contributor to greenhouse gas emissions in Austria is the industrial sector (36%), followed by the transport sector (28%) and the buildings sector (12%) (European Commission, 2023).

Regarding CO₂ emissions from fuel, in 2022, total CO₂ emissions from fuel combustion in Austria were 56.796 Mt CO₂, which corresponds to the 0.2% share of global CO₂ emissions from combustible fuels. In the period between 2000 and 2022, CO₂ emissions decreased of 8.0 % (IEA, 2022). The CO₂ emissions per capita in Austria in 2022 were 6.274 tCO₂ (IEA, 2023).

Decarbonisation Roadmap

Austria is committed to reaching climate neutrality by 2040. Approximately three quarters of electricity production already comes from renewable sources, with a target of 100% renewable electricity supply by 2030 (IEA, 2023).

[Integrated National Energy and Climate Plan for Austria 2021-2030:](#) It sets out measures for the implementation of five dimensions of the Energy Union, including decarbonisation, energy efficiency, security of energy supply, Market integration through the Network Development Plan development and competitiveness through research and technological development (Federal Ministry Republic of Austria Sustainability and Tourism, 2019).

[Austria's Circular Economy Strategy](#) is based on 5 main goals:

- Reduction of resource consumption: material footprint reduced to 7 tonnes per capita and year by 2050 and domestic material consumption reduced to 14 tonnes per capita and year by 2030;
- Increasing domestic resource productivity by 50% by 2030;
- Increasing the circularity rate to 18% by 2030;
- Reduction of the material consumption in private households by 10% by 2030.

(Republic of Austria, 2022).

The overview of companies' current approach and behaviour regarding this issue shows that:

Climate Transition situation: compared to other EU countries, Austrian companies are more likely to invest in solutions to avoid and reduce exposure to physical risks (29% vs. 20%). Large companies compared to SMEs develop or invest more in measures to increase resilience to the physical risks of climate change (51% vs. 31%).

Net-Zero investments: Almost all Austrian companies (95%) are taking measures to reduce their greenhouse gas (GHG) emissions. To make their business model more sustainable, Austrian companies mainly invest or implement energy efficiency initiatives (77%) or waste minimisation and recycling activities (72%), but less than half of Austrian companies (45%) set and monitor targets for their GHG emissions. Furthermore, about 60% of Austrian manufacturing companies are setting and monitoring greenhouse gas targets, but, as in the case of energy audits, only a minority of companies in other sectors are doing the same

However, it is evident that SMEs still lack the resources to transform their business models towards more sustainability and climate neutrality. In particular, the Austrian region of Lower Carinthia is highly affected by the climate neutrality targets by 2040 in Austria and by 2050 in the EU, due to the high share of carbon-intensive industries (Meltzer et, al, 2022).



Green transition policies and national financial support

In Austria buildings and transport account for around half of total emissions. To progress the transition in these sectors, the government supports building renovation, switching from fossil fuels to sustainable heating systems, the electrification of transport and invests in public transport infrastructure.

Climate and Energy Fund: supports energy-related research projects, environmentally compatible transport projects and measures to bring climate-friendly energy technologies to market. Each year it makes available a promotion volume of up to EUR 150 million for climate protection and sustainable energy supply projects.

Austrian Climate Change Act: sets emission limits for a total of six sectors and defines rules on the development and implementation of effective climate mitigation measures outside the EU emissions trading system.

Bilateral Climate Finance Programme: the Austrian BMK is providing financial support for bilateral climate finance projects. projects must contribute to the following objectives: climate change mitigation, climate change adaptation, combination of emission reduction and adaptation. In this programme, projects can apply for grants between 150,000 Euro to 2,000,000 Euro.

UFI - Umweltförderung im Inland: a funding program for eco-friendly investments that supports investments in the private and business context which have a positive environmental effect by saving resources, energy and emissions. In 2021, UFI funding of approximately EUR 274 million was granted for 33,675 projects, representing a total investment of EUR 1,678 billion in Austria.

Ökostromgesetz - Green Electricity Law: support for photovoltaics, wind, biomass/ biogas, small hydropower and energy storage

Support for decarbonising the economy: a new financial package with the goal of supporting the decarbonisation of its economy until 2040. The funds will be allocated until 2026 and will support the following activities: decarbonisation of energy-intensive industries; support to households for energy-efficient heating and cooling; support for reducing energy imports; grants for companies to become climate neutral; research grants for green technologies and digitization.

The European Commission has approved, under EU State aid rules, a €2.7 billion Austrian scheme to support companies active in the industrial sector to decarbonise their production processes. The measure will contribute to the implementation of Austria's National Energy and Climate Plan and to the achievement of the European Green Deal targets, while helping to end dependence on Russian fossil fuels in line with the REPowerEU Plan (European Commission, 2024).

Skills & Competences

Austria has anchored their green skills strategies within a broader strategy of just transition. The goal of Austrian Just Transition Action Plan on training and reskilling is to put measures in place to meet the demand for skilled labour during the green transformation by 2030.

It seems that Austria does not have much of an approach to assessing and predicting competences for the green transition.

Several innovative policy initiatives on the promotion of green transition skills, such as the Environmental Foundation (Umweltstiftung) or the Regional Training Centre for Climate Protection (Klimaschutz Ausbildungszentrum) in Lower Austria, have been launched and can provide insights and lessons to be learned (OECD, 2023).

Climate protection initiative "klimaaktiv": providing advice, information and qualification initiatives, transparent standards, quality assurance measures and activating and integrating relevant actors and stakeholders.



1.2.2 - CROATIA



CROATIA

Climate Footprint

According to an EEA report, Croatia is one of the three countries with the highest cumulative percentage of GDP damage caused by extreme weather and climate events.

Croatian companies' **perception of the impact of climate change** is growing significantly, with 63% stating that weather events have already had an impact on their business. According to EIBIS 2023, weather events represented almost twice the risk of major impacts for infrastructure (25%) and construction companies (24%) than for manufacturing companies (12%). Furthermore, there was less impact caused by weather events on SMEs compared to large companies where it was more pronounced (EIB, 2023).

Energy use: the energy mix of Croatia is the following one: oil (39.3%), natural gas (27%), biofuel and waste (19.4%), hydro (5.9%), coal (5.1%), and the rest is wind, solar etc. (IEA, 2022).

Transportation and Logistics / Supply chain and sourcing strategy: most Croatian companies (94%) have experienced at least one of the disruptions generated by international trade in recent years, for example regarding access to commodities or raw materials and disruptions of logistics and transport. However, less than half (46%) have changed their procurement strategy or plan to do so.

The companies that show the highest probability of changing their sourcing strategy, or planning to do so, are those in the manufacturing and large-scale sectors. In contrast, those in the construction sectors, which have suffered the most from international trade disruptions, do not seem to intend to change their sourcing strategy. In terms of potential changes in sourcing strategy, Croatian companies seem more likely than EU companies to invest in digital tracking of inventory and inputs (27% vs. 20%). However, they are less inclined to increase inventories and stockpiling than those in the EU (21% vs. 31%) (EIB, 2023).

Waste management and circular economy: approximately 6 million tonnes of waste are produced each year in Croatia (about 1.5 tonnes per person per year) and most of this comes from the construction sector and households. The Croatian economy is only 2.7% circular (Ministry of Foreign Affairs, 2023). Furthermore, in Croatia 41.155 people are employed in circular economy sectors (1.2 % of EU total in 2018). The material footprint (consumption of raw materials) in Croatia was 15 tonnes per person, while the utilisation rate of circular materials in Croatia in the period 2011-2020 was 5.1%. (EEA, 2022).

Carbon footprint: In 2021, the approximate national GHG emissions were 23.3 MtCO₂-eq, 2.1% lower than in 2020 and 5.6% lower than pre-pandemic levels. (European Commission, 2023).

In 2022, total **CO₂ emissions from fuel combustion** in Croatia amounted to 15.67 Mt CO₂, recording a decrease of 6% in the period between 2000-2022. The highest contribution to CO₂ emissions in Croatia came from the transport sector (42.4%), followed by the electricity and heat producers

Decarbonisation Roadmap

Croatia recognised the need to adopt a strategic approach to climate change adaptation and to develop innovative solutions for sustainable development, thus adopting its first climate change adaptation strategy in 2020 (Government of the Republic of Croatia, 2020). Croatia wants to reduce its CO₂ emissions by 45% by 2030 and abandon coal by 2033 (Fusiek, 2023).

Below are the **strategic planning documents related to low-carbon development and the fight against climate change**, as reported in the [Integrated National Energy and Climate Plan 2030](#):

- [National Development Strategy of the Republic of Croatia until 2030](#);
- Energy Development Strategy until 2030 with an outlook to 2050;
- [Climate Change Adaptation Strategy for the period until 2040 with an outlook to 2070](#);
- [Long-Term Strategy for the Renovation of the National Building Stock until 2050](#);
- [Low-carbon Development Strategy until 2030 with a view to 2050](#).
- Energy efficiency programme for the decarbonisation of the energy sector (MESD, 2021);
- [Croatian Hydrogen Strategy until 2050](#);
- [Waste Management Plan for the period 2023-2028](#): roadmap for reducing waste generation and achieving the EU goal of 70% construction waste recovery, including recycling and other types of waste usage. The objectives are: strengthening the market for secondary raw materials and by-products, improving data collection on construction waste, reducing illegal dumping of construction waste and increasing waste recovery.

According to the EIBIS 2023 report, an overview of the current approach and behaviour of companies on this topic shows that:

Climate Transition situation: only 5% of Croatian companies have invested in strategies to adapt to the physical risks of climate change.

Waste reduction and recycling are among the top actions for 74% of Croatian companies (EIB, 2023).

Net-Zero investments: 61% of Croatian companies do not have a strategic plan to reduce their carbon footprint; 23% do not have a strategy, but plan to implement it and only 4% have achieved climate neutral. However, Croatian firms are less inclined to invest in sustainable transport solutions (32% versus 46%), but more likely to invest in renewable energy generation, both onsite and offsite (49% versus 41%).



(20.7%), the industries (14.6%) (IEA, 2022.) It seems that the transition to a net-zero economy is only seen as an opportunity or a risk by less than one third of SMEs and large companies. Furthermore, the only sector in which most companies determine and monitor their GHG emissions is industry (51%) (EIB, 2023)

Energy efficiency investments: Around 48% of companies invested in measures to improve energy efficiency in 2022. Half of the companies have carried out energy audits in the last three years and have allocated 11% of their investments to improving efficiency. Manufacturing (67%) and services (51%) seem to be the sectors most likely to invest in energy efficiency, while construction companies (22%) are the least.

Green transition policies and national financial support

Croatia's Recovery and Resilience Plan: EUR 658 million for the low-carbon energy transition through the modernisation of energy infrastructure, investment support to produce advanced biofuels and renewable hydrogen, and the financing of innovative carbon capture and storage projects.

EUR 542 million for business support for green transition and energy efficiency, supporting projects to stimulate the green economy, sustainable tourism and investments in green technologies (European Commission, 2021).

Support for companies for a transition to an energy efficient economy (Croatia's recovery and resilience plan): for productive investments by SMEs in energy-intensive sectors. These cover the promotion of the circular economy, the introduction of resource efficiency in the life cycle of production and products, and the reduction of harmful emissions from energy-intensive industries (Government of the Republic of Croatia, 2024).

Environmental Protection and Energy Efficiency Fund aimed at preservation, sustainable use, protection and improvement of the environment, as well as ensuring energy efficiency and use of renewable energy sources. The Fund's total investments in energy efficiency projects since 2004 have amounted to EUR 303 million, of which EUR 2.5 million for climate change adaptation in the field of energy efficiency and EUR 25 million for renewable energy sources (Government of the Republic of Croatia, 2019).

Skills & Competences

The availability of qualified personnel in green skills is considered a long-term obstacle for 92% of companies, indicating a potential need for training.

Green training aid: co-financing the cost of training (75% of total eligible costs), to provide targeted support to employees who need additional skills in order to achieve the greatest possible efficiency and productivity of the new workplace, and to employers who need investment in the development and productivity of their workforce in order to adapt to changes in the market, organizational and process changes in business and technological progress.

Incentive for Green/Digital Traineeship: to train people for self-employment and encourage employment of people by co-financing the cost of their gross salary and other costs for employers.

The Public Employment Service (PES) has implemented a system in which all workers and jobseekers are entitled to training vouchers to cover the cost of a green training module (OECD, 2024).

In the context of specific national level actions by 2025 the focus is on:

- Creating incentives to greening VET programmes, including education and training in green technologies and innovation, energy efficiency, the circular economy, environmental awareness, sustainable use of learning and training materials, and digitisation to reduce climate impacts.
- Define labour-market-relevant skills for the green transition that are to be incorporated in curricula and VET provision.
- Define and support opportunities to enable teaching and training staff, managing teams in VET providers and trainers and mentors in companies to act as multipliers and mediators, in view of increasing digitalisation and sustainability within the provision and management of training programmes.

(Government of the Republic of Croatia, 2021).



1.2.3 - ITALY



ITALY

Climate Footprint

Climate change is a reality for most Italian companies, and almost three quarters (73%) recognise that weather events have an impact on their business (EIB, 2024).

Energy use: In 2022, the largest source of energy consumed is oil products (40.3%), followed by natural gas (28%), electricity (21.7%) and biofuels and waste (7.5%). Italy is highly dependent on natural gas, which accounts for about 38% of total energy supply, but the share of modern renewables in final energy consumption is increasing, showing a growth trend of 243% from 2000 to 2021 (IEA, 2023).

Transportation and Logistics / Supply chain and sourcing strategy: Italian companies (96%) also faced some disruptions in international trade, with disruption of access to raw materials or commodities (66%) being the biggest obstacle. However, only 39% have changed their sourcing strategy or are planning to do so, which is lower than the European average (39% vs. 49%). The companies most inclined to do so are manufacturing and large companies, while those least inclined are infrastructure companies (18%) and SMEs (31%).

Waste management and circular economy: Italy remains first in the European ranking, followed by Germany, France, Poland and Spain. The country excels in waste recycling, with a rate of 71.7% for packaging in 2021, higher than the EU average of 64%. The 65% of Italian SMEs adopt circular economy practices, more than doubling by 2021. The main measures concern the use of recycled materials (68.2%) and the reduction of packaging (64%), with 61% of companies noting a reduction in costs thanks to these measures (Circular Economy Network, 2024).

In Italy, 518 859 people are employed in circular economy sectors (14.6 % of EU total in 2018) (EEA, 2022).

Carbon footprint: Italy's greenhouse gas emissions in 2022 were 418.3 MtCO₂-eq. The highest contribution to GHG emissions in Italy came from the transport sector (26%), followed by the energy sector (22%) and the industry sector (19%) (European Commission, 2023)

In term of CO₂ emissions from fuel combustion in 2022, Italy produced 310,289 Mt CO₂ with a reduction trend of 26% in the period 2000-2022. The largest sources of CO₂ emissions per sector are the transport sector for 33% and electricity and heat producers for 30%, while industry accounts for 12.5% of the emissions generated (IEA, 2023).

Decarbonisation Roadmap

The Italian decarbonisation plan sets a **55% reduction in greenhouse gas emissions by 2030** compared to 1990 levels, and the achievement of **net zero emissions by 2050**, with a target of 30% renewables in total energy consumption and 55% renewables in electricity production.

Italy's path mainly includes a series of strategic interventions in specific sectors such as:

Energy sector: aiming to reach 30% of renewables in total energy consumption and 55% of renewables in electricity generation. (IEA, 2023)

Industry: including the adoption of CO₂ capture and storage technologies and the use of green hydrogen to power energy-intensive processes.

Transport: with progressive shift away from fossil fuels, promoting electric mobility and the spread of recharging infrastructures. The transport sector is responsible for about 26% cent of Italian emissions, with reduction targets of 60% by 2030.

Building: with building renovations through incentives such as the 110% Superbonus, which offers tax deductions for energy upgrades.

Agriculture: promoting sustainable farming practices, efficient water management and reduction of emissions from fertiliser use (ISPRA, 2024).

The National Strategy for the Circular Economy was adopted in June 2022 and covers the following steps: a new digital waste traceability system; tax incentives to support recycling activities and the use of secondary raw materials; a revision of environmental taxation on waste; the right to re-use and repair; reform of Extended Producer Responsibility (EPR) systems and consortia; support for existing regulatory instruments, such as end-of-waste legislation and minimum environmental criteria for green public procurement, with particular reference to the construction, textile, plastic and waste electrical and electronic equipment (WEEE) sectors; support for industrial symbiosis projects (Italian Government, 2022).

Net-Zero investments: decarbonisation investments in Italy in 2023 exceeded EUR 127 billion, representing 25% of the total investments made in the country. Italy is the first EU country to perceive decarbonisation as an opportunity.

Energy efficiency investments: In 2022, almost half of Italian companies (45%) invested in energy efficiency measures, with manufacturing companies showing the greatest propensity for such investments, while those in the construction sector were the least inclined to make such investments. Italian companies mainly aim to invest and focus on waste reduction and recycling and renewable energy production, or at least to adopt concrete solutions in these two directions (EIB, 2024).



Green transition policies and national financial support

Many initiatives for the green and digital transition in Italy today are supported by the Recovery and Resilience Plan, the package defined by the Italian government, following the launch of Next Generation EU, the EU plan to recover from COVID pandemic in Europe.

In particular, a **budget of EUR 68.6 billion** has been allocated to Mission 2 of the Italian National Recovery and Resilience Plan, which concerns the green revolution and ecological transition, with specific measures for: circular economy and waste management, renewable energy sources, enhance the electricity grid and water supplies, promotion of energy efficiency in public buildings, investments to combat climate change and hydrogeological instability.

The most relevant opportunities for the green industrial transition at national level are:

Innovation agreements: (Total budget: EUR 1 billion) for research and development projects to introduce innovative solutions. The projects involve collaboration with technology transfer centres and research institutions for the creation of new products, processes and services, or the improvement of existing ones, with a view to sustainability and digitisation of the production system.

The Green Transition Fund: the fund has been established by CDP Venture Capital to promote and foster the growth of an innovation ecosystem for the green transition through venture capital investments. The investment areas are renewable energy, circular economy, waste management and energy storage (CDP, 2023)

National Fund for Energy Efficiency: a private equity fund created in 2014 to promote investment funds in energy efficiency, renewables, electrification and energy community (EIB, 2014).

Development agreements on renewables and batteries: to promote the development of photovoltaics, wind turbines and batteries. The funding available is one billion EUR. Proposals can be submitted by a company or by a consortium of companies, regardless of its dimensions and nationality.

Tax Credit for 5.0 Transition: for innovation projects resulting in reduced energy consumption

Fund for industrial energy transition: approved in 2022 and made effective in 2023, supports industrial players in implementing energy-saving measures in their production methods. EUR 300 million can be accessed on application, up to a maximum of EUR 20 million per intervention, provided the applicant implements the measure within a 36-month period.

Subsidies for the purchase of new electric vehicles: incentives for modernising the country's light vehicle fleet with EUR 1 billion, available from June 2024. To encourage the elimination of the most polluting vehicles and to incentivise the purchase of new electric vehicles up to a maximum of 13,750 euros per application (IEA database, 2024)

Skills & Competences

Many Italian SMEs lack advanced technical skills to implement decarbonisation strategies. According to the World Economic Forum's Global Competitiveness Report, Italy is among the countries least prepared for the transformation, mainly due to its curricula and low propensity to invest in the development of such skills.

The growth of investment in clean energy is expected to provide new job opportunities, particularly for those with training in STEM disciplines. However, Italy lags in these areas, with a mismatch between demand and supply of skills.

It is crucial that Italy incentivises the development of the skills needed for the future and supports targeted investments to prepare the future workforce for the needs of the renewable energy sector (World Economic Forum, 2020).

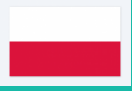
The Italian **PNRR** devotes ample space in **Mission 2** and **Mission 4** to investments in training for the skills needed for the green transition. It also supports the adaptation of study paths (higher technical institutes and universities) to train experts in areas such as decarbonisation, energy efficiency, and new green technologies.

Tax credit for staff training 4.0: Companies can request this measure for training activities for its employees concerning digitalization and Industry 4.0 topics.

The New Skills Fund (NCCF) supports companies that need to adapt to new organisational and production models, in response to ecological and digital transitions, that need to train new skills for their workers for this purpose.



1.2.4 - POLAND



POLAND

Climate Footprint

Climate change's impacts are becoming increasingly noticeable across various sectors, especially in heavy industry and energy.

Energy Use: Poland's energy consumption remains heavily dependent on fossil fuels, particularly coal. In 2022, coal accounted for 66% of Poland's total electricity generation. The share of renewable energy in total energy consumption has been growing steadily, reaching 16.1% in 2022, with wind energy (8%) and biomass (6.7%) leading the way. There is also a recent push toward increased investment in solar power, which saw a growth of 300% between 2020 and 2022 (IEA, 2023)

Transportation and Logistics / Supply Chain and Sourcing Strategy: Nearly all Polish companies engaged in international trade (97%) have encountered some form of disruption. The most reported challenges include limited access to commodities or raw materials (69%), disruptions in logistics and transportation (65%), and difficulties complying with new regulations, standards, or certifications (65%). Despite these hurdles, less than half (48%) of Polish businesses have altered or plan to adjust their sourcing strategies. Polish firms are comparable to the EU average in their efforts to increase stock levels (26% in Poland versus 31% across the EU) and implement digital systems for inventory and input tracking (21% compared to 20% EU-wide). Additionally, fewer than 10% of Polish importers (9%) have reduced or intend to reduce their reliance on imported goods or services—a figure aligned with the EU average (10%). However, Polish companies are notably more proactive in diversifying or expanding the number of their import markets, with 36% pursuing this strategy compared to 24% across the EU (EIB, 2024).

Waste Management and Circular Economy: In 2020, Poland generated around 13.1 million tonnes of municipal waste, with a recycling rate of 38.7%. The country's circularity rate—reflecting the share of recycled materials in the economy—stands at 9.5% (EEA, 2022).

Carbon Footprint: Greenhouse gas (GHG) emissions in Poland reached 384.8 MtCO₂-eq in 2022. The energy sector, driven largely by coal use, is the leading emitter, responsible for 57% of total emissions. Industry (20%) and transport (14%) are other major contributors. Despite challenges, Poland's carbon intensity has decreased by 8% between 2000 and 2022 due to efficiency improvements and a gradual increase in renewables (European Commission, 2023).

Decarbonisation Roadmap

Climate Neutrality Goals: Poland's climate neutrality goals are primarily outlined in the Energy Policy of Poland until 2040 (PEP2040). This document sets the framework for the country's energy transition and its contribution to achieving climate neutrality in line with the European Union's climate targets.

Key Goals:

1. **Reduction of Greenhouse Gas Emissions:** Poland aims to significantly lower emissions by increasing the share of renewable energy sources (RES) and improving energy efficiency;
2. **Development of Renewable Energy:** Increasing the share of renewable energy in the energy mix to at least 23% by 2030;
3. **Coal Phase-Out:** Gradual reduction of coal's dominance in electricity production, aiming for less than 56% by 2030 and transitioning toward cleaner energy sources;
4. **Nuclear Energy:** Introducing nuclear power as a stable, low-emission energy source with the first plant operational by 2033;
5. **Green Technologies and Hydrogen:** Promoting innovation in green technologies, including hydrogen production and usage, as part of the green transformation;
6. **Just Transition:** Supporting coal-dependent regions through economic diversification and social programs to ensure a fair and equitable transition (Republic of Poland, 2021).

Integrated National Energy and Climate Plan for Poland 2021-2030

The plan highlights five key actions:

1. **Increase Renewable Energy:** Expand the share of renewables to 21-23% by 2030, focusing on wind, solar, and biomass energy development;
2. **Enhance Energy Efficiency:** Implement programs to modernize infrastructure and reduce energy consumption across all sectors;
3. **Support Low-Emission Technologies:** Invest in nuclear energy, hydrogen, and innovative green technologies to transition away from coal;
4. **Strengthen Energy Infrastructure:** Modernize grids, enhance cross-border interconnections, and support energy storage solutions;
5. **Ensure a Just Transition:** Provide economic support and reskilling opportunities for coal-dependent regions to ensure a fair and equitable shift (European Commission, 2024).

Circular Economy Goals: Poland's *Roadmap for Transformation Towards a Circular Economy* (2019). This document serves as a strategic framework to transition the country's economy from a linear to a circular model:

- **Increase recycling rates** for municipal waste to 65% by 2035;
- **Boost the use of secondary raw materials**, with a target of 12% circularity by 2030;
- **Reduce landfill use** by encouraging waste separation and recycling;
- **Enhance resource efficiency** to meet European circular economy goals.



The roadmap focuses on five specific areas: sustainable industrial production, sustainable consumption, bioeconomy, new business models implementation, monitoring and financing of CE (Republic of Poland, 2019).

Overview of Companies' Approach and Behaviour: in 2022, 43% of Polish firms invested in developing or introducing new products, processes, or services, aligning closely with the EIBIS 2022 figure (44%) and exceeding the EU average of 39%. Additionally, 13% of firms in Poland reported that their innovations were new to the national or global market, matching the EU average (13%) and slightly below the EIBIS 2022 figure (16%). However, only 60% of Polish firms adopted at least one advanced digital technology, falling behind the EU average of 70% (EIB 2024).

Green transition policies and national financial support

Key Sectors: Poland's energy transition is heavily focused on reducing coal dependency, increasing energy efficiency, and modernizing industrial processes. This involves promoting green building renovations, expanding renewable energy, and upgrading transport infrastructure.

[National Fund for Environmental Protection and Water Management \(NFOSiGW\)](#): NFOSiGW supports a wide range of environmental projects, from energy efficiency in buildings to waste management and renewable energy deployment. In 2023, it allocated approximately €200 million to support clean energy projects and environmental protection measures (Republic of Poland, 2024).

Just Transition Fund: Poland benefits from EU support via the Just Transition Fund, particularly in coal-dependent regions such as Silesia. The fund supports projects that aim to diversify local economies, reskill workers, and encourage green business practices. Funding ranges from €500,000 to €5 million per project, depending on scope and potential impact (European Commission, 2022).

Clean Air Programme: a key initiative aimed at reducing air pollution through the replacement of outdated heating systems with cleaner alternatives and by improving energy efficiency in residential buildings. It has an allocated budget of €5.3 billion for 2022-2027 (IEA database, 2024)

[Polish Renewable Energy Sources Act](#): introduces a new framework for supporting renewable energy sources, including wind, solar, hydropower, aerothermal, geothermal, hydrothermal energy, and energy derived from biomass, biogas, agricultural biogas, and bioliquids (art. 2.22). Its purpose is to stabilize the long-term support system while mitigating the risk of uncontrolled increases in electricity prices. In 2024 the policy has been significantly amended by introducing more impactful support schemes. (Republic of Poland, 2015).

Skills & Competences

Green Skills Strategy in Poland:

Poland's strategy for green skills is "embedded" within broader policy frameworks, particularly in the **Integrated Skills Strategy 2030**, which outlines key goals for enhancing skills development, including those related to environmental and green transitions. This strategy emphasizes the development of key competencies such as digital skills, critical thinking, and adaptability to meet future economic and social challenges, including the green economy (Republic of Poland, 2020)

Recovery and Resilience Plan:

Green skills promotion represents a crucial reform contained in Poland's REPowerEU chapter of the Plan (European Commission, 2023).



1.2.5 - SLOVAKIA



SLOVAKIA

Climate Footprint

Climate change impact: according to the European Investment Bank Investment Survey (EIBIS) 2023, 69% of Slovakian manufacturing companies are feeling the impact of climate change, primarily through disruptions in production processes and supply chains (EIB, 2024).

Energy use: the primary sources of energy in Slovakia are nuclear (54.6%), natural gas (22.8%), and oil products (15.4%). In recent years, Slovakia has been shifting towards a higher share of renewables, with 8.3% of the energy mix now represented by biofuels and waste. In 2022, the total energy supply was primarily from nuclear power (53.2%), natural gas (20.9%), and coal (11.8%) (IEA, 2023).

Transportation and Logistics / Supply chain and sourcing strategy: Slovakian companies have been affected by logistical and transportation issues, with 68% of companies highlighting transportation disruptions as a major challenge. The shift towards digitalization in logistics, like real-time tracking, has been a priority to mitigate supply chain problems, alongside increasing inventory levels to handle disruptions (EIB, 2023).

Waste management and circular economy: in Slovakia, the total raw material consumption in 2019 was 98 million tons, and the circularity rate was recorded at 4.5%, indicating a growing need to improve waste management practices and circular economy measures (Eurostat, 2024).

Carbon footprint: In 2022, greenhouse gas (GHG) emissions in Slovakia were 39.3 MtCO₂-eq. The largest contributor to GHG emissions was the energy sector, accounting for 42%, followed by the industrial processes sector (22%) and agriculture (10%) (European Commission, 2023).

Regarding CO₂ emissions from fuel, in 2022, Slovakia's total CO₂ emissions from fuel combustion were 28.3 Mt CO₂, representing about 0.1% of global CO₂ emissions from combustible fuels. Between 2000 and 2022, Slovakia reduced CO₂ emissions by 17.3%. The CO₂ emissions per capita in Slovakia in 2022 were 5.203 tCO₂ (IEA, 2023).

Decarbonisation Roadmap

Climate Neutrality Goals: Slovakia is committed to achieving climate neutrality by 2050, aligning with the European Union's overarching goal. In 2022, Slovakia generated 66% of its electricity from low-carbon sources, primarily nuclear and renewables. The country aims to increase the share of renewables to 24% of final energy consumption by 2030 (IEA, 2023).

[Integrated National Energy and Climate Plan for 2021-2030 \(Slovakia\):](#) the energy and climate plan outlines several key targets to reduce greenhouse gas emissions, increase energy efficiency, and expand renewable energy use by 2030. The plan includes strategies to phase out coal by 2030, modernize the energy infrastructure, and support innovation in clean technologies (Slovak Republic, 2019).

Circular Economy Goals:

Slovakia has adopted its Environmental Strategy in 2019, focusing on these primary objectives:

- **Reducing waste production** and improving waste management with a target of achieving 65% recycling of municipal waste by 2035.
- **Enhancing resource efficiency**, aiming for a 30% increase in resource productivity by 2030.
- **Increasing the circularity rate** to 12% by 2030, promoting the use of secondary raw materials.
- **Reducing reliance on primary raw materials**, with a focus on limiting the extraction of domestic raw materials by 10% by 2030. (Slovak Republic, 2019)

Overview of Companies' Approach and Behaviour:

Climate Transition Situation: while fewer Slovak companies currently invest in avoiding physical climate risks compared to the EU average, there is a growing interest among larger firms in sectors like automotive and chemicals. 24% of companies have begun implementing measures to address physical risks, with larger companies investing more heavily than SMEs in climate resilience measures.

Net-Zero Investments: a significant portion (89%) of Slovak companies are actively working to reduce their GHG emissions. Energy efficiency is a key priority, with 70% of companies implementing measures to improve energy use, while 65% engage in waste reduction and recycling initiatives. However, only 40% of Slovak companies set and track emissions targets, indicating a need for stronger monitoring practices.

In the manufacturing sector, around 55% of companies have established GHG reduction targets, while other sectors lag behind. SMEs face particular challenges, such as limited access to financing and technical expertise for sustainability transformations. The high reliance on industrial manufacturing and energy-intensive industries poses additional challenges in meeting climate goals (EIB, 2024).



Green transition policies and national financial support

Key Sectors: the Slovak government focuses on decarbonizing specific sectors by investing in the modernization of industrial processes, increasing energy efficiency, expanding the use of renewable energy, and promoting cleaner transportation options. Support is available for building renovation, energy-efficient heating systems, and low-carbon transportation projects.

Slovakia's Recovery and Resilience Plan: the Plan (6.4 B €) is supporting Slovak industry in reducing net greenhouse gas emissions:

- through a decarbonisation scheme for industrial companies, expected to deliver a greenhouse gas emissions reduction of at least 1.2 Mt of CO₂ equivalent;
- the investments under the scheme are expected to deliver energy efficiency improvements, reducing Slovakia's dependency on fossil fuel imports;
- this financing will help the large Slovak industrial sector in undertaking the green transition and in securing its competitiveness (European Commission, 2024).

[Low-Carbon Development Strategy of the Slovak Republic until 2030 with a View to 2050:](#)

The outlined strategy proposes a set of financing opportunities:

- Modernisation Fund - to encourage investment in modernising energy systems and improving energy efficiency;
- Innovation Fund - a pan-European fund and will be financed from the auctioning of 450 million EU emissions;
- EU structural and investment funds;
- Environmental Fund.

(Slovak Republic, 2020).

Green Investment Scheme (Zelená Domácnostiam): a funding program for residential and business eco-friendly investments. The scheme supports projects with a positive environmental impact, including solar panels, heat pumps, and energy-efficient heating systems. In 2022, the program granted EUR 82 million for 14,550 projects, leading to an estimated total investment of EUR 490 million in Slovakia. (Slovak Republic, 2015)

EU Support for Decarbonisation in Slovakia: the European Commission has approved a EUR 1 billion Slovak scheme under EU State aid rules to help decarbonize the industrial sector. This measure aligns with Slovakia's National Energy and Climate Plan and contributes to the European Green Deal goals while reducing dependency on imported fossil fuels.

Skills & Competences

Slovakia's Just Transition Framework:

Slovakia has integrated its green skills development into a broader strategy to ensure a just transition. The country's Just Transition Plan focuses on mitigating the social and economic impact of the green transformation, particularly in regions historically dependent on carbon-intensive industries, such as Upper Nitra. The plan includes training and reskilling initiatives to address the anticipated demand for skilled workers in the green economy by 2030 (Stępień et al., 2023).

Innovative Initiatives for Green Skills Development:

Several innovative initiatives in Slovakia focus on fostering green skills. At national level an example is represented by the national project Digital Future (launched in October 2024) responds to the demands of both employers and employees to raise awareness of the digital and green transitions (Krištofičová, 2024).

National initiatives:

In the Economic Policy Strategy of the Slovak Republic (until 2030) a broad range of measures in areas such as human capital development, technological change and business environment development to ensure the competitiveness and sustainability of economic growth are mentioned. In 2019, the adopted Strategy of the Environmental Policy (until 2030) lists environmental education and education for sustainable development as one of its major priorities (OECD, 2020).



1.2.6 - SLOVENIA



SLOVENIA

Climate Footprint

Energy Use:

Slovenia's energy consumption is still largely reliant on fossil fuels, although renewable energy has a strong presence. In 2022, fossil fuels (oil, gas, and coal) accounted for around 65% of total energy use, while renewables like hydropower and biomass comprised 33%. Hydropower is a critical component of Slovenia's energy mix, contributing 25% of the country's electricity generation. Solar energy is on the rise, with an 11% increase in capacity from 2020 to 2022 (IEA, 2023)

Transportation and Logistics / Supply Chain and Sourcing Strategy:

Transport is one of Slovenia's primary sources of greenhouse gas emissions, accounting for about 28% of the total emissions in 2023. According to the EIB country Report Slovenian firms, if compared with EU firms, have been much less disrupted by compliance with new regulations, standards or certifications (28% versus 55%), recent changes in customs and tariffs (32% versus 51%) or disruption to logistics and transport (48% versus 65%) (EIB, 2024)

Waste Management and Circular Economy:

Slovenia has shown strong progress in waste management, achieving a recycling rate of 60.7 % in 2020—one of the highest in the EU. The country's circularity rate stands at 12.3 12.3%, above the EU average, with a national strategy focused on reducing waste generation and boosting material recovery rates (EEA, 2022)

Carbon Footprint:

In 2022, Slovenia's greenhouse gas emissions were 16.0 MtCO₂-eq, with the energy sector being the largest emitter at 56%. Transport contributes 28% of the total emissions, followed by agriculture at 10% (European Commission, 2023).

Decarbonisation Roadmap

Climate Neutrality Goals: Slovenia's climate neutrality goals are set out in the Resolution on the Long-Term Climate Strategy until 2050 adopted in July 2021. The document outlines the country's commitment to achieving net-zero greenhouse gas emissions by 2050. It establishes a framework for reducing emissions across sectors with specific reduction targets:

1. Transport and Energy: reduction by 90-99%;
2. Industry: reduction by 80-87%;
3. Waste Management: reduction by 75-83%;
4. Buildings and General Consumption: reduction by 87-96%;
5. Agriculture: reduction by 5-22% (reflecting the sector's unique challenges related to methane emissions and food production).

(Government of the Republic of Slovenia, 2021).

Integrated National Energy and Climate Plan for Slovenia 2021-2030:

The 2030 targets outlined in Slovenia's Integrated National Energy and Climate Plan (NEPN) include the following objectives:

1. Achieving a **36% reduction in total greenhouse gas emissions** by 2030 compared to 2005 levels;
2. Improving **energy efficiency by at least 35%**, a target that exceeds the EU's goal of 32.5%;
3. Increasing the **share of renewable energy sources to at least 27%** in final energy consumption. Although this is lower than the EU average of 32%, it reflects Slovenia's specific domestic conditions, with plans to enhance this target in future NEPN updates (expected in 2023/24);
4. Allocating **3% of GDP to research and development (R&D)**, with **1% of GDP coming from public funds**, to support innovation in energy and climate technologies.

(Government of the Republic of Slovenia, 2020).

Circular Economy Goals: the Roadmap towards a circular economy contains Slovenia's strategy, focus areas and goals of the country's path towards a continuous progress in its circular economy performances. The main goals highlighted in the roadmap are:

- Outline the potentials that establish Slovenia as the leader of the transition into the Circular Economy in Central and Eastern Europe;
- Involve stakeholders to identify and connect circular practices;
- Create recommendations for the Government of the Republic of Slovenia to facilitate a more efficient transition;
- Identify circular opportunities for the strengthening of international economic competitiveness and quality of life for all.

The four priority areas identified in the roadmap are food system, forest-based value chains, manufacturing industry and mobility (Korpar at al., 2018).

Overview of Companies' Approach and Behaviour: nearly all firms in Slovenia (96%) are actively working to lower their greenhouse gas (GHG) emissions. However, only about one-third (34%) establish and track specific emissions reduction targets, which is below the EU average of 42%. The most common measures taken by Slovenian companies include waste reduction and recycling efforts (85%) and energy efficiency enhancements



(71%). Compared to their EU counterparts, Slovenian firms are more proactive in specific areas, particularly in investing in cleaner, less polluting technologies and business sectors (53% vs. 32%) and waste management practices like recycling (85% vs. 67%) (EIB, 2024).

Green transition policies and national financial support

Eco Fund (Eko Sklad): the Eco Fund provides low-interest loans and grants for energy efficiency improvements, renewable energy installations, sustainable mobility, and waste reduction. In 2019, a total of EUR 62 million subsidies were paid by Eco Fund to various beneficiaries. In 2023, it allocated EUR 80 million for various climate-related projects (Eko Sklad, 2024).

Just Transition Fund: Slovenia by benefitting from the EU's Just Transition Fund, is targeting regions most affected by the coal phase-out, particularly the Savinja-Šalek region. The fund supports projects focusing on economic diversification, reskilling, and job creation in renewable energy sectors. Grants range from EUR 500,000 to EUR 3 million, depending on the project's scope.

The Just Transition Fund will particularly support the establishment of a 'Just Transition Centre' in each region. These centers will foster collaboration through local partnerships, offer training and capacity-building programs, and provide assistance in project development. They will also oversee and coordinate just transition efforts in the two regions, engaging with youth, NGOs, social and economic stakeholders, and local communities to ensure inclusive and equitable progress (European Commission, 2022).

Recovery and Resilience Plan (RRP): the RRP plays a crucial role on country's restructuring process of its green transition policies and of the financial support opportunities offered to Slovenian companies.

The five components of Slovenia's RRP are:

1. **Renewable Energy and Energy Efficiency** - investments to expand the use of renewable energy sources (e.g., solar and wind) and improve energy efficiency in buildings and industries, aiming to reduce greenhouse gas emissions and reliance on fossil fuels.
2. **Sustainable Renovation of Buildings** - funding for energy-efficient renovations of public and private buildings to enhance energy performance and reduce energy consumption;
3. **Circular Economy and Resource Efficiency** - promoting circular economy initiatives by supporting waste reduction, recycling, and resource-efficient production practices;
4. **Sustainable Mobility** - development of infrastructure for zero-emission transportation, including electric vehicle charging stations and incentives for green vehicle purchases;
5. **Clean and Safe Environment** - investments in environmental protection initiatives, such as improving water management systems, reducing pollution, and conserving biodiversity (Government of the Republic of Slovenia, 2023).

Skills & Competences

The Slovenian Recovery and Resilience Plan (RRP) foresees a series of actions that aim to address competences required by the new occupations and the green transition. The 5 specific actions are:

1. **Reforming Education** - modernizing educational systems to equip students and teachers with competencies for the digital and green transitions. This includes integrating digital and sustainable development skills into curricula across all levels of education;
2. **Vocational Education and Training** - updating vocational and technical education programs to provide practical skills that align with green technologies and industries. The reform emphasizes apprenticeships and closer cooperation between educational institutions and employers;
3. **Higher Education Transformation** - reforming higher education to meet the demands of the green and digital economy. This includes adapting curricula to incorporate green and digital competencies, with a focus on flexible and inclusive learning approaches;
4. **Investment in Teacher Training** - offering professional development to educators in green, digital, and financial literacy skills. This ensures that teachers are equipped to deliver relevant content and help students develop the skills needed for a sustainable future;
5. **Greening Education Infrastructure** - improving the sustainability of educational and research facilities, including constructing energy-efficient buildings and creating spaces that foster modern teaching practices.

(Government of the Republic of Slovenia, 2023).



Chapter 2 - Mapping of decarbonisation levels among SMEs of the 6 countries

2.1 - Introduction

The survey tool was chosen with the aim of best assessing the levels of decarbonisation of SMEs in the six Central European countries involved in the project.

The survey, shared by all partners with targets within their networks, also allows the identification of the main needs of these SMEs in terms of knowledge, skills, access to, and availability of technologies and financial tools to support decarbonisation.

Another goal of the survey is to provide a benchmark for comparison with the country profiles that emerged from the desk research, identifying the most high-performing countries in terms of SME decarbonisation and determining the most effective types of interventions to support them.

The survey is divided into 4 different sections:

- General Information;
- Knowledge of current climate footprint;
- Presence of decarbonisation roadmaps or goals;
- Additional Comments.

The survey focuses not only on the performance and levels of decarbonisation of SMEs but also on their capacity and willingness to set medium- and long-term goals to reduce their impacts, generate positive ones, and potentially rethink their business models.



2.2 Analysis of results

SMEs distribution by Country

A total of 152 SMEs responded to the survey. All partners engaged companies from the six countries, with varying levels of participation. A significant majority (73%) consists of SMEs from Italy and Croatia. The remaining 27% is distributed among Poland, Slovakia, Slovenia, and Austria.

The survey aimed to gather feedback from manufacturing SMEs. The responses came from SMEs across at least 17 different sectors, providing a relatively comprehensive overview of decarbonisation levels across various industries. Of the responding SMEs, 16% operate in the "Machinery" sector, 11% in "Agrifood," and 9% in "Electronics."

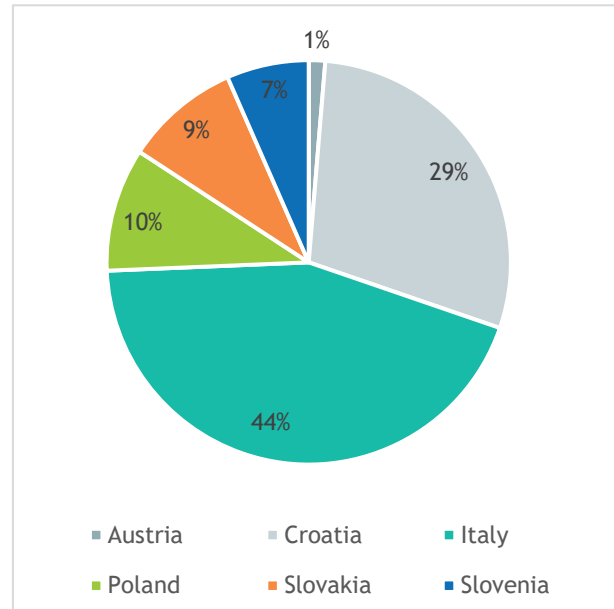


Figure 2 - SMEs distribution by Country

SMEs distribution by manufacturing industry sector

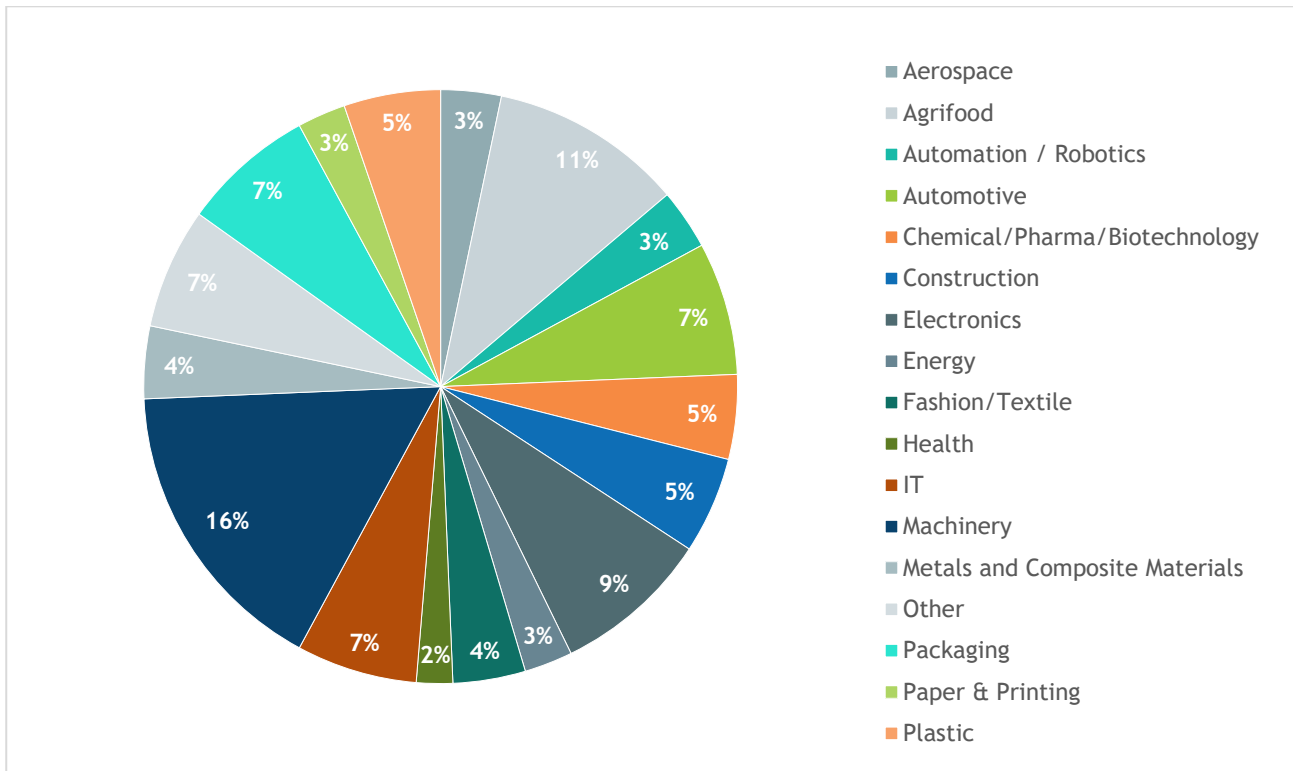


Figure 3 - SMEs distribution by sector



SMEs distribution by employees and by annual revenue

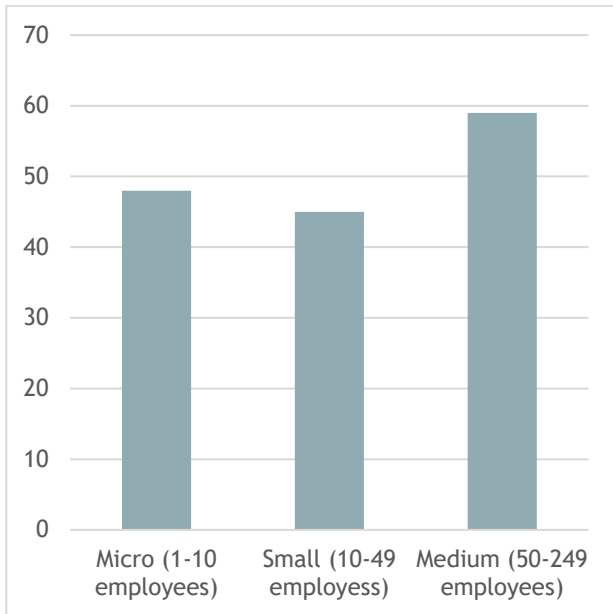


Figure 4 - SMEs distribution by employees

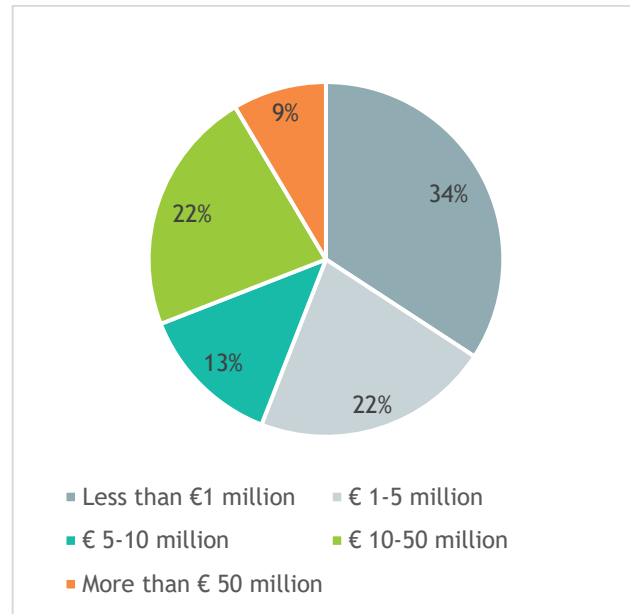


Figure 5 - SMEs distribution by annual revenue

The responses collected and deemed valid were those from SMEs within the range of 1-249 employees. 48 SMEs reported having between 1 and 10 employees, 45 between 10 and 29, and the remaining 59 between 50 and 249 employees. The responding SMEs are evenly distributed across the categories of Micro, Small, and Medium enterprises. 34% of the sample considered generates less than 1 million euros in annual revenue. This is an important figure for understanding the specific needs of microenterprises for whom decarbonisation represents a significant challenge. Only 9% of the sample reports annual revenues exceeding 50 million euros, while two groups of enterprises (22% each) represent those with revenues between 1-5 million euros and 10-50 million euros, respectively.

Primary energy source consumption by Country

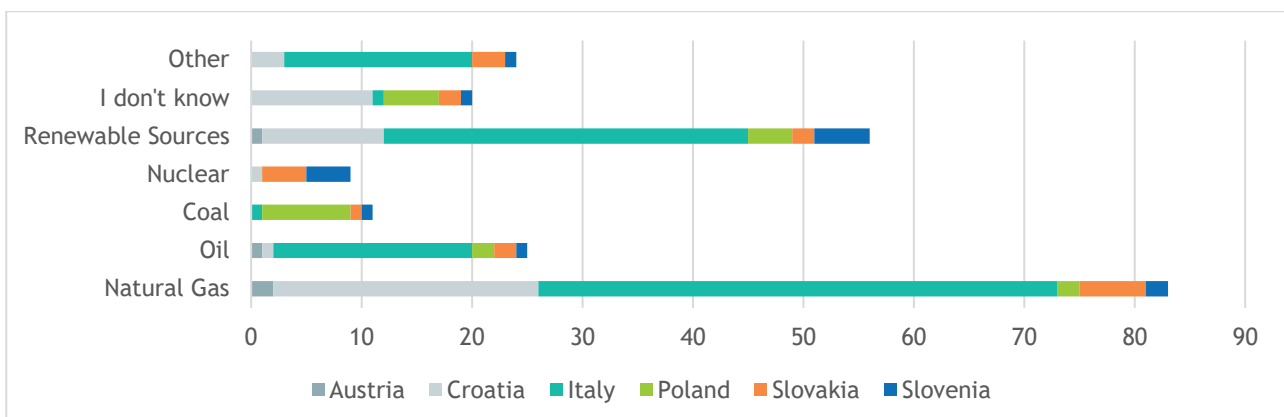


Figure 6 - Primary energy source consumption by Country



The responding companies were asked about their primary source of energy consumption, and the results were as follows:

- Natural gas is the most commonly used primary energy source, followed by renewable energy sources;
- Italian and Croatian SMEs, due to the large number of responses, significantly contribute to defining this result;
- Slovenian SMEs show the greatest diversity in the energy sources they use, followed by Polish SMEs;
- Coal is still an energy source in use. Among the respondents, Polish SMEs indicated this option more frequently than SMEs from other countries.

Transportation modes for business operations by Country

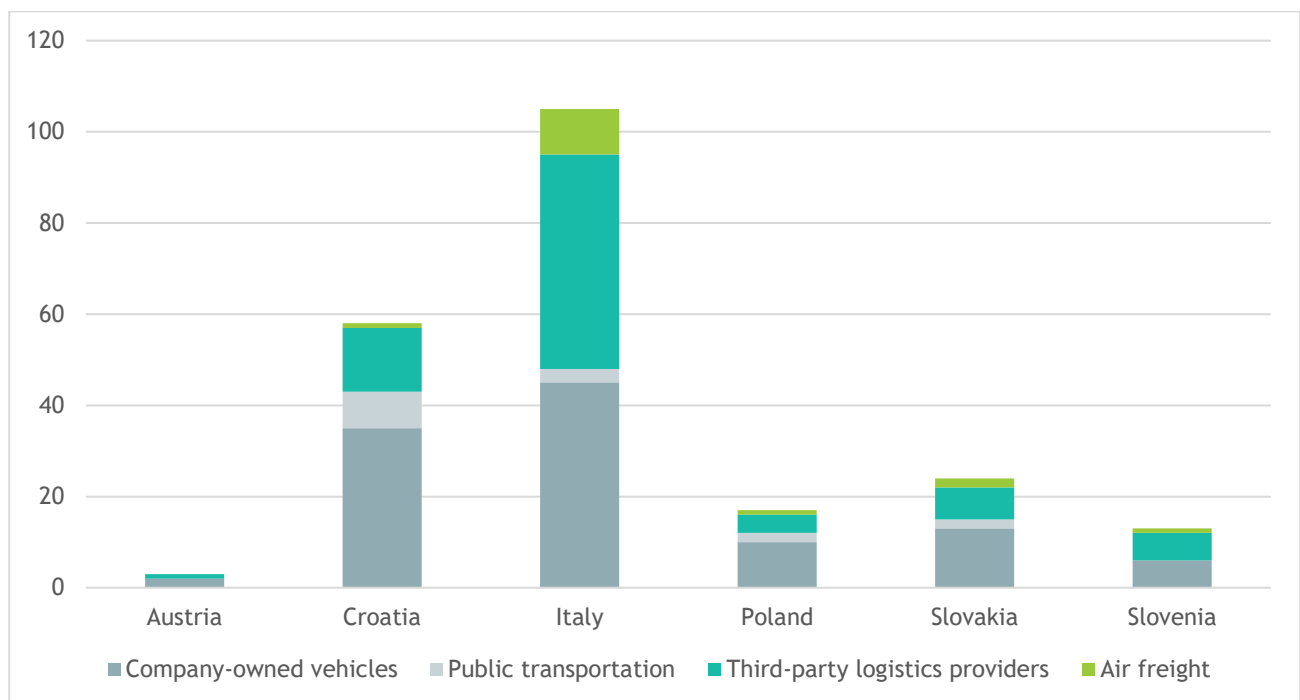


Figure 7 - Transportation modes for business operation by Country

79 companies stated that they use third-party logistics services as their mode of transportation to conduct business operations.

109 companies reported relying on their own corporate fleet, while only a small fraction (15) mentioned including air transport in their operations.

There is an even distribution across the various countries between the options "company-owned vehicles" and "third-party logistics providers," with the exception of Croatia, where the option "company-owned vehicles" is clearly more commonly selected.



Carbon dioxide emissions monitoring from transport

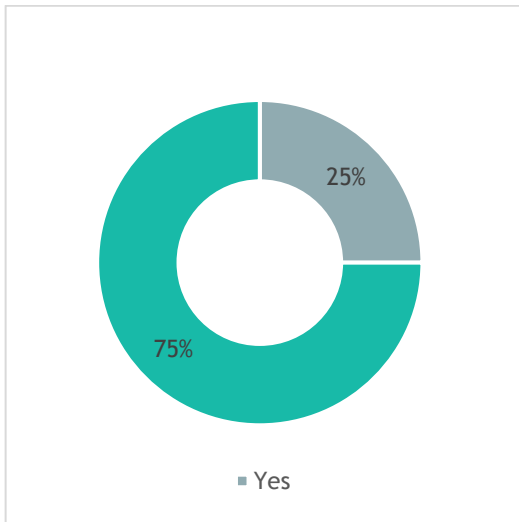


Figure 8 - Carbon dioxide emissions monitoring of transport (Total)

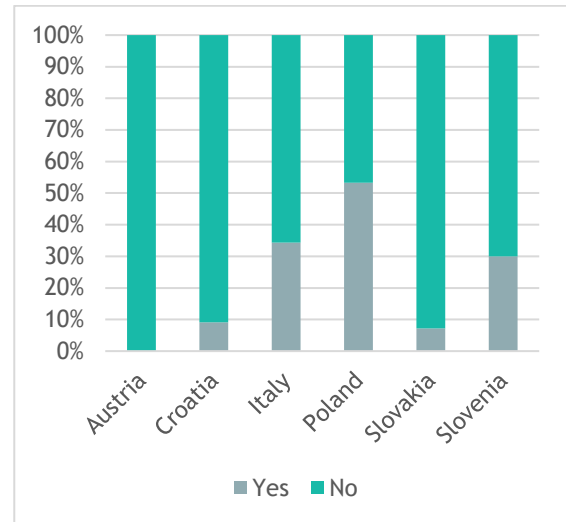


Figure 9 - Carbon dioxide emissions monitoring of transport (by Country)

Only 25% of the sample reported tracking their carbon emissions related to transportation and logistics activities. Looking at the country-specific breakdown of responses:

- half of the Polish companies indicated that they monitor these specific emission levels;
- out of 77 Italian companies, only 23 reported tracking emissions related to transportation/logistics;
- of the 44 Croatian companies, only 4 responded positively to the question;
- 3 out of 10 Slovenian companies monitor this type of emissions.

Waste management by Country

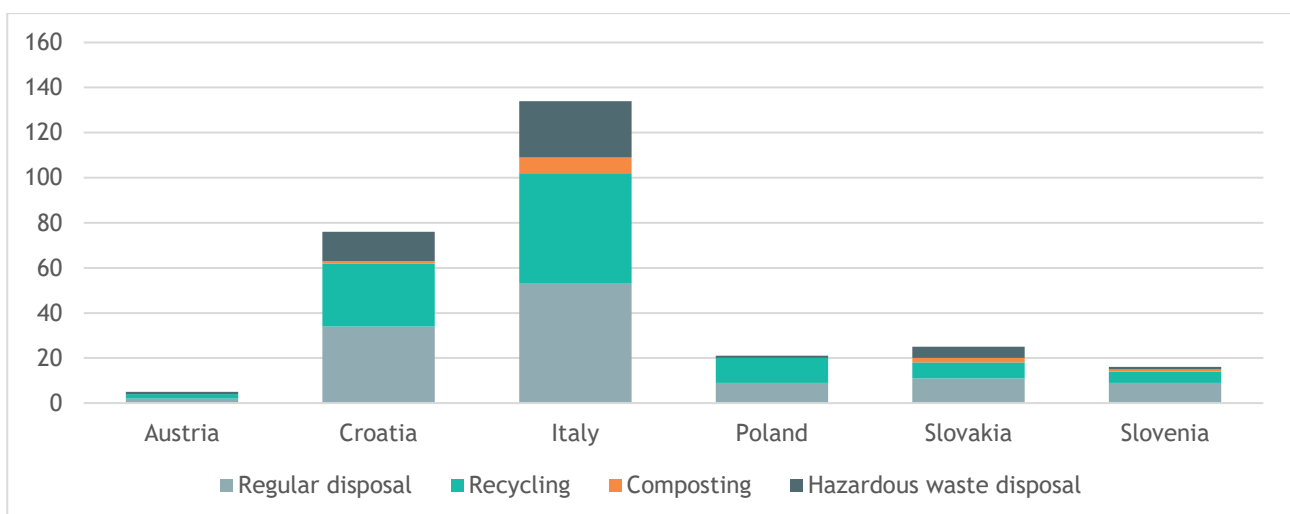


Figure 10 - Waste management by Country



Most enterprises manage their waste primarily through regular disposal, with particularly high percentages in Slovenia (56,2%) and Croatia (44,7%). The only exception is Poland, where the predominant method is recycling, adopted by 52,3% of enterprises, whereas in the other countries it is generally the second most popular option. Composting turns out to be the least used method overall, with a total absence in Poland, where no company surveyed adopts it. Hazardous waste disposal is also uncommon, with the lowest percentage in Poland (4,8%) and the highest in Slovakia (20%).

Tracking quantity of waste produced

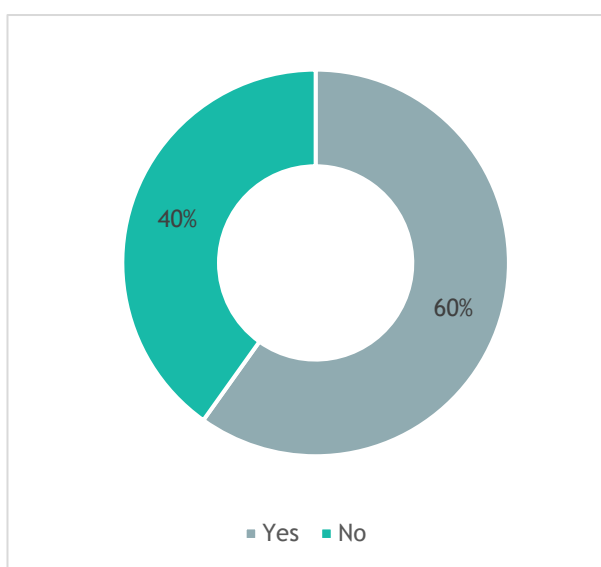


Figure 11 - Tracking quantity of waste produced (Total)

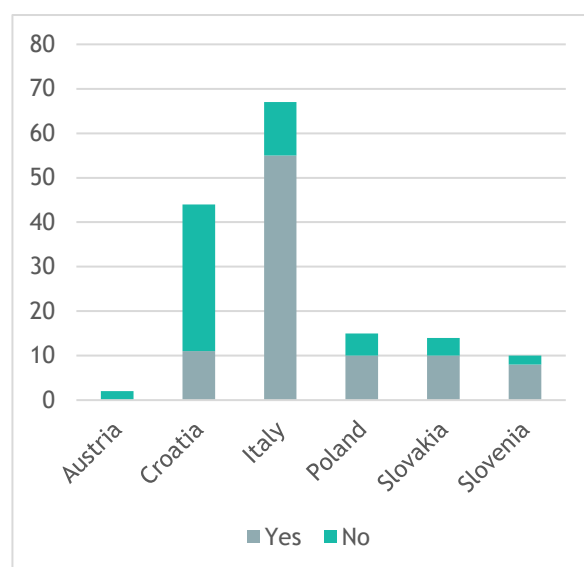


Figure 12 - Tracking quantity of waste produced (by Country)

Most enterprises (60%) declared that they monitor the amount of waste generated. The country-specific breakdown confirms this trend, showing that enterprises in 5 out of 6 countries responded positively to the survey. The only exception is Croatia, where only 25% of enterprises track their waste

Among the countries that responded positively, differences are observed. Italy stands out with the highest percentage of companies tracking waste (82%), followed by Slovenia (80%), Slovakia (71,4%), and finally Poland (66,7%). Poland, right after Croatia, is the country with the highest percentage of companies that do not perform this type of monitoring, with 33% of the companies surveyed not monitoring their waste.



Suppliers' carbon footprint as a decision driver in procurement

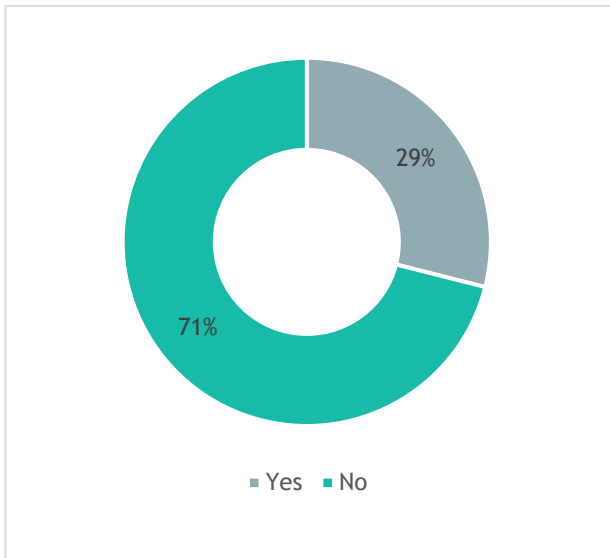


Figure 13 - Procurement by supplier carbon footprint (Total)

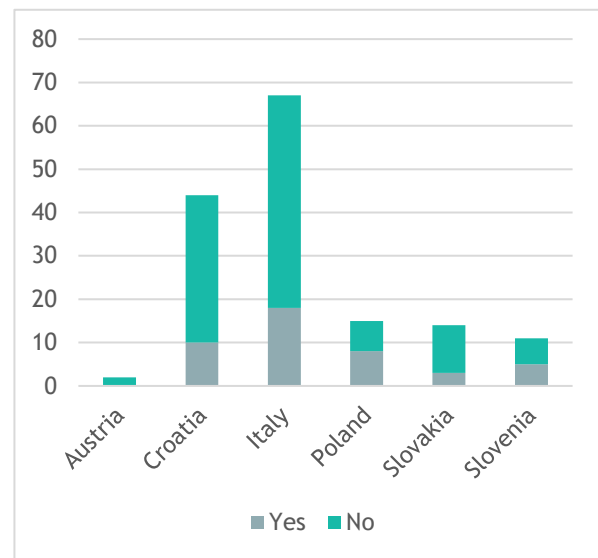


Figure 14 - Procurement by supplier carbon footprint (by Country)

71% of companies reported they do not consider the carbon footprint of their suppliers in their purchasing decisions, while only 29% of them take it into account.

The country with the highest percentage of negative responses is Slovakia (78,6%), followed by Croatia (77,3%), Italy (73,1%) and Slovenia (54,5%). In Poland, on the other hand, the percentage of companies that consider the carbon footprint of suppliers (53,3%) is higher than those that do not (46,6%).

Current company carbon footprint awareness

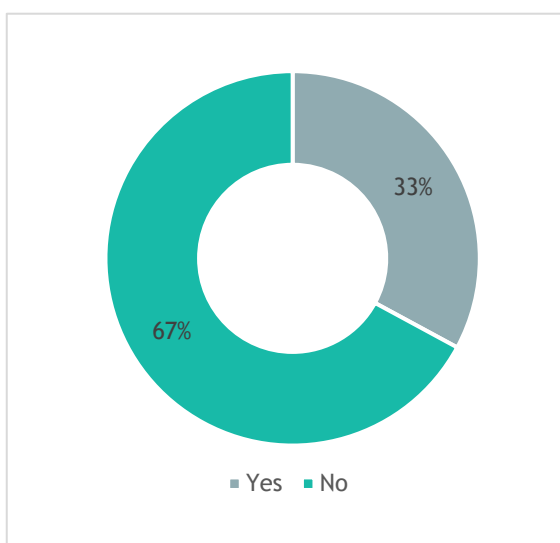


Figure 15 - Company carbon footprint awareness rate (Total)

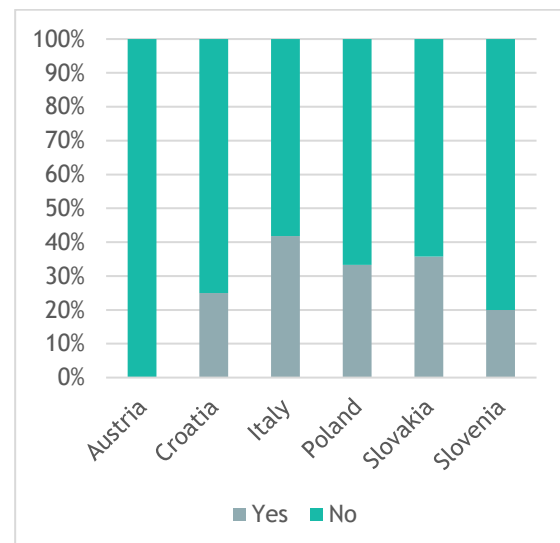


Figure 16 - company carbon footprint awareness rate (by Country)



About two-thirds of respondents indicate they do not know the company's carbon footprint. In the breakdown by country, Italian companies emerge as the most attentive to keeping track their carbon footprint (42 %), followed by Slovakia (35%). On the other hand, only 20 % of the responding companies from Slovenia are aware of their carbon footprint.

Carbon emission measurement tools or methodologies and Net zero/Climate transition plan

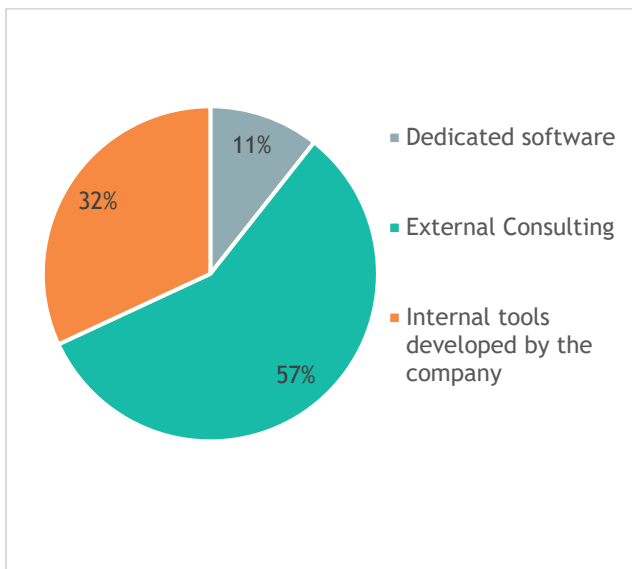


Figure 17 - Carbon emission measurement tools/methodologies (Total)

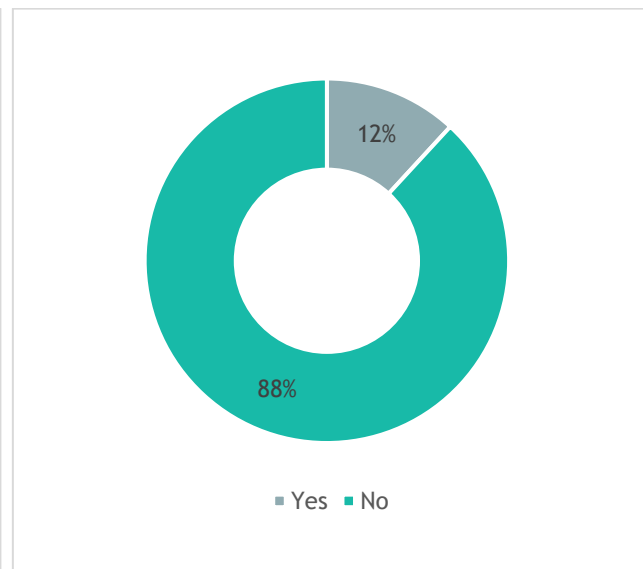


Figure 18 - Net zero/Climate transition plan (Total)

57% of companies track their carbon emissions supported by external consulting services. About one-third of respondents use internal tools developed by the company, while 11 % utilize a dedicated software. Only 12% of the sample reported having a net zero/climate transition plan.



Business areas with the highest emissions rate

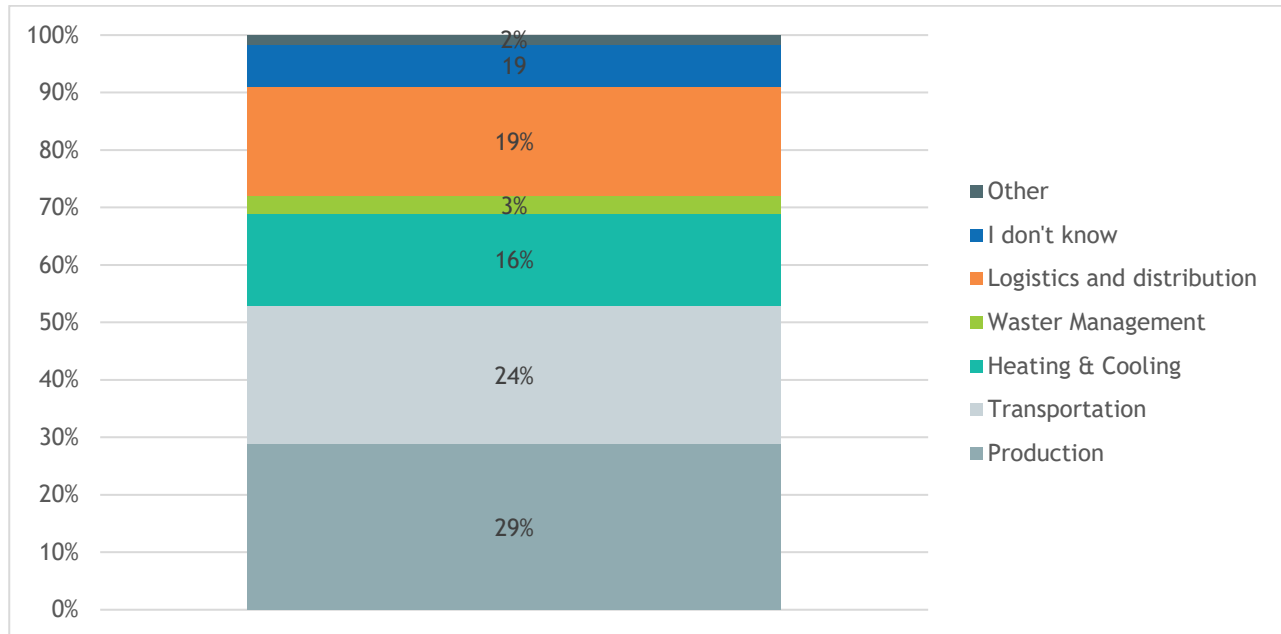


Figure 19 - Business areas with the highest emissions rate (Total)

Based on the responses, companies reported that Production is the area of their business with the highest carbon emissions rate (29%), followed by Transportation (24%) and Logistics and distribution (19%). 19% of the sample is unable to answer.

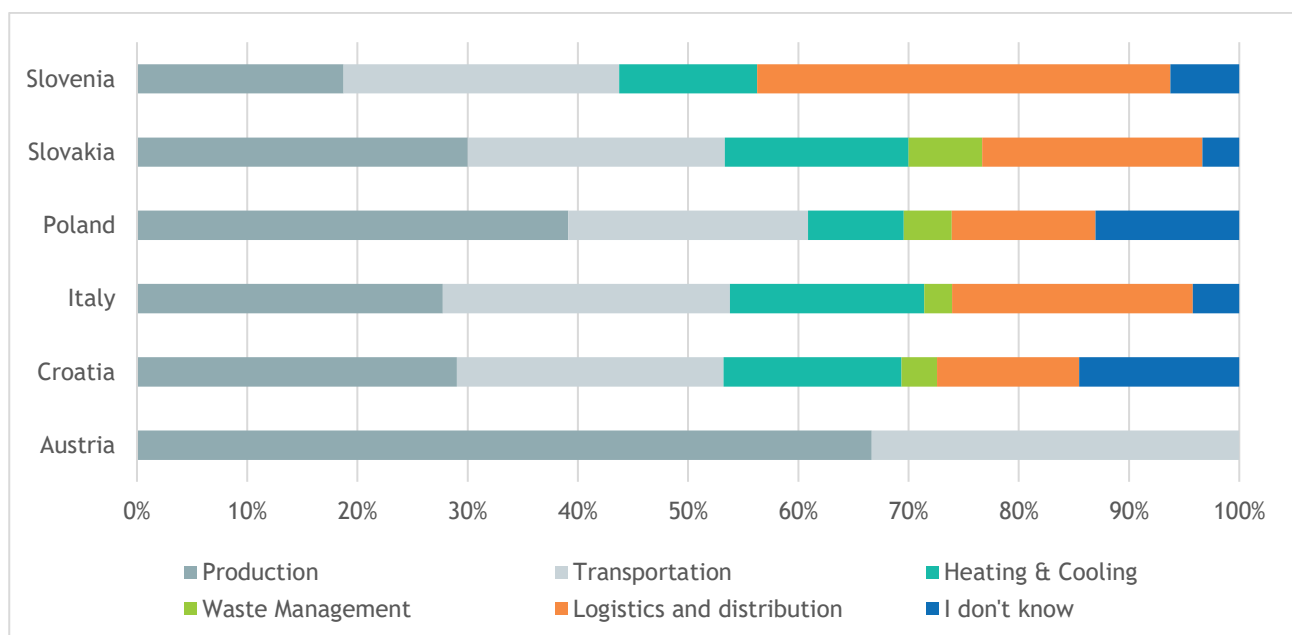


Figure 20 - Business areas with the highest emissions rate (by Country)



Looking at the country-specific breakdown of responses:

- companies from all countries, except Slovenia, stated that the area of their business with the highest carbon emissions rate is Production, followed by Transportation, Logistics and distribution, and finally Heating & Cooling;
- Slovenian companies reported Logistic and distribution as the area with the highest carbon emissions rate (6 out of 16), followed by Transportation (4 out of 16);
- Croatia has the highest number of answers “I don’t know” (9 out of 62).

Business areas with greatest reduction potential

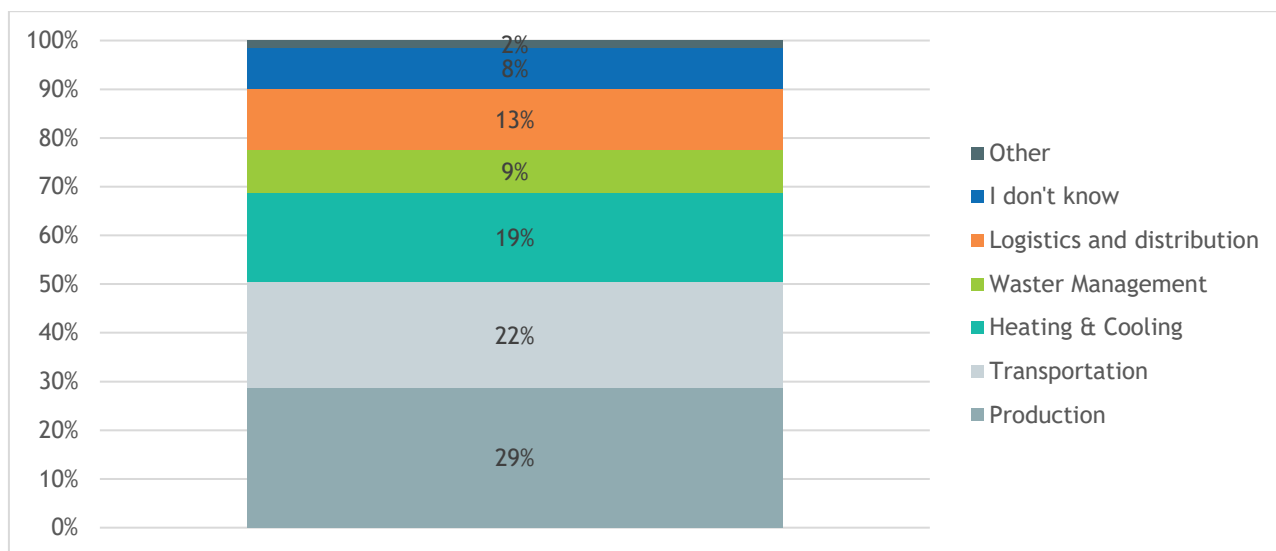


Figure 21 - Business areas with greatest reduction potential (Total)

29% of the responding companies reported that the area of their business with the greatest potential for carbon emissions reduction is Production, followed by Transportation (22%) and Heating & cooling (19%).

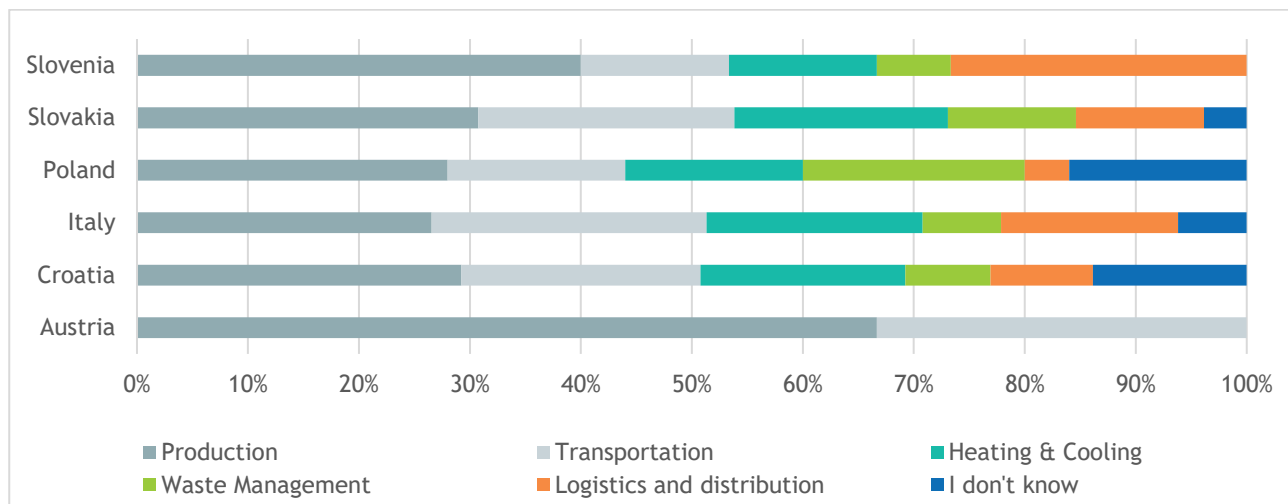


Figure 22 - Business areas with greatest reduction potential (by Country)



Looking at the country-specific breakdown of responses:

- in every country, the area with the greatest potential for carbon emissions reduction is production;
- for Slovakia, Italy and Croatia, the second area with the greatest potential for carbon emissions reduction is transportation.
- around 27% of answers (4 out of 15) from Slovenian companies stated logistics and distribution as the area with the greatest potential for carbon emissions reduction;
- Polish companies declare that Waste management, after production, is the area with the greatest potential for carbon emissions reduction, followed by transportation and heating & cooling, with the same amount of marked answers.

Energy-efficient equipment or practices use (e.g. LED lighting, energy-efficient HVAC systems)

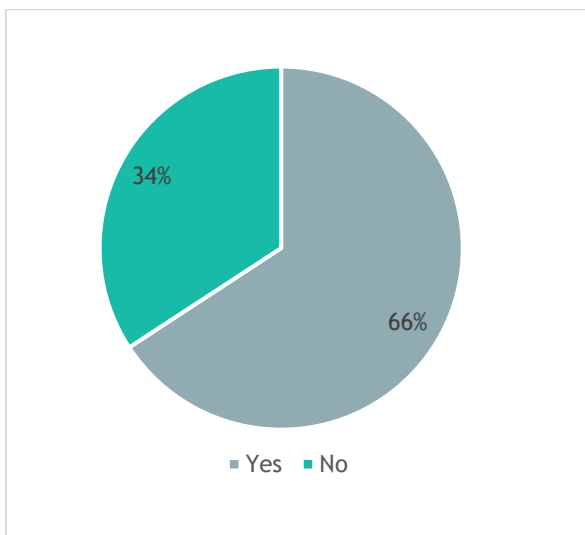


Figure 23 - Use of energy-efficient equipment or practices rate (Total)

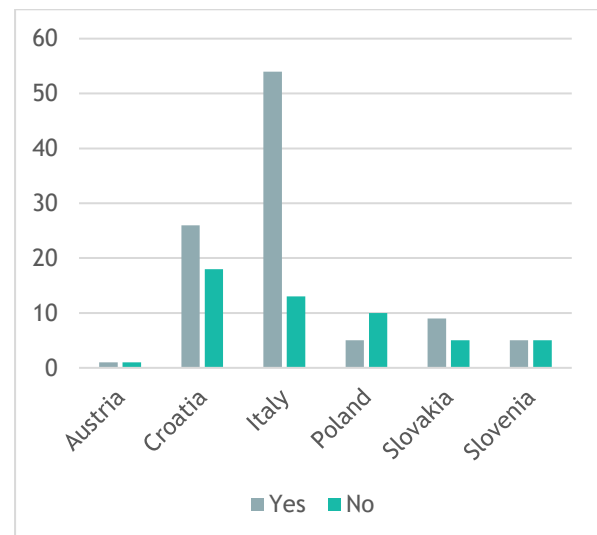


Figure 24 - Use of energy-efficient equipment or practices rate (by Country)

66% of the sample reported using energy-efficient equipment or practices like LED lighting or energy-efficient HVCA systems in their activities.

Looking at the country-specific breakdown of responses:

- Croatian and Italian companies proved to be the most energy-efficient: 54 out of 77 Italian companies and 26 out of 44 Croatian companies responded positively to the question;
- Slovak companies also have a majority of companies using energy efficiency systems;
- Only 5 out of 15 Polish companies use energy efficiency systems and practices;
- Half of the Slovenian companies indicated that they use energy-efficient equipment or practices.



Main energy efficiency systems used

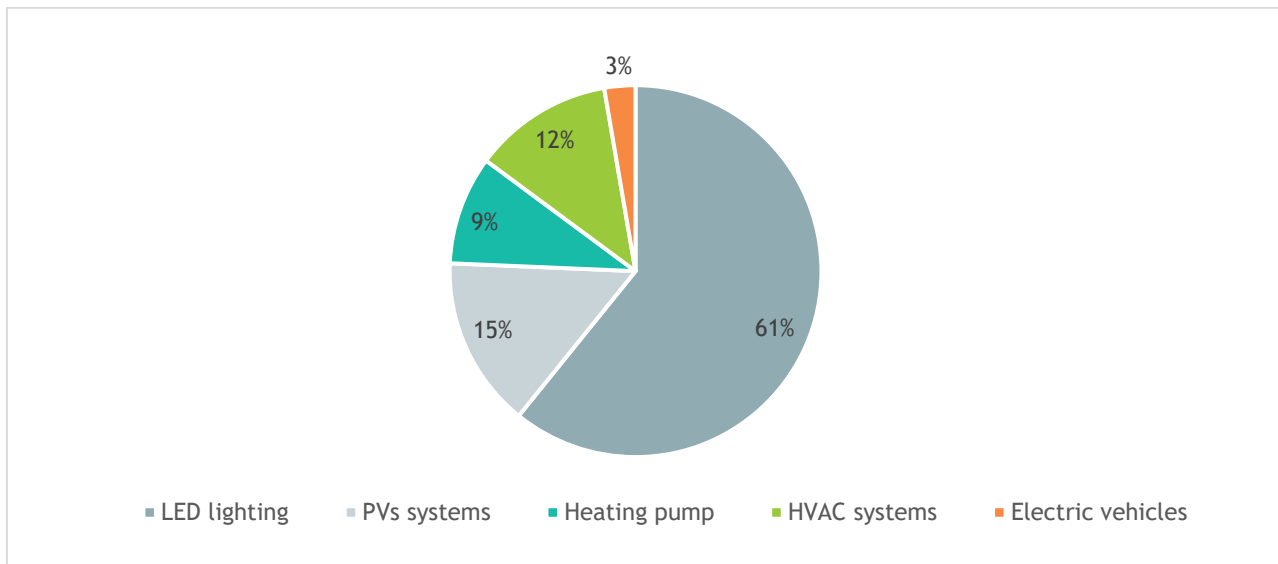


Figure 25 - Main energy efficiency systems used

- 61% of the companies that reported using energy-efficient systems refer to LED lighting;
- with a more even distribution there are 15% using PVs, 12% for HVCA systems and 9% for heating pumps;
- only 3% stated that they use electric vehicles.

Transportation-related emissions reduction measures implementation (e.g., route optimization, fuel-efficient vehicles)

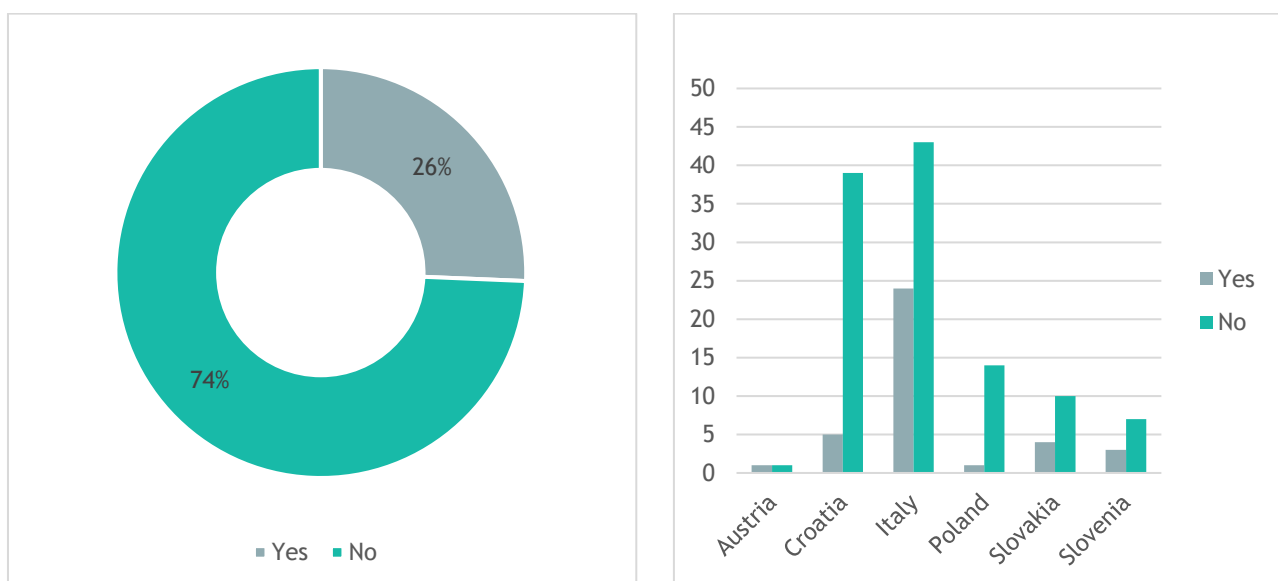


Figure 26 - Transportation-related emissions reduction measures implementation rat

Figure 27 - Transportation-related emissions reduction measures implementation rate



Only 26% of the sample reported having implemented measures to reduce transportation-related emissions.

Looking at the country-specific breakdown of responses:

- all participating countries showed a majority of negative responses;
- more than half of Italian companies are implementing measures to reduce transport-related emissions;
- only 5 out of 44 Croatian companies responded positively to the question;
- 30% of Slovak and Slovenian companies have implemented measures to reduce transport-related emissions.

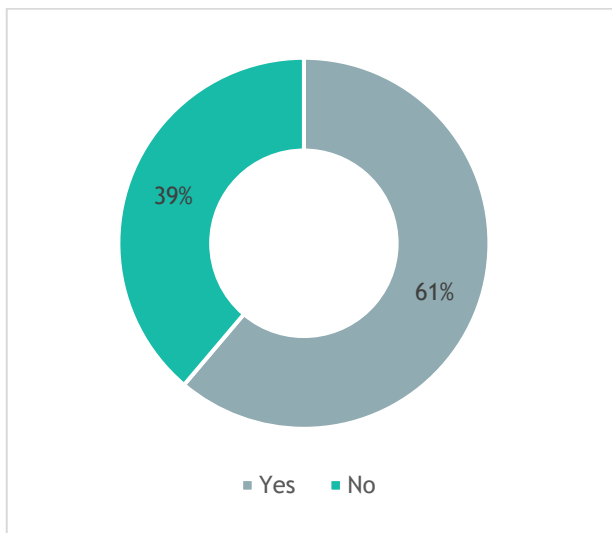


Figure 28 - Waste reduction practices implementation rate (Total)

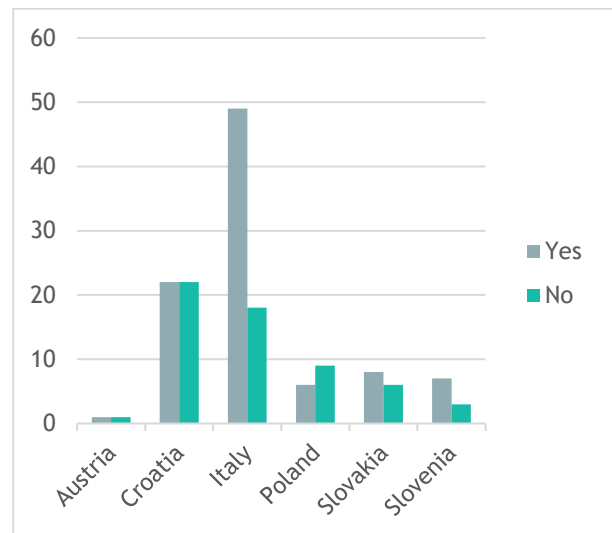


Figure 29 - Waste reduction practices implementation rate (by Country)

61% of companies stated that they had implemented waste reduction practices like reduction of packaging or reusing materials.

Looking at the country-specific breakdown of responses:

- half of Croatian companies responded positively to the question;
- 49 out of 77 Italian companies stated that they had implemented practices to reduce waste;
- more than half of the Slovenian and Slovakian companies responded positively to the question;
- Poland has only 6 out of 15 companies reporting that they have implemented practices to reduce the amount of waste.



Circular economy activities implemented (by Country)

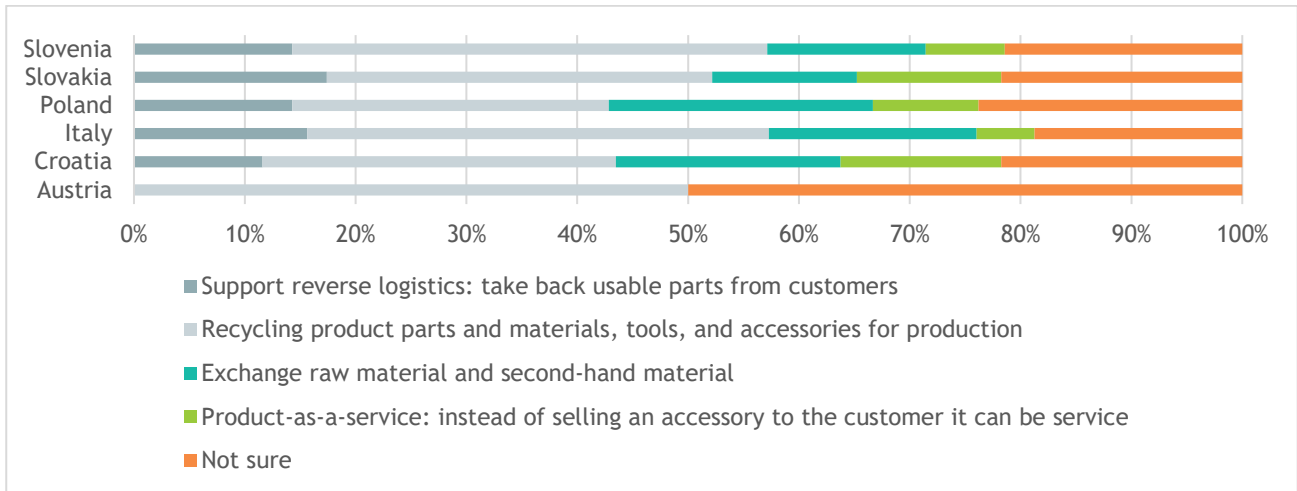


Figure 30 - Circular economy activities implemented (by Country)

The main activity that the respondents' companies, divided by country of belonging (Slovenia, Slovakia, Poland, Italy, and Croatia), execute or try to implement in their processes is recycling product parts and materials, tools, and accessories for production (around 30 - 40% of the companies for each country).

15% of the companies for each country answered supporting reverse logistics, which involves taking back usable parts from customers. A similar percentage declared exchanging raw and second-hand material.

The last selected activity was "product-as-a-service," which means selling a service to the customer instead of a product. Around 20% of the respondents for each country were not sure about the executed or implemented activities.

Main challenges to reduce the carbon footprint

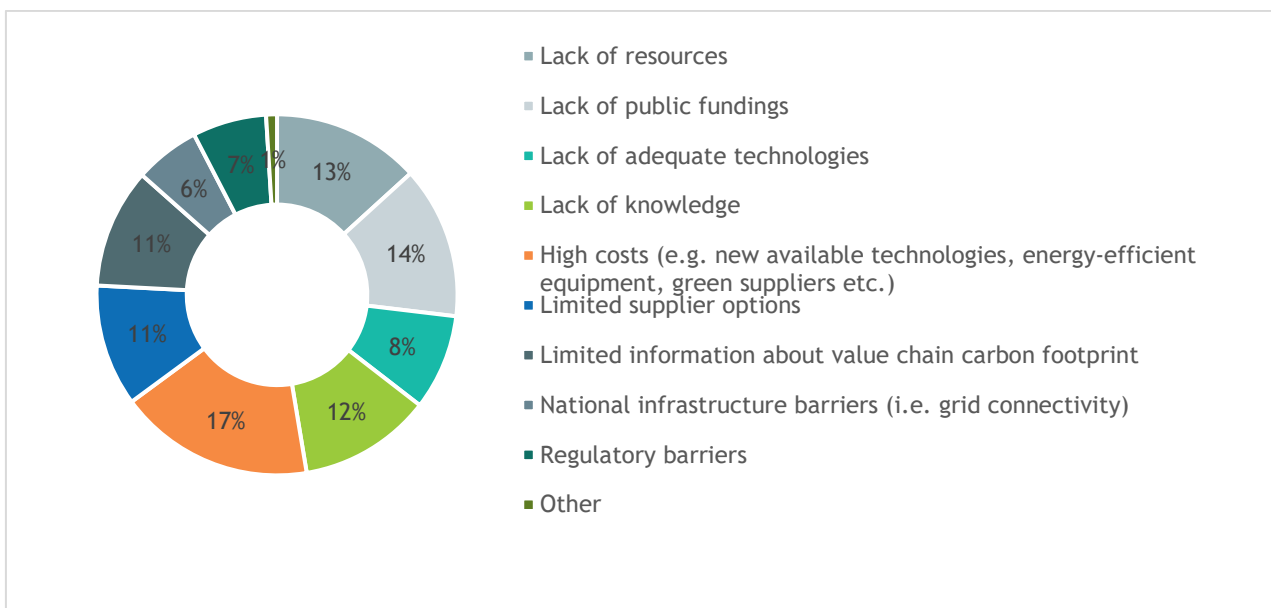


Figure 31 - Main challenges to reduce the carbon footprint (Total)



17% of the respondents stated that the main challenge they face in reducing their carbon footprint is related to the high costs (e.g. new available technologies, energy-efficient equipment, green suppliers etc.).

14% of the companies affirmed that the main obstacle was the lack of public funding, followed by a lack of resources, for 13% of the firms.

Both obstacles of having limited suppliers' options and limited information about the value chain carbon footprint were selected by 11% of the respondents respectively.

8% declared a lack of adequate knowledge, while 7% regulatory barriers. Lastly, only 6% of the respondents stated that the main challenge is related to national infrastructure.

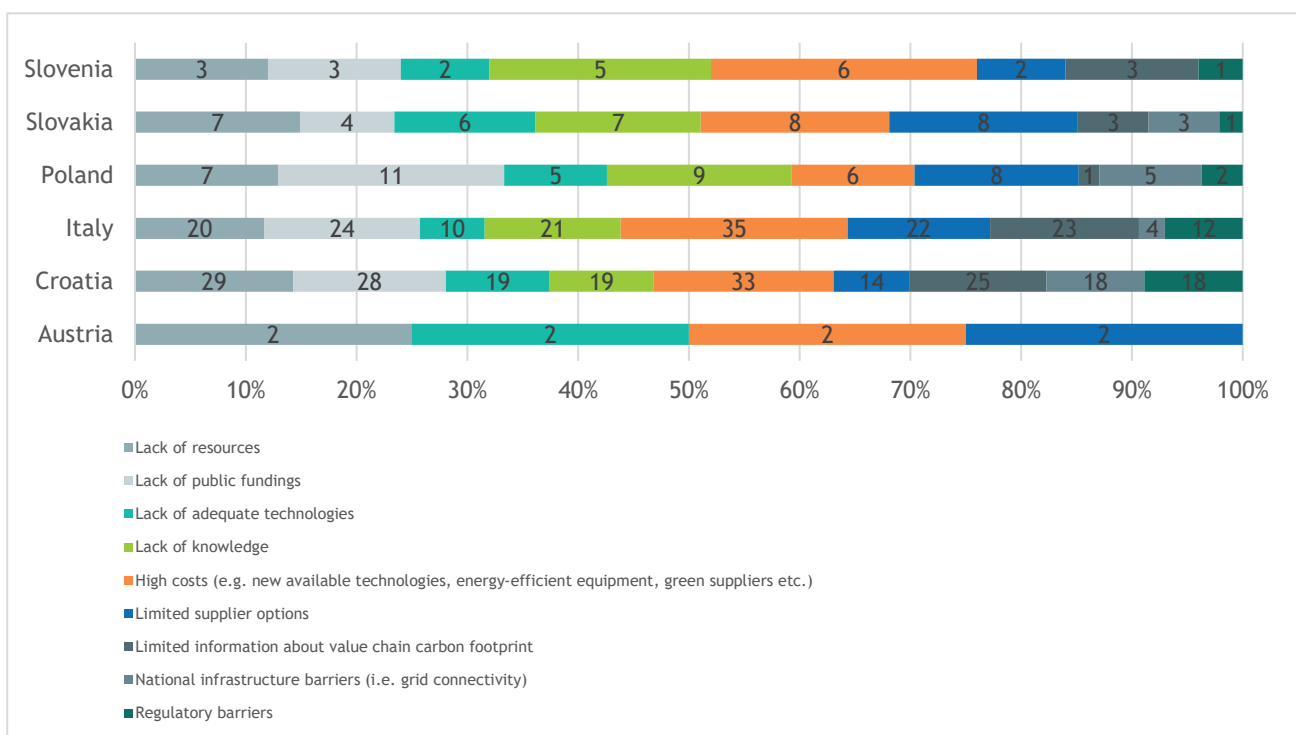


Figure 32 - Figure 35 - Main challenges to reduce the carbon footprint (by Country)

The same answers were differentiated according to the different companies' countries of belonging. For the majority of Slovenian companies, the biggest challenges are high costs and lack of knowledge. For Slovakian ones are high costs, limited supplier options, and lack of knowledge and resources.

According to Polish companies, instead, the main obstacles were the lack of public funding, lack of knowledge and limited supplier options. Italian firms responded that the main difficulties are high costs, lack of public funding, limited information about the value chain carbon footprint and limited supplier options. Lastly, Croatian firms responded to high costs, lack of resources and public funding and limited information about the value chain carbon footprint.

It is possible to observe how for all countries, except Poland, the main obstacle is the high costs.



Support required to reduce carbon footprint (e.g., financial incentives, training programs, government policies)

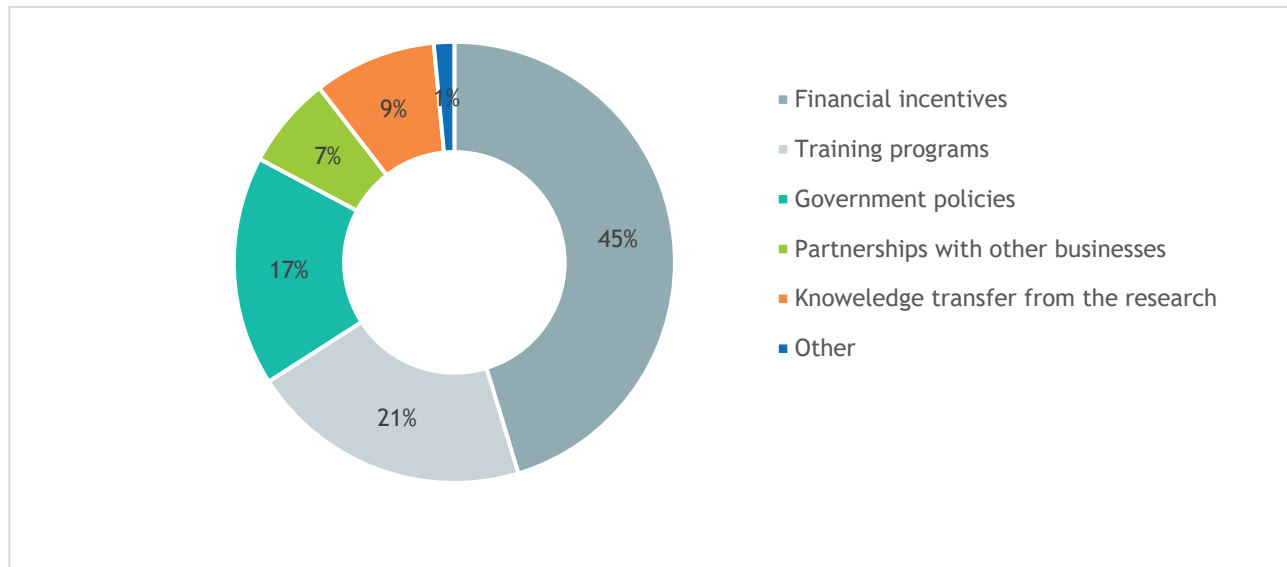


Figure 33 - Support required to reduce carbon footprint (Total)

45% of the respondents affirmed that financial incentives are what would support them the most in reducing their carbon footprint. The second most selected option was training programs (21% of respondents), while the third one was government policies (17% of firms). Knowledge transfer from the research and partnerships with other businesses were chosen respectively by 9 and 7% of the respondents.

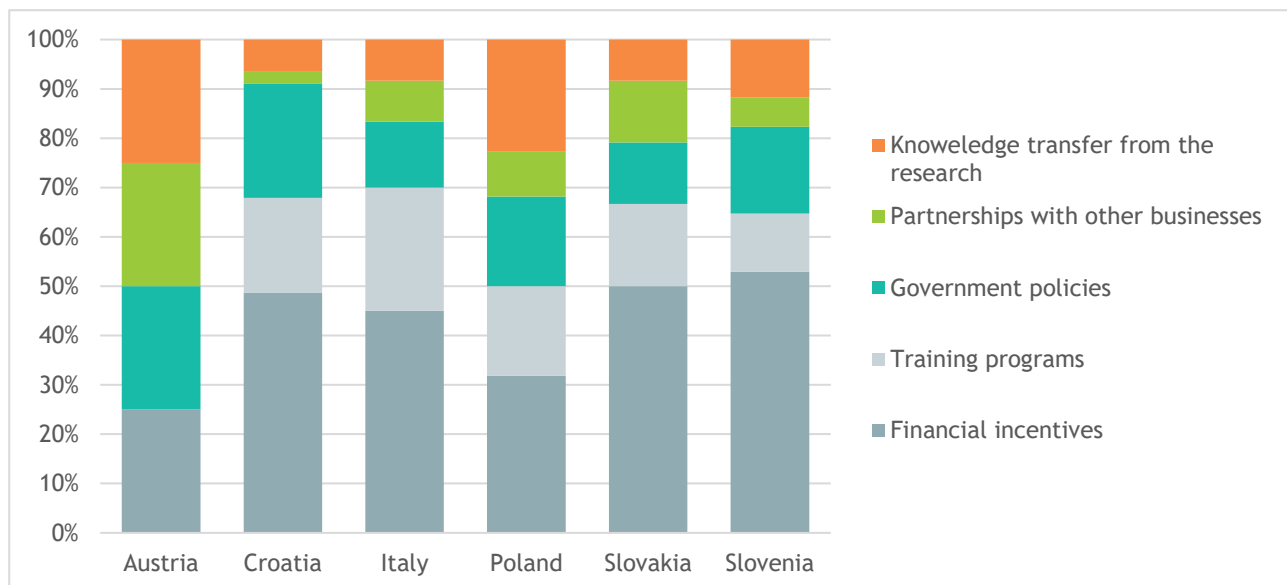


Figure 34 - Support required to reduce carbon footprint (by Country)

The same answers were differentiated according to the different companies' countries of belonging. For all of the countries, Croatia, Italy, Poland, Slovakia and Slovenia, what would help them the most in reducing their carbon footprint would be financial incentives. While the least helpful activity would be instead partnership with other businesses.



Key challenges in setting emissions targets

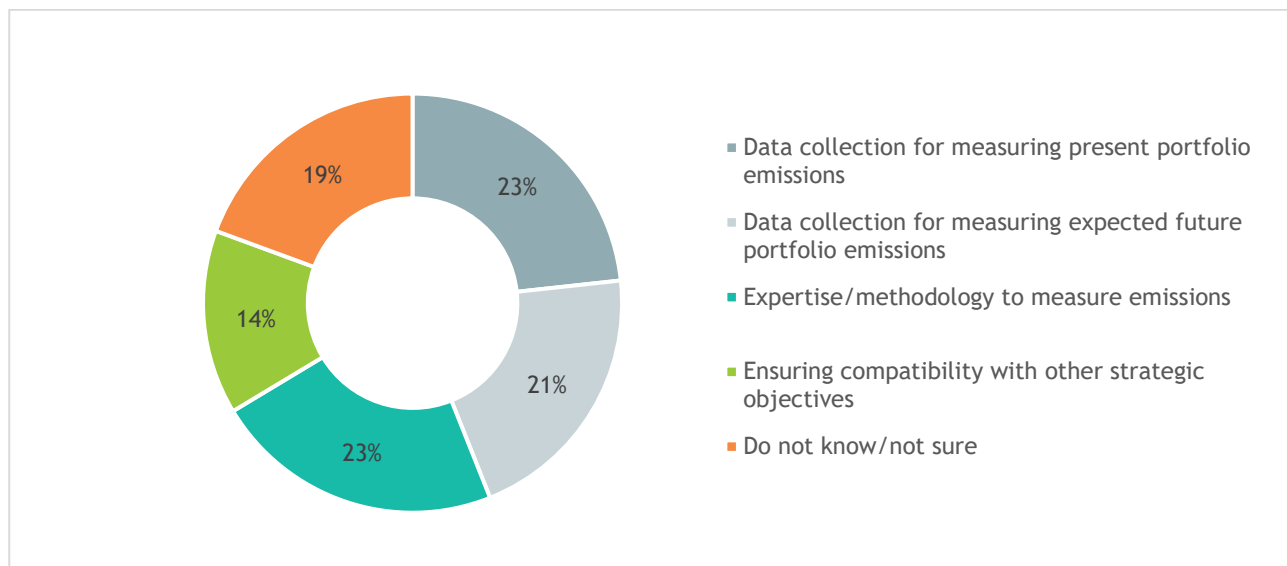


Figure 35 - Key challenges in setting emissions targets (Total)

About 67% of SMEs, or 154, believe that the main challenges in determining targets are related to data collection regarding the measurement of their emissions. Twenty-three percent believe that the problem takes over with the measurements of present emissions. 22% say the difficulty is both attributable to the choice of methodology to be followed for measurements. In contrast, 21% of SMEs find that measuring expected future emissions is the main challenge. Finally, 19%, or about 45 SMEs, do not provide an answer, saying they do not have sufficient information.

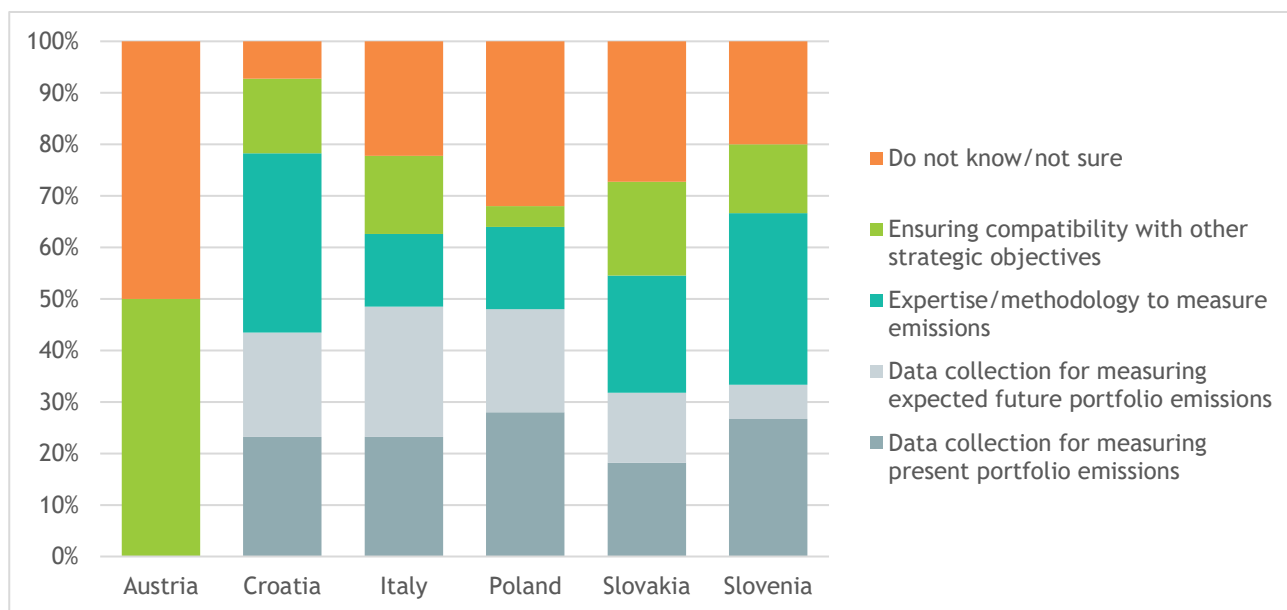


Figure 36 - Key challenges in setting emissions targets (by Country)

Out of the total 232 companies, the order of countries is, in terms of the number of companies participating in the survey: Italy, Croatia, Poland, Slovakia, Slovenia and Austria. We analyze the responses by country of origin:



- Italy: accounts for the largest share of participation with 99 companies accounting for 43% of the total. Of these, 25% believe the main challenge is data collection for expected future emissions. 22% say they are unsure or do not have sufficient knowledge to be able to answer. For 48% of Italian SMEs, the main challenge is related to collecting quantitative data regarding present or future emissions;
- Croatia: as many as 69 companies participated and 35% identify the problem in the degree of competence/methodology by which emission measurements are made. About 44% of SMEs believe that the difficulty comes from collecting emissions data, while only 7% say they do not know or are uncertain;
- Poland: as the main finding we note that 32% of companies do not provide an answer. 48% of companies link difficulties with data collection of present and/or future emissions, representing the country with the highest relative number of companies with uncertainty among the various survey participants;
- Slovakia: over 27% of Slovak companies say they do not know or are unsure. 32% link the main challenge to data collection;
- Slovenia: 33% of companies say the difficulty is due to the degree of expertise/methodology to measure emissions, 33% associate it with collecting data on current and/or future emissions while 20% say they do not know enough or are not certain.

Compatibility with other strategic goals is the answer with low percentages in all five countries, peaking at 18.2% in Slovakia, 15.15 % in Italy and 14.4% in Croatia.

Rate of use of public funding or incentives for decarbonisation projects

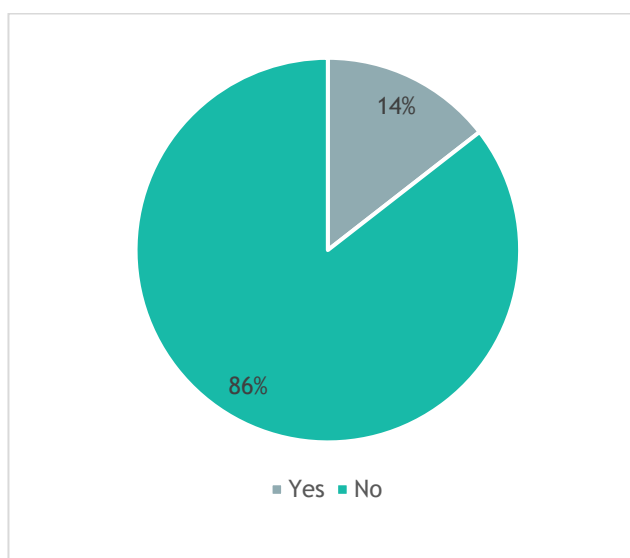


Figure 37 - Use of public funding/incentives rate (Total)

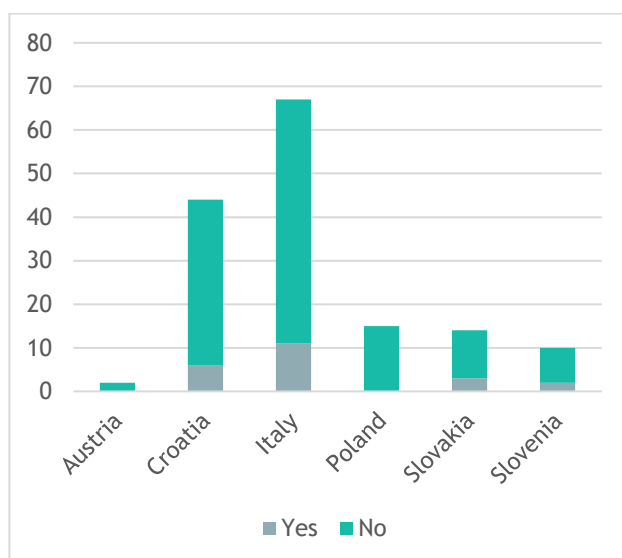


Figure 38 - Use of public funding/incentives rate (by Country)



Out of a total of 152 companies, 85.5 percent, say they have never applied for either public funds or incentives for decarbonisation projects. About 22 companies responded positively, representing 14.1% of the total. The largest number of companies that have applied at least once either for public funds or incentives is 11 from Italy. However, they account for only 16 % of Italian SMEs responding to the question. The highest relative percentage of affirmative responses belongs to Slovakia with about 21.42 %, considering, however, that the total number of Slovak SMEs is 14. Note that 100% of Polish SMEs say they have never made any kind of request.

Main Funding programmes used

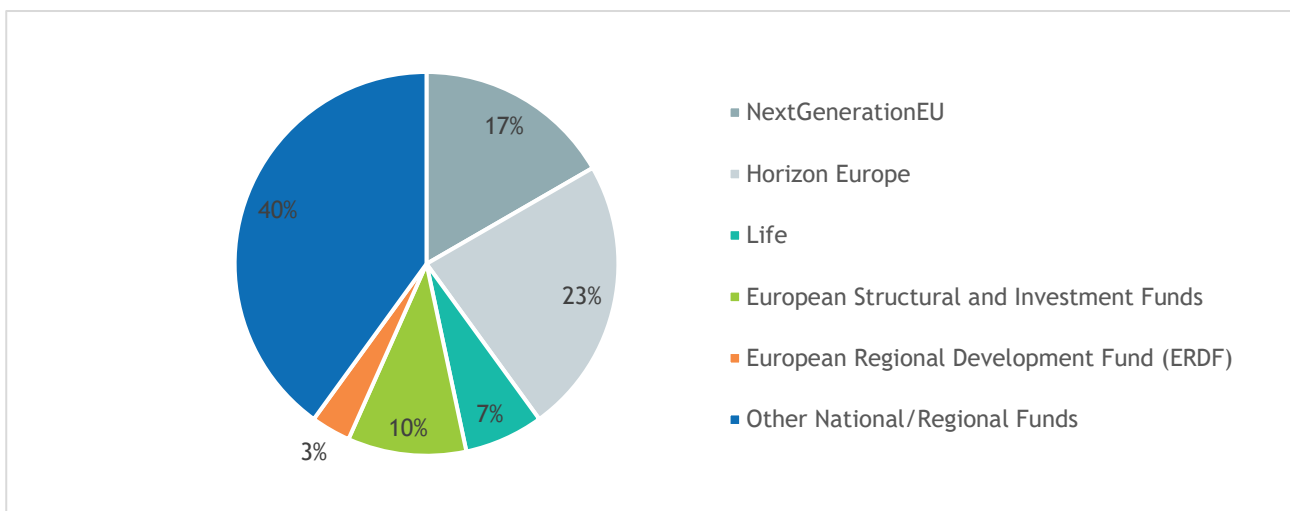


Figure 39 - Main funding programmes used

Out of a total of 30 responses, most of the instruments used fall under regional or national funds, totalling 40 percent with about 12 responses. The European Horizon program ranks second with as many as 7 responses and a percentage of 23%. The other two European programs Life and Next Generation EU compete with percentages of 7% and 17% respectively. The remaining exploited instruments belong to either the European Structural and Investment Funds, 10%, or the ERDF, only 3%.



Effectiveness/adequacy of public funding for green transition (by Country)

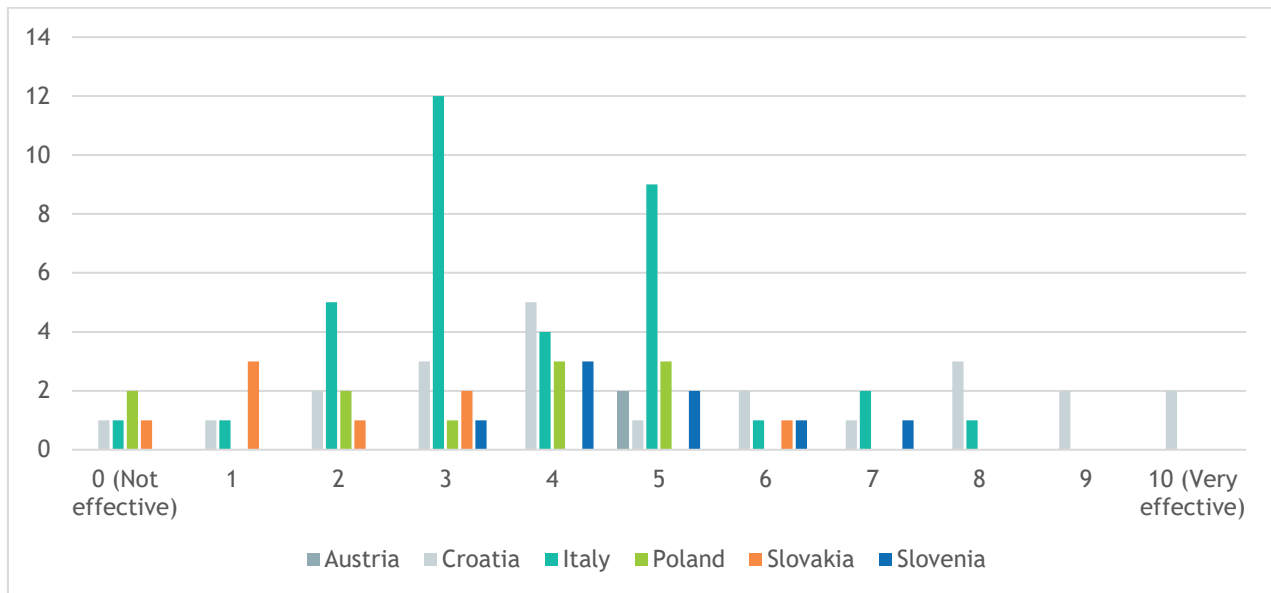


Figure 40 - Effectiveness/adequacy of public funding for green transition (by Country)

Among the 88 received responses, the average satisfaction with public funding for green transition was 4.07 on a scale of 0 to 9 points.

In detail, among Italian SMEs, 12 companies gave a score of 3, while 9 companies gave a score of 5. Only 1 SME considered public funding adequate, with a score of 9.

Croatia stands out as the only country where all SMEs rated it on different levels of satisfaction. In particular, 2 Croatian SMEs rated public funding for green transition as adequate, giving a score of 9.



Skills needed in the company to implement decarbonisation strategies

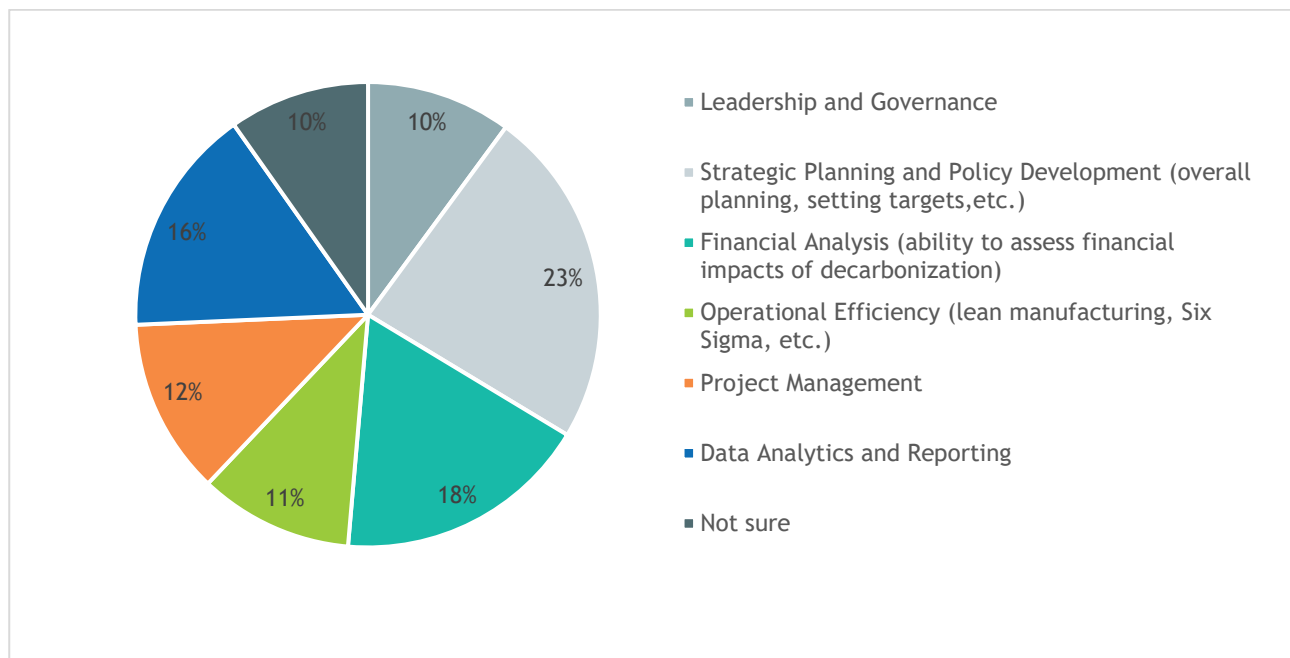


Figure 41 - Skills needed in the company to implement decarbonisation strategies (Total)

In particular:

- Croatia: 29 SMEs indicate as a priority the competence in “Strategic Planning and Policy Development”, placing the competence in “Operational Efficiency” in the last place;
- Italy: Italian SMEs (35) follow a similar trend, favouring competence in “Strategic Planning and Policy Development” to develop decarbonisation strategies;
- Poland: there is more uncertainty among Polish SMEs, which are more uninformed about the competences needed to implement decarbonisation strategies;
- Slovakia: 7 Slovak SMEs consider “Financial Analysis” as a key competence for the implementation of decarbonisation strategies;
- Slovenia: Slovenian SMEs, on the other hand, attach equal importance to the competencies of “Leadership and Governance”, “Strategic Planning and Policy Development”, “Financial Analysis” and “Operational Efficiency”.

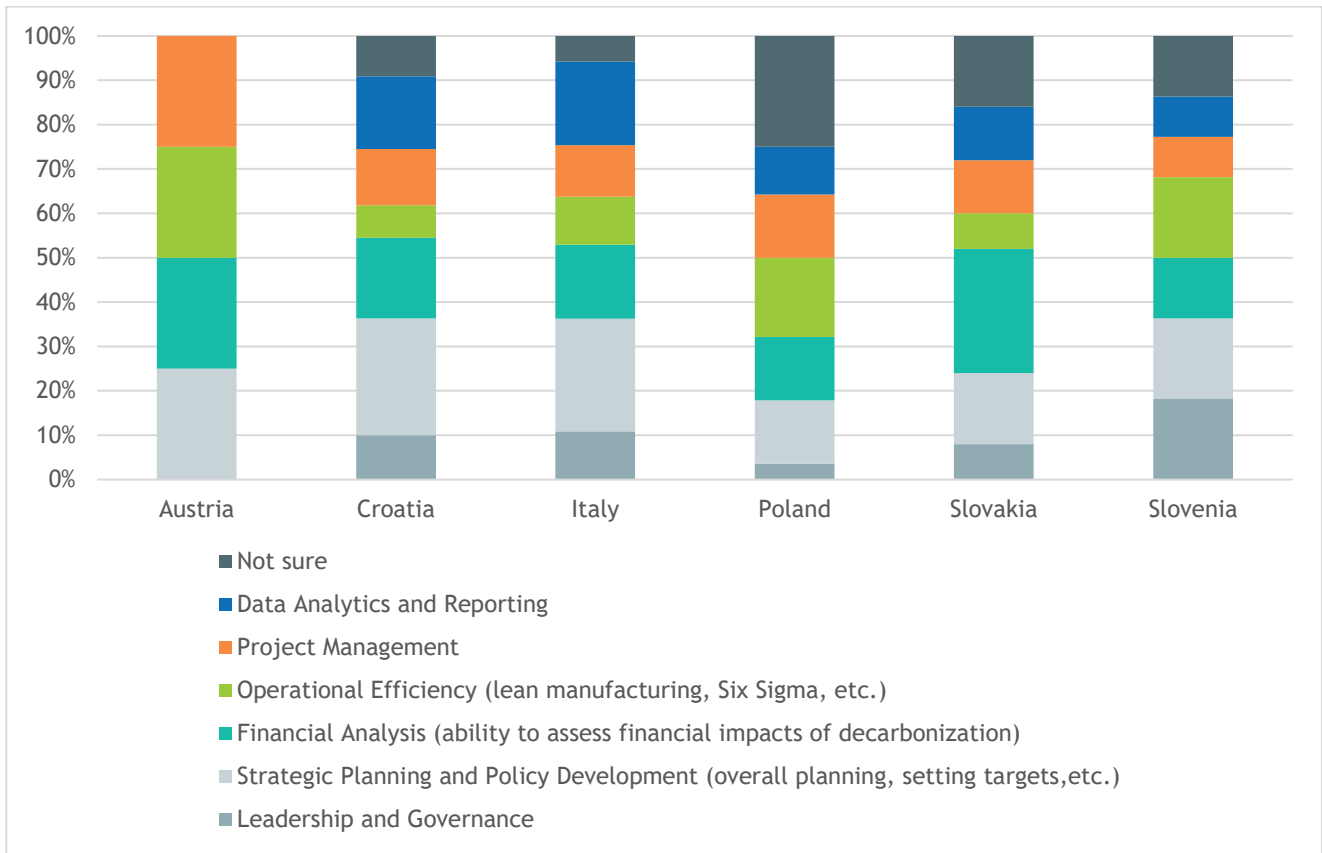


Figure 42 - Skills needed in the company to implement decarbonisation strategies (by Country)

Factors considered during the decision-making process for the implementation of decarbonisation investments

In the mapping of SME responses, the main factors considered for the implementation of decarbonisation investments are the following:

- compliance with EU regulations and standards;
- cost-benefit analysis;
- availability of technologies;
- supply chain management.

In general, SMEs focus on these aspects to guide their decisions on decarbonisation investments.

Other responses that emerged from the survey, although to a lesser extent, include:

- long-term sustainability goals;
- risk management;
- feasibility of investments within individual companies;
- impact on production processes and logistics.



Chapter 3 - Main findings on decarbonisation levels in Central Europe

3.1 - Findings on each county decarbonisation level

An outlook for each country can be provided by comparing the information highlighted from the analysis and the survey conducted in the partner countries represented in CREDIT4CE.

3.1.1 - Croatia

The analysis confirms that the decarbonisation levels of Croatian companies are still limited compared to climate goals. Renewable energy represents a significant part of Croatia's energy mix, but natural gas and oil dominate, in line with national statistics.

Only a minority of companies (38%) monitor carbon emissions related to transportation, highlighting a lack of attention in sectors such as logistics and transport, which are responsible for 42% of CO₂ emissions in Croatia.

Regarding sourcing, fewer than a third of businesses consider the carbon footprint of suppliers, indicating limited adoption of sustainable practices. Additionally, many sectors, particularly SMEs, lack climate transition plans, in line with the finding that fewer than a third of companies perceive the net-zero transition as a priority. SMEs recognize production and transportation as the areas with the highest potential for emission reductions, but only 39 companies have taken concrete measures in the latter sector.

3.1.2 - Italy

While desk research shows that most of the energy consumed comes from oil and natural gas (with a significant growth of renewable sources), survey data confirms the dependence on natural gas. Regarding sourcing strategies, the information that 39% of Italian companies have adopted or plan to adopt changes to address supply chain disruptions is partially confirmed by the survey data, which shows that only 29% of companies consider the carbon footprint of suppliers, signaling a still limited approach to sustainability strategies.

In terms of emissions, while desk research indicated a significant reduction of CO₂ emissions in Italy in recent decades, the responses from SMEs indicate that only a portion of Italian companies monitor emissions, especially those related to transportation and production. This suggests that national progress might come from public policies or industry-level innovations rather than widespread corporate initiatives. As for measures to reduce the impact of transportation/logistics (a limited area of intervention in Italy), there is a match with what the survey reveals, where only 39 companies report having taken concrete actions in this area.



What is generally observed is that Italian SMEs need to accelerate the implementation of emission monitoring systems and further integrate circular economy models.

3.1.3 - Poland

Many Polish companies recognize the need to increase the use of renewable energy, but the transition to cleaner sources still seems to be a challenge for most of them, with coal continuing to dominate in their energy operations.

In terms of supply chain management, Polish companies show relatively greater commitment to diversifying import markets, with 36% adopting this strategy compared to 24% in the EU, suggesting a proactive adaptation to global logistical challenges.

Only a small percentage of Polish businesses involved in the sample report having implemented significant strategies in waste management and the circular economy, highlighting a trend in line with the relatively low circularity rates at the national level.

Although some companies recognize the importance of monitoring and reducing their emissions, there does not seem to be a widespread response to this issue, with few companies currently measuring and systematically monitoring their CO₂ emissions.

3.1.4 - Slovakia

According to desk research, 69% of Slovak manufacturing companies feel the impacts, mainly through disruptions in production processes and supply chains, and the survey confirms that Slovak SMEs also face significant difficulties related to supply chain disruptions, but not all directly identify climate change as the primary cause.

Survey results confirm the mapping of energy consumption in Slovakia: indeed, in a landscape dominated by nuclear energy (54.6%) and natural gas (22.8%), several Slovak companies recognize the importance of transitioning to cleaner energies, but nuclear energy and natural gas remain the primary sources used, in line with the findings.

Regarding waste management and the circular economy, desk research reports a very low circularity rate (4.5%) and an increasing need to improve waste management practices. However, Slovak companies do not seem to place significant importance on circular economy initiatives.

Few companies declare that they monitor their CO₂ emissions. Overall, the position of the Slovak SMEs involved in the sample confirms some of the general challenges reported at the national strategy level, such as the impact of logistical disruptions and dependence on traditional energy sources. However, there is limited participation from Slovak companies in proactive sustainability strategies, emissions monitoring, and the circular economy.



3.1.5 - Slovenia

In terms of energy consumption, Slovenia can be considered a country dependent on fossil fuels (65%) but with a significant contribution from renewable energy, particularly hydropower (25%) and biomass. Slovenian SMEs show increasing attention to the use of renewable energy, with some companies reporting investments in low-carbon technologies.

In transportation, Slovenian companies appear less affected and less responsive to regulatory changes and logistical disruptions compared to the general average. This trend is partially reflected by the fact that Slovenian companies report less attention to measures for reducing transportation emissions compared to other countries.

The survey does not reveal any specific circular economy or industrial symbiosis initiatives, as no direct responses regarding the adoption of circular economy practices were found among Slovenian companies, which does not align with the country's high recycling performance.

The analysis also shows that few companies regularly monitor emissions, highlighting a gap between national emissions reduction policies and their implementation at the company level.

3.1.6 - Austria

Given the response rates of Austrian companies to the survey, it was not possible to make a meaningful comparison between the information derived from desk research and the survey itself.

CONCLUSION

This deliverable will serve as a crucial starting point for structuring the following work phases of the CREDIT4CE project. The information identified thanks to the efforts of each partner and the valuable contributions from SMEs in the represented countries will help define the service scope that the Virtual Decarbonisation Hub will tailor to concretely support SMEs in improving their decarbonisation processes and carbon footprint, while continuing to seek less impactful alternatives for their business models.



ANNEX 1

SURVEY: Mapping the decarbonisation readiness of manufacturing SMEs



Mapping the decarbonisation readiness of manufacturing SMEs

* Required

General Information

1. **Company Name:**
*
Enter your answer

2. **In which country is your company located?**
*
Enter your answer

3. **Manufacturing Industry Sector:**
*

- Aerospace
- Agrifood
- Automation / Robotics
- Automotive
- Chemical/Pharma/Biotechnology
- Electronics
- Health
- Fashion/Textile
- Machinery
- Packaging
- Plastic
- Other



4. **Company Size** *

- Micro (1-10 employees)
- Small (10-49 employees)
- Medium (50-249 employees)

5. **Annual Revenue:** *

- Less than €1 million
- € 1-5 million
- € 5-10 million
- € 10-50 million
- More than € 50 million

Knowledge of current climate footprint

6. **What is your primary source of energy?** (Select all that apply)

*

- Natural Gas
- Oil
- Coal
- Nuclear
- Renewable Sources (e.g. solar, wind, hydro, biomass)
- I don't know
- Other

7. **How much energy does your company consume annually** (in kWh for electricity, therms for natural gas, etc.) ?

*

- Less than 10,000 kWh/therms
- 10,000-50,000 kWh/therms
- 50,000-100,000 kWh/therms
- More than 100,000 kWh/therms
- Not sure

8. **What modes of transportation does your company primarily use for business operations?** (Select all that apply)

*

- Company-owned vehicles
- Public transportation
- Third-party logistics providers
- Air freight
- Other

9. **Do you track the carbon emissions from transportation?**

*

- Yes
- No



10. How does your company manage waste? (Select all that apply) *

- Regular disposal
- Recycling
- Composting
- Hazardous waste disposal
- Other

11. Do you track the amount of waste your company produces? *

- Yes
- No

12. Do you consider the carbon footprint of your suppliers when making purchasing decisions? *

- Yes
- No

13. Do you source materials locally to reduce transportation emissions? *

- Yes
- No
- Sometimes

14. Have you encouraged your suppliers to adopt more sustainable practices? *

- Yes
- No

15. If yes, specify: *

Enter your answer

16. Are you aware of your company's current carbon footprint? *

Enter your answer

17. If yes, which tools or methodologies do you use to measure carbon emissions? *

- Dedicated Software
- External Consulting
- Internal tools developed by the company
- I don't know
- Other



Presence of a decarbonisation roadmaps or goals

18. Does your company have a net zero/climate transition plan? *

- Yes
- No

19. Which specific areas of your business have the highest carbon emissions rate? (Select all that apply) *

- Production
- Transportation
- Heating & Cooling
- Waste management
- Logistics and distribution
- I don't know
- Other

20. Which specific areas of your business have the greatest potential for carbon emissions reduction?(Select all that apply)

- Production
- Transportation
- Heating & Cooling
- Waste management
- Logistics and distribution
- I don't know
- Other

21. Does your company have specific measurable targets to reduce its carbon footprint? *

- Yes
- No

22. If yes, please specify: *

Enter your answer

23. Do you use any energy-efficient equipment or practices? (e.g. LED lighting, energy-efficient HVAC systems) *

- Yes
- No



24. If yes, please specify: *

Enter your answer

25. Have you implemented any measures to reduce transportation-related emissions? (e.g., route optimization, fuel-efficient vehicles) *

Yes

No

26. If yes, please specify: *

Enter your answer

27. Have you implemented any waste reduction practices? (e.g. reducing packaging, reusing materials) *

Yes

No

28. Do you source materials locally to reduce transportation emissions? *

Yes

No

Sometimes

29. Does your company consider to access to Voluntary Carbon Market? *

Yes

No

30. Which of these activities do you execute or try to implement in your processes? (Select all that apply) *

Support reverse logistics: take back usable parts from customers

Recycling product parts and materials, tools, and accessories for production

Exchange raw material and second-hand material

Product-as-a-service: instead of selling an accessory to the customer it can be service

Not sure

Other

Knowledge transfer from the research

Other

33. In your view, what are the key challenges in setting emissions targets? *

Please select at most 2 options.

Data collection for measuring present portfolio emissions

Data collection for measuring expected future portfolio emissions

Expertise/methodology to measure emissions

Ensuring compatibility with other strategic objectives

Do not know/not sure



34. Has your company ever applied for public funding or incentives for decarbonization projects? *

- Yes
 No

35. If yes, which regional, national and European funding sources have you utilised? (Please indicate the name of the programs) *

Enter your answer

36. How effective/adequate is the public funding for green transition in your country, compared to your needs/expectations? (If you never used funding for green transition do not answer)

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

Not effective

Very effective

37. What are the competencies that your company needs to develop to implement decarbonization strategies? *

- Leadership and Governance
 Strategic Planning and Policy Development (overall planning, setting targets, etc.)
 Financial Analysis (ability to assess financial impacts of decarbonization)
 Operational Efficiency (lean manufacturing, Six Sigma, etc.)
 Project Management
 Data Analytics and Reporting
 Not sure
 Other

38. What factors do you consider during your decision-making process for implementing investments in decarbonization? *

Enter your answer

Additional Comments

39. Do you have any additional comments or insights on decarbonisation not covered by this survey?

Enter your answer

You can print a copy of your answer after you submit

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