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TOOLKIT

Strategy • Action • Results

**A practical guide to the green and
circular transition**

**Green and Circular Economy in Business by
Digital Solutions**

2024-1-EL01-KA210-ADU-000251741

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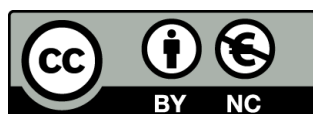
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PART A - FOUNDATIONS

Chapter 1 - Introduction

Small and micro enterprises play a crucial role in the European economy, yet they often face significant challenges when it comes to understanding and applying sustainability principles in their everyday business operations. Limited access to tailored training, lack of time and resources, and the complexity of green and circular economy concepts frequently make sustainability appear distant or difficult to implement in practice. At the same time, managers and employees are increasingly expected to respond to environmental, social and regulatory demands that directly affect business viability, competitiveness and long-term resilience.

This Toolkit has been developed in response to these challenges, within the framework of the **Erasmus+ project CREDIT – Green and circular economy in business by digital solutions - (2024-1-EL01-KA210-ADU-000251741)**. It is conceived as a practical and accessible resource that supports small and medium-sized enterprises (SMEs) in navigating sustainability in a realistic and meaningful way. Rather than offering abstract theory or prescriptive solutions, the Toolkit brings together knowledge, research insights and practical guidance that can be adapted to different business contexts and levels of experience.

The Toolkit is intended primarily for SME managers and owners, employees, and adult education professionals working with businesses. Managers may use it to reflect on strategic choices, organisational priorities and long-term planning, while employees can use it to better understand their role in the implementation of sustainable practices at operational level. Trainers and facilitators may also draw on the Toolkit as a reference when designing learning activities, workshops or training programmes related to green skills and sustainable entrepreneurship. Although its focus is on SMEs, the content is designed to be transferable and relevant to a wider ecosystem of organisations supporting business development and adult learning.

The structure of the Toolkit reflects a deliberate progression from understanding to application. The first part introduces the foundational concepts of sustainability, green growth and circular economy in the business context. Its aim is to establish a shared language and a common point of reference, allowing readers with different backgrounds to develop a basic understanding of what sustainability means for enterprises today and why it matters for both economic performance and social responsibility.

Building on this foundation, the second part presents the analytical work carried out within the CREDIT project. Drawing on research activities, stakeholder input and case-based insights from different national contexts, this section explains how the project consortium identified the key areas, competences and practices that are particularly

relevant for SMEs. This part makes explicit the reasoning behind the selection of sustainability dimensions addressed in the Toolkit, linking real business experiences with broader European frameworks and policy directions. In doing so, it provides readers with a clear understanding of why certain issues are prioritised and how they relate to everyday business decisions.

The third part of the Toolkit shifts the focus towards practical implementation. It offers guidance, examples and reflective prompts that support SMEs in translating sustainability principles into concrete actions across different spheres of business activity. Rather than proposing a single model or pathway, this section recognises the diversity of SMEs and encourages users to identify feasible entry points for change, taking into account their specific context, capacities and constraints. The emphasis is on gradual integration, experimentation and learning-by-doing, acknowledging that sustainability is a process rather than a one-off intervention.

Throughout the Toolkit, sustainability is approached as a shared responsibility within the enterprise. Managers, employees and external stakeholders are all seen as active contributors to change, each with a distinct but interconnected role. The Toolkit can be read sequentially or used selectively, depending on the needs and interests of the reader. Its modular nature allows users to engage with specific topics or sections without losing sight of the broader picture.

Ultimately, this Toolkit is offered as a supportive and flexible tool to accompany SMEs on their path towards more sustainable and resilient business practices. It is designed to remain useful beyond the lifetime of the CREDIT project, serving as a reference point for future training initiatives, organisational reflection and collaborative learning in the field of green and circular economy.

Chapter 2 - Understanding the Green Economy

The green economy is an economic system that seeks to expand growth and employment while operating within environmental limits. It creates value through activities that minimize impact and use resources efficiently, supported by green economic incentives—such as tax reliefs, subsidies, and innovation grants—that internalize environmental costs and spur investment in cleaner technologies and circular processes (Arsawan et al., 2024; European Commission, 2020). As a strategic agenda, it integrates economic prosperity, social inclusion, and environmental protection, positioning sustainability not as a trade-off with growth but as the foundation of long-term competitiveness through efficiency, innovation, and resilience (Lavrinenko, Rybalkin, Danileviča, & Sprūde, 2022; European Commission, 2020). In practice, environmental improvements—such as waste reduction, energy conservation, and process optimization—strengthen cost efficiency and risk management, while social practices like fair work, employee well-being, and community engagement build legitimacy and brand trust (European Commission, 2023b; Jenkins, 2009).

2.1 What Is the Green Economy?

Building on this premise, the **green economy** functions as a strategic framework that aligns economic growth, social inclusion, and environmental protection within planetary boundaries (Lavrinenko et al., 2022; European Commission, 2020). This framework reflects a shift from short-term gains toward systemic efficiency, innovation, and resilience, where environmental stewardship enhances competitiveness through lower costs, reduced risks, and improved market adaptability.

At the enterprise level, the green economy represents a new business paradigm that shapes how value is created, delivered, and sustained. For SMEs, integrating environmental and social considerations into their operations fosters innovation and differentiation, enhancing both performance and reputation. **Green innovation**—through cleaner production, eco-design, and efficient resource use—acts as a bridge between sustainability goals and competitive advantage (OECD, 2021b; Porter & van der Linde, 1995). Within this paradigm, **sustainable consumption and production (SCP)** aim to decouple growth from environmental degradation by improving productivity across product life cycles through circular material flows and responsible consumption patterns (UNEP, 2011).

Innovation and knowledge sharing play a pivotal role in accelerating this transition. The **Quintuple Helix Model** offers a systemic lens for understanding how sustainable innovation emerges from collaboration among five interacting spheres—government, business, academia, civil society, and the natural environment (Carayannis, Barth, & Campbell, 2012).

It highlights that advancing a green economy requires not only technology and finance but also cooperation, education, and public awareness. Viewed through this lens, a green economy is **prosperity within planetary limits**, powered by innovation, efficient resource use, and inclusive collaboration (UNEP, 2017).

Building on these conceptual foundations, the following section examines how green economy principles are operationalized within SMEs, focusing on their readiness to adopt circular economy practices.

2.2 Circular Economy Practices and SME Readiness in the Green Economy

According to the European Commission (2020), SMEs form the backbone of the European economy—over 99% of all businesses and a significant share of employment and value creation. An SME employs fewer than 250 people and has either an annual turnover of up to €50 million or a balance-sheet total not exceeding €43 million. Given their scale, diversity, and local embeddedness, SMEs play a decisive role in realizing the transition to a green economy where growth aligns with environmental protection and social responsibility.

The shift toward sustainability requires businesses to rethink how value is created and maintained. Here, the concept of **environmental stewardship** becomes central—it reflects a company's commitment to managing resources responsibly and minimizing environmental impact (Omowole et al., 2024). For SMEs, stewardship bridges profitability and sustainability by translating ecological awareness into operational improvements and innovation. It functions both as a guiding principle and as a practical framework through which firms can align with **SDG 12** (responsible consumption and production) and **SDG 13** (climate action).

A critical pathway for implementing stewardship is the circular economy (CE) model, which departs fundamentally from the traditional linear “take–make–dispose” system. The linear model relies on continuous resource extraction and waste accumulation, while CE promotes closed-loop systems where materials retain value through reuse, repair, remanufacturing, and recycling (Masi, Day, & Godsell, 2018; Ghisellini, Cialani, & Ulgiati, 2016). This transition allows firms to decouple growth from resource consumption and waste generation, fostering resilience and competitiveness.

This multidimensional progression typically unfolds across three interconnected levels:

- **Operational greening**, focused on energy efficiency, cleaner production, and waste minimization;
- **Strategic greening**, integrating sustainability into business models and decision-making; and
- **Relational greening**, extending responsibility across supply chains, customers, and communities (Johnson & Schaltegger, 2020).

While the potential benefits are clear—cost savings, innovation, and improved reputation—SMEs often face resource barriers: limited financing, lack of expertise, and uncertainty about returns (Rizos et al., 2016; Schaper, 2016). Fragmented policy frameworks or insufficient institutional support can further slow progress. Overcoming these challenges requires targeted **financial incentives** (Arsawan et al., 2024), capacity-building programs, and stronger inter-firm collaboration.

Readiness for CE implementation develops along a **continuum of maturity** (Arsawan et al., 2024). At early stages, firms act reactively. As capabilities deepen, sustainability becomes strategic and value-driven. Mature SMEs view circularity as a driver of differentiation and competitiveness, aligning with national and EU goals. Ultimately, the circular economy enables **sustainability-oriented market transformation**, where innovation, responsibility, and profitability reinforce one another.

Building upon this operational foundation, the next section turns to the entrepreneurial dimension—exploring how business leaders and innovators translate these circular and green principles into market-oriented action.

2.3 The Green Entrepreneur and Innovation Ecosystems

As the transition toward a sustainable economy accelerates, **entrepreneurs** play a vital role in transforming circular and green principles into viable business models. Green entrepreneurship refers to business activity that combines economic value creation with environmental stewardship and social responsibility. It reflects the shift from reactive environmental compliance to proactive innovation, where the reduction of resource use, waste, and emissions becomes a driver of competitiveness and long-term growth (UNEP, 2011).

In the European context, SMEs are essential actors in advancing the circular economy (CE). Their flexibility and proximity to local markets enable them to experiment with new sustainable models, yet their limited resources often constrain large-scale implementation. According to Tritto, Dias, and Bassi (2024), SME engagement in circular practices typically manifests in operational practices such as optimizing water and energy consumption, increasing renewable use, minimizing waste through reuse or resale, and redesigning products and services to reduce material intensity. These actions represent measurable indicators of an enterprise's willingness and maturity to transition toward circular operations.

However, readiness to adopt CE and green business practices varies significantly across Europe and within countries. **Internal factors**, such as company size, leadership vision, investment in research and development, and employee competences, strongly influence the pace and depth of change. Larger SMEs, or those investing in R&D and innovation, are

typically more capable of redesigning production processes and implementing closed-loop systems. **External conditions**—including policy stability, infrastructure, regulatory frameworks, and market incentives—create either enabling or limiting environments for such transformation. Tritto et al. (2024) identify a persistent East–West divide in the EU: Western and Northern European SMEs show higher circular adoption rates, reflecting stronger institutional capacity and environmental literacy, while Eastern European firms often face financial and infrastructural barriers that slow the transition.

As outlined earlier, the circular economy provides regenerative logic for value creation, one that redefines growth. Unlike the traditional linear model of “take–make–dispose,” the CE aims to **close material and energy loops** by reusing, repairing, and recycling resources. This is often captured in the **3Rs principle**—reduce, reuse, and recycle—but extends further through restorative practices such as remanufacturing and refurbishing. For entrepreneurs, its implications are practical: redesign products and services, re-route by-products, and build **closed-flow** linkages, in which waste from one process becomes input for another, across supply chains to unlock new revenue and reduce risk (Geissdoerfer et al., 2017; Geng & Doberstein, 2008).

Green entrepreneurship, in this sense, operates at the intersection of **economic viability and ecological regeneration**. Entrepreneurs act as catalysts translating policy frameworks like the European Green Deal and the Circular Economy Action Plan into practice. Yet they must navigate multiple, and sometimes conflicting, expectations—market competition, regulatory demands, and social responsibility (O’Neill & Gibbs, 2016). Their **entrepreneurial identity** is fluid, balancing commercial pragmatism with environmental commitment. As O’Neill and Gibbs (2016) note, this negotiation produces diverse narratives: some entrepreneurs pursue pragmatic strategies focusing on efficiency and profitability, while others adopt transformative approaches that challenge conventional business logics and consumer habits.

Ultimately, the green entrepreneur’s capacity to innovate depends on both **structural support and cultural change**. Access to financing, networks, and policy alignment remains critical, but so too does the broader societal recognition that sustainability can enhance—not hinder—competitiveness. When effectively supported, SMEs can transform circular economy principles into scalable models that reinforce the **United Nations Sustainable Development Goals 12 and 13**, promoting responsible production, consumption, and climate action (United Nations, 2015). In this way, entrepreneurship functions not only as a mechanism for market adaptation but also as a cornerstone of Europe’s transition toward a regenerative and inclusive green economy.

As SMEs and entrepreneurs scale these sustainable models, **digital technologies** emerge as crucial enablers, linking environmental and technological innovation in what has come to be known as the “twin transition.”

2.4 The Digital–Sustainability Nexus: The Twin Transition

The growing interdependence between digitalization and sustainability has reshaped how businesses operate and compete. This convergence—often called the **twin transition**—reflects the parallel and mutually reinforcing shifts toward a digital and green economy. In practice, it means using digital technologies to accelerate sustainability goals while ensuring that digital growth itself remains environmentally responsible (Burinskienė & Nalivaikė, 2024; European Commission, 2023a).

For SMEs, digital tools provide practical means to implement sustainable business practices efficiently. Many still operate at a **basic digital intensity**, relying on standard tools such as websites and social media (Burinskienė & Nalivaikė, 2024). Enhancing this capacity is essential for environmental performance. Technologies such as data analytics, automation, the Internet of Things (IoT), and **digital twins** allow SMEs to monitor resource flows, reduce waste, and improve productivity. They also enhance transparency, enabling firms to track emissions and sustainability performance throughout supply chains.

However, **digitalization alone does not ensure sustainability**. Without environmental alignment, it can increase energy demand or generate e-waste. The goal is **sustainable digitalization**—where technological efficiency directly supports carbon reduction, circular production, and social well-being. SMEs can achieve this through energy-management systems, smart manufacturing, green procurement platforms, and digital tools for environmental reporting and certification (Burinskienė & Nalivaikė, 2024; OECD, 2021a).

When strategically integrated, the twin transition becomes a **driver of competitiveness and resilience**. Digitally mature, environmentally conscious SMEs adapt faster to regulations, attract green finance, and meet consumer demand for sustainable products. By embedding digital tools within sustainability strategies, SMEs advance **SDGs 9 and 12**, promoting innovation and responsible industrial growth (United Nations, 2015).

The integration of digital and sustainable transitions ultimately reshapes how firms compete and grow. Within this context, sustainability has become synonymous with competitiveness—the defining logic of success in the green economy.

2.5 Competitiveness, Sustainability, and Ecological Resilience in SMEs

In the contemporary green economy, **sustainability has become synonymous with competitiveness**. For small and medium-sized enterprises (SMEs), the integration of environmental and social goals is no longer peripheral but fundamental to strategic advantage. As markets, regulations, and consumer expectations evolve, sustainability functions both as a risk mitigation tool and a source of innovation and differentiation (Oduro & Haylemariam, 2025; Porter & van der Linde, 1995).

Sustainability and Competitiveness – How They Reinforce Each Other

The green economy integrates sustainability with competitiveness by emphasizing that responsible resource use and social equity underpin long-term growth (European Commission, 2023b). Environmental sustainability enhances cost efficiency through waste reduction and energy conservation, while social sustainability—fair labor, welfare, and community engagement—strengthens legitimacy and loyalty (Jenkins, 2009). Together, these dimensions shape **sustainable competitiveness**: the ability to create value through innovation while minimizing harm to people and planet. Unlike traditional cost-based competition, sustainable competitiveness relies on **dynamic capabilities**—the firm’s capacity to learn, adapt, and innovate.

Financial vs. Non-Financial Competitiveness – Why Timing Matters

Competitiveness unfolds across **financial** (profitability, cost savings) and **non-financial** (innovation, stakeholder satisfaction, reputation) dimensions. Non-financial gains often precede financial ones: eco-efficiency and ethical branding may raise short-term costs but yield long-term advantages in innovation and retention (Oduro & Haylemariam, 2025; Klewitz & Hansen, 2014). Viewing sustainability as an **investment** rather than an expense allows SMEs to pursue strategic adaptation.

From Costs to Strategic Returns – Building VRIN Capabilities

Implementing sustainable practices requires investments in technology, training, and systems—but these generate measurable returns. As Porter and van der Linde (1995) argue, well-designed environmental strategies turn compliance into opportunity. The **resource-based view** explains this: when sustainability becomes embedded in routines and culture, it forms resources that **are valuable, rare, inimitable, and non-substitutable** (Barney, 1991). Environmental-management systems, stakeholder trust, and transparent governance thus become durable sources of advantage. Sustainability alignment also shields firms from carbon pricing, supply disruptions, and reputational risk (OECD, 2021b).

Ecological Resilience – Competing Under Volatility

Closely linked to competitiveness is the concept of **ecological resilience**—an enterprise’s capacity to anticipate, absorb, and adapt to environmental and market shocks while maintaining performance (Tazhibekova & Shametova, 2025; Folke, 2016). In SMEs, resilience manifests through three interconnected capabilities:

1. **Operational adaptability** – the ability to modify production, logistics, or energy systems to reduce dependency on scarce resources;

2. **Strategic flexibility** – integrating environmental awareness into management and innovation decisions; and
3. **Relational capacity** – fostering networks that enable shared learning and sustainable collaboration (Walker et al., 2004).

Reducing an SME's **ecological footprint**—through resource efficiency, waste minimization, and renewable energy—strengthens competitiveness by improving cost structures and brand credibility (Hart & Dowell, 2011). Firms with high ecological resilience not only withstand disruptions but also capitalize on them, securing investor confidence and access to sustainability-linked finance.

SMEs with the greatest investment appeal combine environmental management systems (e.g., ISO 14001), digital monitoring tools, and leadership commitment. Their integration in **green clusters and industrial symbiosis** networks fosters shared innovation and collective resilience (Boons et al., 2011). Such enterprises exemplify how ecological responsibility evolves into strategic advantage: resilience becomes both a business capability and a contribution to the wider sustainability transition.

Embedding Competitiveness through Sustainability Practices

Effective SMEs approach sustainability as a systemic management principle rather than a discrete project. Empirical research highlights several **best practices** that integrate social and environmental priorities into competitiveness strategies:

1. Embedding sustainability indicators into business strategy and performance systems;
2. Applying circular economy principles such as eco-design and resource reuse;
3. Building inter-firm partnerships for resource and knowledge exchange;
4. Investing in employee development and green skills;
5. Enhancing transparency through sustainability reporting and stakeholder dialogue;
6. Using digital and financial tools, such as ESG metrics and impact tracking, to optimize investments (European Commission, 2023; Oduro & Haylemariam, 2025).

The Strategic Mindset for the Green Economy

Ultimately, competitiveness in the green economy stems from **mindset transformation**. Reactive SMEs view sustainability as compliance; proactive ones see it as a source of innovation and shared value (Bansal & Song, 2017). Those that internalize sustainability within their innovation logic achieve enduring benefits—adapting faster, attracting investors, and gaining legitimacy in evolving markets. Ecological resilience and social

responsibility thus converge into a new strategic paradigm: one where sustainable competitiveness is not a trade-off but the foundation of growth in a green and regenerative economy.

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Chapter 3 - The Complexity of Sustainable Business Models

Sustainability is no longer a “nice-to-have” add-on to business activity. For SMEs, it is becoming a defining condition of competitiveness, shaped by rising expectations from customers, supply chains, banks, and regulators, and by a market that increasingly rewards transparency, resilience and responsible practices. Yet this transition is rarely straightforward. The sustainability landscape is crowded with frameworks, standards and reporting requirements—CSR, ESG, double materiality, CSRD, the EU Taxonomy, ISO 14001, EMAS—each bringing its own language and logic. For smaller firms, the challenge is not only to respond, but to do so in a way that makes strategic sense and fits real capacity. This chapter unpacks that complexity: it clarifies the shift from responsibility to performance, explains why alignment at business-model level matters before compliance, and introduces the key regulatory and voluntary frameworks that are most likely to influence SMEs—directly or through value-chain pressure. The aim is to help readers understand what these tools are, why they matter, and how to make informed choices about how far to go.

3.1 Why Sustainable Business Models Matter Now

Competitiveness in today’s economy is increasingly shaped by a firm’s ability to operate sustainably and adapt to shifting environmental and social expectations. As shown in the previous chapter, efficiency, resilience, and innovation now anchor long-term performance. Building on that foundation, this chapter examines why sustainable business models have become essential and how regulatory, market, and societal pressures are reshaping the environment in which SMEs operate.

One of the defining changes is the shift from a **shareholder-oriented** perspective to a **stakeholder-driven model of value creation**. Firms are expected not only to generate profit but also to manage their environmental footprint, support employee well-being, and contribute to the broader community (Al Malki, 2023). This expansion of responsibility is particularly significant for SMEs, whose legitimacy often depends on local trust and relational networks. Sustainable growth, therefore, is no longer about financial continuity alone but about balancing economic performance with ecological limits and social resilience.

Regulatory developments in Europe reinforce this shift. Policymakers are embedding sustainability into the competitive framework through instruments such as the EU Taxonomy and the Corporate Sustainability Reporting Directive (CSRD), which formalize expectations around transparency, climate risk, and responsible operations. Central to these frameworks is **double materiality**: firms must evaluate both how sustainability issues affect financial outcomes and how their own activities affect society and the environment (Delgado-Ceballos et al., 2022). This dual perspective broadens accountability and demands deeper integration of sustainability into strategy, risk

management, and performance systems, even for SMEs that may fall outside full reporting obligations but remain subject to supply-chain expectations.

However, SMEs encounter this evolving landscape with limited institutional capacity. Barriers such as financial constraints, managerial overload, skill shortages, and the absence of dedicated sustainability personnel make the adoption of structured practices difficult (Al Malki, 2023). Evidence from European SME case studies shows a recurring pattern: external pressures, particularly regulatory requirements and customer expectations, drive early sustainability actions, but internal limitations restrict the shift from isolated measures to integrated management systems (Moursellas et al., 2023). Many SMEs therefore implement practical steps with immediate cost benefits (e.g., reducing energy use, recycling, reusing materials) while struggling with more complex tasks such as supplier engagement, environmental tracking, or navigating certifications like ISO 14001 and EMAS.

These pressures are accelerating a deeper transformation in business-model design. Traditional models focused solely on economic value are no longer adequate in the face of regulatory demands, societal expectations, and resource constraints. Research shows that **sustainability-oriented business** models require the simultaneous creation of economic, social, and environmental value, supported by innovations in processes, products, organizational structures, and collaborations (Figueiredo et al., 2024). Cooperation becomes a strategic capability: SMEs increasingly depend on partnerships with suppliers, clients, universities, and European networks to access technologies, expertise, and market opportunities they cannot develop internally. Yet collaboration with governmental or research entities may introduce bureaucratic delays or administrative burdens, illustrating the complexity SMEs must navigate when aligning innovation with evolving sustainability requirements.

To organize this complexity, SMEs need internal structures capable of steering sustainability as a strategic priority. Gennari (2023) identifies three interconnected pillars that shape an SME's transition capacity: **governance** (leadership, strategy, resources, decision-making); **relations** (culture, learning, stakeholder cooperation); and **innovation** (eco-design, technological upgrades, new business models). These pillars evolve unevenly, with firms progressing from reactive compliance to proactive improvement and, ultimately, to fully integrated sustainability systems. This multi-stage evolution underscores that sustainability transformation is not a linear checklist but a dynamic process requiring alignment between internal capabilities and external expectations.

Altogether, these dynamics explain why sustainable business models are no longer optional. SMEs operate within a rapidly expanding ecosystem of expectations, from regulators, investors, customers, and supply chains, that directly shape competitiveness and long-term viability. At the same time, they must navigate significant resource constraints and fragmented guidance, making sustainability both a strategic imperative and a managerial challenge. This chapter explores how regulatory and voluntary

frameworks contribute to this complexity and what it means for SMEs seeking to build coherent, future-oriented business models.

3.2 Navigating the Sustainability Landscape: CSR, ESG, and Strategy Alignment

For many SMEs, the sustainability landscape now feels crowded with acronyms and expectations: CSR, ESG, SDGs, “green transition,” double materiality, impact reporting. Behind this complexity lies a simple managerial question: how can a small business align its business model with these expectations in a way that fits its size, sector, and resources? This question has become particularly pressing as SMEs shift from shareholder-oriented logics toward broader stakeholder expectations (Freeman, 1984; Rao et al., 2023). Customers, employees, banks, communities, and supply-chain partners increasingly expect credible action, transparency, and measurable outcomes—transforming sustainability from a voluntary gesture into a core strategic requirement.

From Responsibility to Performance: CSR vs. ESG

Historically, Corporate Social Responsibility (CSR) emerged as a voluntary, values-driven concept. Companies were encouraged to “give back” to society through philanthropy, community projects, or isolated environmental initiatives. CSR often sat outside the core business model—symbolic rather than strategic (Carroll, 1999).

But as climate risks, supply-chain disruptions, and social inequalities began to affect operating costs, market access, and investor decisions, this approach proved insufficient. The conversation moved from “doing good” to understanding how environmental and social issues shape business resilience and performance. This is where ESG (Environmental, Social, Governance) enters.

ESG reframes sustainability as a measurable set of risk and performance factors:

Environmental (E): Energy use, emissions, waste, circularity, resource efficiency, climate exposure.

Social (S): Skills, training, working conditions, diversity, occupational safety, community impact.

Governance (G): Accountability structures, transparency, ethics, decision-making systems (Kotsantonis et al., 2016).

Where CSR asks: “What do we contribute to society?” ESG asks: “How do environmental and social issues affect our business, and how do we manage them?”

For SMEs, this distinction matters. CSR can remain peripheral and project-based; ESG forces sustainability into the language of management: controls, risks, indicators, and governance.

Importantly, countries with stronger “social responsibility environments”, meaning transparent governance, human capital development, environmental norms, tend to stimulate higher SME innovation and strengthen stakeholder expectations for responsible practices (Oliinyk et al., 2023). This institutional context reinforces why ESG thinking is becoming unavoidable even for smaller firms.

From Scattered Actions to a Sustainability Strategy

As expectations rise—from regulators, banks, large customers, and employees—many SMEs undertake isolated sustainability actions: installing LEDs, recycling, switching suppliers, or supporting local social activities. These steps matter, but they do not constitute a strategy.

A sustainability strategy includes three elements:

a. Clarity on what really matters (materiality). Not all sustainability topics matter equally for every SME. Materiality identifies what affects the long-term success of the business, and what matters most to key stakeholders.

This now includes double materiality, the idea that firms must assess both how sustainability issues impact the business and how the business impacts society and the environment (Delgado-Ceballos et al., 2022). For SMEs, this dual lens helps turn abstract sustainability objectives into clear priorities.

b. Focused priorities and targets. Once the material issues are clear, SMEs define a small set of priority areas, such as energy and carbon, waste and circularity, employee well-being, or responsible sourcing. Targets can be:

- quantitative (e.g., “reduce electricity use per unit of output by 15%”),
- qualitative (e.g., “formalize supplier code of conduct”), or
- process-oriented (e.g., “integrate sustainability criteria into investment decisions”).

Research shows that SMEs with clearer priorities and stronger governance structures are more resilient, more adaptive in crises, and more capable of transitioning toward long-term sustainable growth (Rao et al., 2023).

c. Integration into the business model and governance. A sustainability strategy is not a separate “green initiative”—it informs:

- value creation (products, services, value propositions),

- value delivery (processes, supply chains, partnerships),
- value capture (cost structure, risk management, revenue models).

SMEs often begin with simple governance steps: assigning responsibility, embedding basic ESG indicators into management reporting, or aligning procurement and investment decisions with sustainability goals. Countries with higher national social responsibility norms also show stronger SME innovation and business sophistication, reinforcing the connection between governance quality and sustainability integration (Oliinyk et al., 2023).

Voluntary reporting plays a role here, but SME practices are still limited. Most small firms publish little or no structured sustainability information; disclosures remain reactive, template-like, and rarely externally assured due to cost barriers (Ortiz-Martínez & Marín-Hernández, 2024). These patterns highlight why SMEs struggle to connect sustainability practices with formal governance structures and why strategy, not reporting, must come first.

What Does This Look Like in an SME Context?

A sustainability strategy in an SME does not require replicating the complexity of large corporate frameworks. Instead, it can be built around four practical questions:

a. Stakeholders and expectations

Who matters most to our business—customers, employees, suppliers, banks, local communities, regulators? What are they asking for now—or likely to ask for soon?

b. Risks and opportunities

Which environmental or social issues could disrupt our operations or reputation (energy volatility, resource scarcity, stricter regulation)? Where do we see opportunities in greener products, processes, or partnerships?

c. Priorities and actions

Which 3–5 sustainability topics are critical? What concrete actions can we take in the next 1–3 years that improve performance and are feasible?

d. Minimum structure

How do we formalize existing efforts—through simple policies, basic procedures, and internal plans—so sustainability does not depend on one person?

This structured reflection fills a critical capability gap: SMEs often approach sustainability tactically through scattered initiatives, rather than embedding it into their governance and business model (Rao et al., 2023).

Why Alignment Matters Before Looking at Rules

Understanding CSR, ESG, and sustainability strategy at the business-model level is essential before turning to regulatory frameworks such as the CSRD, EU Taxonomy, ISO 14001, or EMAS. These frameworks do not exist in isolation; they codify how sustainability should be integrated into governance, risk management, and value creation.

When an SME first clarifies:

- what sustainability means for its business model,
- which issues and stakeholders are most material, and
- how it intends to manage them,

external frameworks become supports and reference points—not bureaucratic burdens. This preparatory clarity is especially important as sustainability reporting expectations formalize and intensify across European markets (Ortiz-Martínez & Marín-Hernández, 2024).

3.2.1 Corporate Sustainability Reporting Directive (CSRD)

The Corporate Sustainability Reporting Directive – **Directive (EU) 2022/2464** – is the EU’s new framework for how companies must report on sustainability. It amends the EU accounting and transparency rules so that sustainability information is treated with the same seriousness as financial reporting (Directive (EU) 2022/2464, 2022). In practice, it makes environmental, social and governance (ESG) performance visible to investors, lenders, regulators and other stakeholders in a standardised way (IBM, 2025).

Most SMEs will not be directly subject to CSRD. However, they will increasingly feel its effects through value-chain pressure from large customers, financial institutions and investors who are in scope and need reliable data from the SMEs they work with (Braun, 2025; Social and Economic Council of the Netherlands [SER], n.d.; The Hague University of Applied Sciences, 2025). CSRD is therefore highly relevant for SMEs, even when they never publish a formal “CSRD report” themselves.

The section below explains CSRD through five essential questions that an SME manager should be able to answer.

Does CSRD apply to my SME – and why should I care if it doesn’t?

CSRD directly applies to three main groups (Directive (EU) 2022/2464, 2022):

- **All “large” EU undertakings** and large groups that exceed at least two of the usual size criteria on net turnover, balance sheet total and employees.
- **All companies whose securities are admitted to trading on an EU regulated market**, including **listed SMEs**, except micro-undertakings.

- Certain **non-EU (“third-country”) companies** with significant net turnover generated in the EU and a large EU subsidiary or branch.

These companies must include a **sustainability reporting section** in their management report, prepared in line with **European Sustainability Reporting Standards (ESRS)** and subject to external assurance (Directive (EU) 2022/2464, 2022; IBM, 2025).

For SMEs, two situations are particularly important:

- **Listed SMEs:** CSRD foresees **simplified, proportionate reporting standards** for listed SMEs, with later application dates and the option to opt out for a limited period if they explain why (Directive (EU) 2022/2464, 2022; Manasakis, 2024).
- **Non-listed SMEs:** they are **not required** by CSRD to report, but they are still part of the **value chains** that large companies must report on. Large customers and banks will therefore ask them for sustainability information so they can meet their own obligations (Braun, 2025; IBM, 2025; SER, n.d.).

Recent EU discussions go even further in this direction. As part of a broader **“Omnibus” simplification package**, the European Commission has proposed to **limit mandatory CSRD reporting mainly to very large companies (over 1,000 employees)** and instead develop a **voluntary sustainability reporting standard for SMEs (VSME)** that smaller firms can use when they want or need to report (European Commission, 2025). This reinforces a trend: **most SMEs will not be directly regulated by CSRD, but they will be “pulled in” indirectly** through the information needs of their CSRD-reporting partners.

Surveys already show that this is happening. In the Netherlands, about **one in four SMEs** had already received sustainability-related data requests from customers or suppliers by the end of 2024, rising to **around two-thirds for SMEs with more than 50 employees** (The Hague University of Applied Sciences, 2025). For many SMEs, CSRD is therefore **not a distant future issue**, it is already shaping the questions they get from key clients and financiers.

What information about our business will CSRD-reporting companies need from us?

Under CSRD, in-scope companies must disclose information that is necessary to understand both (a) **their impacts on “sustainability matters”** and (b) **how sustainability matters affect their development, performance and position** (Directive (EU) 2022/2464, 2022; IBM, 2025). This information is structured in ESRS into cross-cutting and topic-specific standards covering environment, social issues and human rights, and governance (IBM, 2025; SER, n.d.).

In practical terms, CSRD-reporting customers and banks will need data from SMEs that feeds into at least five areas (Directive (EU) 2022/2464, 2022; IBM, 2025):

a. Business model and strategy

- How resilient is their business model to climate change, resource constraints, labour issues or human-rights risks in the value chain?
- How does their strategy address sustainability impacts and stakeholder expectations?

b. Targets and transition plans

- Their **greenhouse gas (GHG) reduction targets** and progress.
- Other environmental or social targets and how they plan to achieve them.

c. Governance

- The roles, responsibilities and skills of the board and management in overseeing sustainability.
- Whether executive pay is linked to sustainability performance.

d. Policies and due diligence

- Policies on environment, labour, human rights, anti-corruption and responsible business conduct.
- Due diligence processes for identifying, preventing and addressing adverse impacts in their own operations and **value chain**.

e. Impacts, risks, dependencies and indicators

- Principal actual and potential **adverse impacts** connected with operations and the value chain.
- Principal **sustainability-related risks and dependencies**, and quantitative indicators that support the narrative.

For SMEs, this translates into **concrete questions and data requests**. Experience so far suggests that the first wave of demands is heavily focused on **environment and CO₂ emissions**, but with a clear tendency to broaden into social and governance topics (IBM, 2025; The Ecological Entrepreneur, 2025):

a. Environmental data

- Energy and fuel consumption, electricity mix, basic GHG emissions (often at least Scope 1 and 2, with Scope 3 encouraged), waste, sometimes water and material use depending on the sector (IBM, 2025; The Ecological Entrepreneur, 2025).

b. Social and human-rights data

- Number of employees, gender balance, working conditions, health and safety incidents, use of temporary or agency work, respect for labour and human rights in the SME's own supply chain (Directive (EU) 2022/2464, 2022; SER, n.d.).

c. Governance and conduct

- Existence of codes of conduct, anti-corruption measures, whistle-blowing channels, and basic information on how the SME handles complaints and ethical issues (IBM, 2025; Minutiello et al., 2025).

Because CSRD data must be **audited**, large companies and financial institutions will not be satisfied with generic statements (“we are environmentally friendly”). They need **documented, traceable data** that can withstand assurance checks (IBM, 2025). As a result, SMEs are increasingly asked not only **what** they do, but also to **show evidence**, for example, energy bills, fuel logs, HR data or supplier certificates.

What is “double materiality” and how does it change the way we think?

A central innovation of CSRD is that it formalises the idea of double materiality. Companies must assess and disclose sustainability information from two distinct but complementary perspectives (Directive (EU) 2022/2464, 2022; IBM, 2025):

a. Impact materiality – “What do we do to the world?”

- How the company’s activities affect people and the environment, positively or negatively.
- This includes, for example, emissions, pollution, working conditions, human rights, community impacts and effects on biodiversity.

b. Financial materiality – “What does the world do to us?”

- How sustainability matters affect the company’s cash flows, risks, access to finance and overall financial health.
- This covers, for example, climate transition risks, resource price volatility, regulatory change, labour shortages, reputational impacts and supply-chain disruptions.

Information is considered material if it is significant from **either** perspective, or both (Directive (EU) 2022/2464, 2022; SER, n.d.). The Directive explicitly aligns materiality analysis with the **UN Guiding Principles on Business and Human Rights** and the **OECD Guidelines for Multinational Enterprises**, which already require companies to look at both impacts and risks across their value chains (SER, n.d.).

For SMEs, double materiality can be translated into a pragmatic reflection:

On the **impact side**, where are our **biggest footprints**?

- Energy and fuel use, waste, logistics, working conditions, key suppliers, local community.
- Which impacts are most severe, affect many people, or are hardest to fix?

On the **financial side**, where are our **biggest exposures**?

- Dependence on one or two major customers, sensitivity to energy prices, regulatory changes, reputation in the local community, vulnerability to extreme weather or supply disruptions (Braun, 2025; Manasakis, 2024).

Research on SMEs shows that what really drives sustainable strategies is not so much size or formal governance structure, but the **underlying beliefs and vision** of the firm—how decision-makers think about their role, their responsibilities and their long-term competitiveness (Minutiello et al., 2025). Double materiality provides a **structured way** for SME leaders to align those beliefs with concrete priorities: focus on the **few issues that are most important both for society and for the business**.

How do value-chain obligations translate into pressure on SMEs?

CSRD significantly extends the scope of sustainability reporting **beyond a company's own operations**. Companies must report on sustainability matters in **“their own operations and their value chain, including their products and services, their business relationships and their supply chain”** (Directive (EU) 2022/2464, 2022, Art. 19a). This is tightly linked to due-diligence expectations under international standards: companies are expected to have processes to identify, prevent, mitigate and account for adverse impacts across their value chains, not only within their own walls (Braun, 2025; SER, n.d.).

For SMEs, this has several consequences:

a. Visibility inside customers' reports

- If an SME is an important supplier or partner, it becomes part of how the customer explains its value chain emissions, labour conditions, human-rights risks and other impacts.
- This can be positive (as a “responsible supplier” with good data) or negative (as a risk hotspot that needs remedial actions).

b. More structured information requests and contractual expectations

- Large companies, under pressure to demonstrate effective value-chain due diligence, increasingly use **codes of conduct, supplier assessments, audits and digital portals** to collect data and show that they manage ESG risks (IBM, 2025; The Ecological Entrepreneur, 2025).
- SMEs can therefore expect more questionnaires, requests for proof (certificates, policies, procedures) and, in some cases, requirements to improve practices as a condition of doing business.

c. Risk of overburden – and attempts to limit it

- Academic analysis warns that there is a real risk of **overburdening SMEs** with complex, frequent and uncoordinated data requests, given their limited resources and bargaining power (Braun, 2025).

- EU policy makers have recognised this and are working on **proportionality mechanisms**. The proposed “Omnibus” package includes a **value-chain cap**, which would **prohibit CSRD-reporting companies from demanding more information from SMEs than what is foreseen in the official SME sustainability standard (VSME)** (European Commission, 2025).
- Member States can also adopt national measures to protect SMEs, as in Belgium, where SMEs are guided towards the voluntary VSME standard and cannot be forced by large customers to obtain third-party assurance (The Ecological Entrepreneur, 2025).

d. SMEs as essential enablers, not just passive recipients

- From a regulatory systems perspective, CSRD is part of a **multi-level sustainability enforcement system** that only works if SMEs participate. They are the “nodes” that link local realities to EU-level reporting, finance and due diligence (Braun, 2025).
- SMEs are deeply embedded in local communities and supply chains; their actions and data are therefore crucial for making sustainability transitions real on the ground (Manasakis, 2024; Minutiello et al., 2025).

In short, **if you are part of someone’s supply chain, you are part of their CSRD story**. The pressure is real, but there are growing safeguards and tools designed specifically so that **SMEs are not crushed by it**.

How can SMEs turn CSRD-driven demands into a business opportunity?

CSRD and related initiatives create **costs and complexity** for SMEs, but they also open up **opportunities** in at least four areas: competitiveness and market access, finance, internal efficiency, and strategic positioning.

Competitiveness and market access

Evidence shows that sustainability is increasingly a **source of competitive advantage**. Consumers perceive responsible behaviour as a **quality signal** and may be willing to pay a premium; firms with stronger social and environmental performance often show **better abnormal financial returns**; and sustainability is becoming a criterion in tenders and supply-chain selection (Manasakis, 2024). SMEs that can **demonstrate their ESG performance clearly and credibly** are better placed to win and keep contracts with CSRD-reporting clients (The Hague University of Applied Sciences, 2025; The Ecological Entrepreneur, 2025).

Access to finance and risk management

CSRD information also feeds into the **Sustainable Finance Disclosure Regulation (SFDR)** and other financial rules, meaning banks and investors need reliable ESG data on the

companies they finance (IBM, 2025). SMEs that have structured sustainability information can:

- respond more effectively to banks' ESG questionnaires,
- reduce information asymmetry,
- strengthen their case for **better financing terms**, and
- demonstrate resilience to sustainability-related risks (Braun, 2025; Minutiello et al., 2025).

Efficiency, innovation and internal performance

Sustainability data is not just for outsiders. It can also act as **management information**:

- tracking energy and material use reveals **cost-saving opportunities**.
- monitoring safety or labour indicators can reduce **accidents and absenteeism**.
- supplier mapping can highlight **fragile dependencies** and trigger diversification (Minutiello et al., 2025; The Ecological Entrepreneur, 2025).

There is also evidence that responsible business behaviour can **attract and retain employees**, improve motivation and job satisfaction, and even allow some firms to offer slightly lower wages because employees value meaningful, responsible work (Manasakis, 2024). In tight labour markets, this is a non-trivial advantage.

Mindset and tools: values start the journey, tools make it real

Empirical research on SMEs suggests two critical enablers of sustainability strategies:

- **Corporate beliefs and vision** – what company leaders genuinely believe about their responsibilities, their image and their long-term strategy – have a **strong influence** on whether sustainability is taken seriously in the business model (Minutiello et al., 2025).
- **Accounting and reporting tools** – even relatively simple systems to measure, track and report ESG performance – are the **strongest direct driver** of the actual implementation of sustainable strategies (Minutiello et al., 2025).

In other words, **values start the journey, but tools make it real**. Without some kind of basic sustainability accounting, even strong beliefs risk remaining symbolic.

VSME and the emerging support ecosystem

To support SMEs, the EU has promoted a **Voluntary Sustainability Reporting Standard for SMEs (VSME)**. VSME is designed as a **simplified, proportionate framework** aligned with CSRD principles and ESRS, but adjusted to SME realities (European Commission, 2025; The Ecological Entrepreneur, 2025). Key features include:

- **Voluntary use** for non-listed SMEs, but compatible with the information large clients and banks increasingly need.

- A focus on core **ESG topics and a manageable set of indicators**, rather than the full complexity of ESRS.
- A growing **“VSME ecosystem”** with educational materials, templates and digital tools provided through EFRAG and other organisations (European Commission, 2025).

Field testing suggests that both SMEs and information users (banks, large companies) see VSME as a **realistic way to standardise and simplify data requests**, a potential replacement for many ad hoc questionnaires (European Commission, 2025).

Beyond VSME, **industry associations, chambers of commerce, large firms and public authorities** all have a role to play in making CSRD-related demands manageable for SMEs. Proposed measures include:

- sector-specific templates and shared taxonomies,
- collective digital tools and platforms accessible to small firms,
- training and advisory services,
- and “light-touch” due-diligence and assurance approaches for SMEs (Braun, 2025; Manasakis, 2024).

Putting it all together for SMEs

From an SME perspective, a sensible response to CSRD-driven change is not to become a mini-multinational, but to:

- Map where CSRD affects you indirectly*** – which key clients and banks are in scope and what they are likely to ask.
- Identify your most material impacts and risks*** – a short list of issues that matter most for both society and your business.
- Organise basic sustainability data once, in a simple digital form*** – so you can reuse it across questionnaires and use it for internal decisions.
- Use proportionate standards and tools (like VSME)*** – to avoid reinventing the wheel and to keep information demands within reasonable limits.
- Treat sustainability information as a business asset*** – something that helps you cut costs, manage risks, win tenders, attract people and secure finance.

In this way, CSRD becomes less a distant piece of EU legislation and more a **signal**: the market is moving toward greater transparency and responsibility, and SMEs that are **“small but impactful”** can position themselves as valuable, resilient partners in that transition (Minutiello et al., 2025; Manasakis, 2024).

3.2.2 EU Taxonomy for Sustainable Activities

The **EU Taxonomy for Sustainable Activities** is the EU's official dictionary of what counts as an **environmentally sustainable economic activity**. It does **not** label whole companies as “green” or “brown”; instead, it classifies specific activities and links them to **financial metrics** such as turnover, capital expenditure (CapEx) and operating expenditure (OpEx) (EU Platform on Sustainable Finance, 2025).

For SMEs, the Taxonomy can feel abstract and technical. But it already shapes **how banks lend, how investors allocate capital and how large customers assess their suppliers**, so it increasingly influences which firms are financed and which remain in key value chains (Amoedo, 2025; Coolset, 2025).

What the EU Taxonomy classifies

The EU Platform describes the Taxonomy as a “**breakthrough tool**” and the **cornerstone of the EU sustainable finance framework**, covering **six environmental objectives** and more than **150 economic activities** (EU Platform on Sustainable Finance, 2025). For each activity, it sets **technical screening criteria**, “Do No Significant Harm” (DNSH) requirements for the other environmental objectives, and **minimum social safeguards**.

The Taxonomy classifies **activities, not companies**, distinguishing between:

- **Taxonomy-eligible** activities – in scope of the Taxonomy; and
- **Taxonomy-aligned** activities – those that meet all technical criteria, DNSH and minimum safeguards.

It then **translates this into numbers** by requiring companies to disclose the share of **turnover, CapEx and OpEx** associated with eligible and aligned activities, while financial institutions disclose ratios such as the **Green Asset Ratio** and **Green Investment Ratio** (EU Platform on Sustainable Finance, 2025).

In just a couple of reporting cycles, this has already revealed large volumes of “green” revenue and investment, showing that the Taxonomy is actively **mobilising capital** rather than just sitting on paper (EU Platform on Sustainable Finance, 2025).

A simple way to put it for SMEs is:

CSRD tells companies to report on sustainability; the EU Taxonomy tells them which activities count as environmentally sustainable; and Article 8 of the Taxonomy Regulation turns that into hard numbers on green turnover and green investment (Coolset, 2025; EU Platform on Sustainable Finance, 2025).

How the Taxonomy connects financing, investment and business operations

The Taxonomy sits inside a wider **sustainable finance ecosystem** that also includes CSRD and ESRS, SFDR (fund disclosures), the EU Green Bond Standard, MiFID sustainability preferences, due-diligence rules and banking regulations on ESG risk (EU Platform on Sustainable Finance, 2025). Together, these tools are designed to **reorient capital flows** towards a climate-resilient, net-zero economy.

The key link for SMEs is the connection between **CSRD and the Taxonomy**:

- The **Taxonomy Disclosures Delegated Act** (Article 8) requires large financial and non-financial companies that report under CSRD to disclose **how and to what extent** their activities are associated with environmentally sustainable activities.
- In practice:
 - **CSRD/ESRS** define *what* sustainability information must appear in the management report.
 - The **Taxonomy** defines *which activities qualify* as environmentally sustainable.
 - **Article 8** defines *the KPIs* (percentages of turnover, CapEx, OpEx and banking ratios linked to Taxonomy-aligned activities).

This creates a **direct bridge** between **operations** and **finance**: what a company actually does on the ground is mapped against the Taxonomy; part of its revenue and investment is labelled “green”; and those percentages are then used by banks, investors and rating agencies when they evaluate the company (Coolset, 2025).

For in-scope mid-sized firms, ignoring Taxonomy expectations can mean regulatory issues, **harder access to green financing**, greenwashing concerns and messy, last-minute corrections to data (Coolset, 2025). That same logic trickles down to smaller suppliers and borrowers who may not report themselves, but whose activities influence their customers’ and lenders’ Taxonomy numbers.

Why SMEs must understand the Taxonomy: supply chain alignment, funding access, credibility

The Taxonomy was not written with SMEs as the main audience and, in its full technical detail, it is **too complex for most SMEs to apply directly** (Amoedo, 2025; EU Platform on Sustainable Finance, 2025). Yet SMEs generate more than half of EU GDP and around two-thirds of enterprise greenhouse-gas emissions, so Europe’s transition goals depend heavily on them (Amoedo, 2025). At the same time, many SME green projects remain **self-financed** because sustainable finance frameworks are hard to navigate and usable data are lacking.

Supply chain alignment: being “Taxonomy-friendly” for large customers

As CSRD expands the scope of mandatory sustainability reporting, more **mid-market firms and their SME suppliers** are pulled into Taxonomy-related questions (Coolset, 2025). Even if an SME never issues a Taxonomy report, its **key customers and banks do**, and they must explain how far their activities and value chains are Taxonomy-aligned (EU Platform on Sustainable Finance, 2025).

For SMEs, this shows up as:

- questions about which of their **products, services or projects** could qualify as environmentally sustainable.
- requests for **evidence** such as labels, certifications, energy or emissions data; and
- pressure to **shift away from clearly non-aligned activities** that undermine customers’ Taxonomy and CSRD KPIs.

In other words, **supply-chain alignment** becomes a competitive factor: SMEs that can present themselves as **“Taxonomy-friendly partners”** are easier to keep in the value chain.

Funding access: SME-specific Taxonomy approaches and standards

Recognising that the full Taxonomy is not workable for most smaller firms, the EU Platform has proposed **SME-specific approaches** built on Taxonomy concepts but tailored to their reality (EU Platform on Sustainable Finance, 2025):

- A **Simplified Approach** for **listed SMEs**, focused on applying existing Taxonomy criteria in a lighter, less document-heavy way.
- A **Streamlined Approach** for **unlisted SMEs**, offering a voluntary framework to show climate-related efforts and support access to finance. This starts with **climate change mitigation and adaptation** and is designed to extend over time to all six environmental objectives.

The Streamlined Approach suggests practical simplifications for unlisted SMEs, such as:

- using **NACE codes flexibly** rather than rigidly,
- simplifying life-cycle assessment demands, and
- relying on a **short exclusion list** (e.g. no fossil-fuel expansion) plus basic legal compliance as environmental and social safeguards.

Unlisted SMEs could then report a **small set of KPIs** under this approach, which banks and value-chain partners can use alongside Taxonomy data to identify and support credible transition efforts (EU Platform on Sustainable Finance, 2025).

In parallel, the **SME Sustainable Finance Standard** proposed by the Platform is designed as a **voluntary, simplified framework** that allows SMEs to:

- demonstrate their **environmental and climate performance**, and
- make it easier for **banks and investors to classify SME loans and investments as green or transition finance** (Amoedo, 2025).

It focuses on a limited number of climate-related KPIs and is intended to be implemented via a user-friendly online “**SME Sustainability Checker**”. The standard is **inspired by the Taxonomy** (DNSH, minimum safeguards, climate objectives) but **less strict** than the full Climate Delegated Act: an SME meeting it would be “SME-standard aligned” rather than fully Taxonomy-aligned, but that is still enough to unlock **green or transition funding** and to signal seriousness to lenders (Amoedo, 2025).

Credibility and greenwashing risk

Because Taxonomy-style metrics are increasingly used to test whether a company's sustainability claims are real, weak or inconsistent data fuel **greenwashing concerns**. Larger companies risk reputational and regulatory consequences; smaller suppliers risk being seen as **too risky or opaque** to include in green or transition strategies (Coolset, 2025).

SMEs that can provide **Taxonomy-aware, even if simplified, data**:

- strengthen their **credibility** with banks and major customers,
- fit more easily into **sustainable finance products and ESG-driven supply chains**, and
- show that they are actively contributing to the transition, not just reacting under pressure (Amoedo, 2025; Coolset, 2025).

A practical takeaway for SMEs

SMEs **do not need to master every technical detail** of the EU Taxonomy. But it is increasingly important that they:

- understand that **banks and large clients are using Taxonomy logic to steer capital**.
- have a basic sense of **which of their activities could qualify as environmentally sustainable and what proof might be needed**.
- know that **simplified and streamlined SME standards** are emerging as **Taxonomy-inspired, SME-friendly routes** to green funding; and

- treat Taxonomy-related data as part of their **overall ESG information system**, which also serves CSRD-driven supplier questionnaires, internal efficiency and long-term strategy.

Seen this way, the EU Taxonomy is not just a distant regulation in Brussels but a **shared language** connecting **what SMEs do** with **how money flows**. SMEs that learn to speak this language—using proportionate tools and standards—will be **easier to finance, easier to keep in supply chains and more credible partners** in Europe’s sustainability transition.

3.2.3 ISO 14001 (Environmental Management Systems)

ISO 14001 is the world’s most widely used standard for **environmental management systems (EMS)**. It does not tell a company *how green it must be*; instead, it sets out **how to organise and control environmental responsibilities** in a systematic way (International Organization for Standardization [ISO], 2015).

For SMEs, ISO 14001 is voluntary. But it can be a powerful tool to **bring order to environmental issues, prepare for rising ESG expectations, and reduce risk and waste** without having to “reinvent the system” from scratch.

Voluntary and process-based, not a new law

ISO 14001 is an **internationally agreed standard** that sets requirements for an EMS. It is **not legislation** and it does not impose fixed performance levels (e.g. “you must cut CO₂ by X%”) (ISO, 2015). Instead, it describes a **process**:

- understand your context and environmental impacts,
- set a policy and objectives,
- put procedures and controls in place,
- monitor what happens, and
- **improve continuously** (Plan–Do–Check–Act).

Certification is also **voluntary**. An SME can use ISO 14001 as a framework **with or without** obtaining a third-party certificate; certification simply adds external proof that the system is in place and working (ISO, 2015).

This makes ISO 14001 very different from something like CSRD: it’s not another reporting obligation, but a **management toolkit** that SMEs can scale to their size and ambition.

Structuring environmental responsibilities in an SME

Many SMEs already “do things” for the environment—separating waste, fixing leaks, switching lights off—but it’s often ad hoc and person-dependent. ISO 14001 helps turn that into a **structured, shared system**.

An ISO 14001-based EMS typically requires an SME to put in place (ISO, 2015; Compliant Ltd., n.d.):

- A clear **environmental policy** approved by top management.
- A way to **identify environmental aspects and impacts** (e.g. energy use, waste, emissions, water, chemicals) and decide which are **significant**.
- A register of **legal and other requirements** that apply to the company.
- **Objectives and targets** (e.g. reduce electricity use by 10 %, cut general waste, prevent spills).
- Defined **roles and responsibilities** – who coordinates the EMS, who monitors what, who responds if something goes wrong.
- Simple **procedures and work instructions** for activities with higher impact (storage of hazardous substances, waste handling, maintenance, emergency response).
- Regular **internal audits** and **management reviews** to check whether the system is working and what needs to improve.

Research on ISO 14001-certified SMEs shows that, when taken seriously, the standard leads to **real internal changes**: new audits, clearer responsibilities, more systematic target-setting and more frequent discussions about environmental issues, rather than everything being left to one “green person” (Johnstone, 2022).

In practice, ISO 14001 gives an SME a **ready-made blueprint** for turning “environment is everyone’s job” into **concrete roles, routines and documents** that can survive staff changes and growth.

Preparing for compliance and competitiveness

ISO 14001 sits in a sweet spot between **compliance** and **market advantage**.

a. Staying on top of environmental law

The standard requires organisations to **identify and keep up to date with applicable environmental legislation** and to plan how to comply (ISO, 2015). For SMEs that don’t have in-house legal or environmental departments, this is valuable discipline:

- know **which laws apply**,
- have someone **responsible** for tracking changes, and
- show customers and regulators that you have a **systematic approach**, not just good intentions.

b. Competing in more demanding markets

ISO 14001 is internationally recognised and widely requested in **tenders and supply chains**, especially in sectors like construction, manufacturing, logistics and public procurement. Buyers often either:

- make ISO 14001 **mandatory** for suppliers, or
- treat it as a strong **selection or tie-breaking criterion**.

For an SME, certification can therefore:

- open doors to **new contracts**,
- make it easier to pass **supplier audits**, and
- provide credible backing for ESG claims in a world shaped by CSRD and Taxonomy expectations (ISO, 2015; Compliant Ltd., n.d.).

Case examples compiled by ISO show companies using 14001 to achieve “zero landfill”, standardise greener methods and prove that their solutions emit far less CO₂ than competitors—benefits they then use in marketing, tenders and negotiations (ISO, 2015).

c. Business tool, not just eco-badge

Empirical work in SMEs confirms that ISO 14001 is rarely *only* a PR exercise. While certification certainly brings legitimacy, SMEs also use their EMS as a **practical management tool**: to document processes, support quality control, engage staff and make greener operations part of the way they do business, not a side project (Johnstone, 2022).

Ultimately, ISO 14001 works as a **bridge**: it helps SMEs both **stay compliant** and **strengthen their competitive position** in value chains that are becoming more sustainability driven.

Lowering risks and improving monitoring

ISO 14001 is built around **risk-based thinking and monitoring**. It asks organisations to:

- identify **environmental risks and opportunities**.
- plan actions to address them.
- monitor **key indicators** (e.g. energy use, fuel, waste, incidents).
- correct and improve where needed (ISO, 2015).

For SMEs this has several concrete effects:

a. Fewer surprises, fewer incidents

By mapping environmental aspects and putting controls in place, SMEs reduce the likelihood of:

- spills and pollution incidents,
- non-compliance with permits,
- complaints from neighbours or authorities.

External ISO 14001 audits act as a “**fresh pair of eyes**”, often picking up unsafe storage, undocumented practices or hidden inefficiencies and pushing the company to fix them before they turn into bigger problems (Johnstone, 2022).

b. Better data for decisions and for clients

Because the EMS requires regular **monitoring, internal audits and management reviews**, SMEs start to accumulate **structured environmental data**. That data can then be reused:

- to answer **ESG questionnaires** from large customers or banks,
- to document improvements in **tenders and marketing**, and
- to identify **cost-saving opportunities** (e.g. high-consumption equipment, avoidable waste).

SME case studies show that ISO 14001 projects often surface **quick wins**: reducing waste collection costs, cutting energy through behaviour and maintenance, optimising routes to save fuel, and so on (ISO, 2015; Compliant Ltd., n.d.).

c. Blending formal controls and everyday behaviour

Research also highlights that in SMEs, environmental control is both **formal and informal**. ISO 14001 introduces the formal elements—targets, audits, procedures—but SMEs make it work by adding (Johnstone, 2022):

- simple **stories and visuals** to explain why changes matter,
- small **rewards or gamification** (e.g. team challenges, bonuses, social events when goals are met), and
- regular, informal **conversations** about performance.

Together, these elements build a culture where environmental risks are **noticed earlier**, and monitoring is not just a formality but part of how the business is run.

What does this mean for SMEs

In the context of CSRD, the EU Taxonomy and growing ESG expectations, ISO 14001 can be framed to SME managers as:

- a **voluntary, process-based system** they can scale to their size;
- a **practical way to structure environmental responsibilities** and move from ad hoc actions to a coherent approach;
- a **stepping stone** towards meeting client requirements, regulations and market expectations; and
- a tool that **reduces risk and improves monitoring**, while often uncovering very tangible cost and efficiency gains.

It is not mandatory, and it won't solve every sustainability issue. But for many SMEs, ISO 14001 is a **realistic and proven route** to put environmental management on a solid, professional footing without starting from zero.

3.2.4 EMAS (Eco-Management and Audit Scheme)

The **Eco-Management and Audit Scheme (EMAS)** is the European Union's own environmental management scheme. It builds on the same logic as ISO 14001 (plan-do-check-act, continuous improvement) but goes further: it is anchored in **EU law**, places strong emphasis on **legal compliance and measurable performance improvements**, and requires organisations to publish a **validated environmental statement** that is accessible to the public (European Commission, 2007, 2025).

For small and medium-sized enterprises (SMEs), EMAS is a **voluntary but "premium" option**. It is not required by law, yet it offers a robust way to show that environmental impacts are being managed seriously and transparently in an increasingly sustainability-driven market.

EMAS as the EU's premium environmental management tool

EMAS is established by EU Regulation and has been available to organisations since the early 1990s. It is described by the European Commission as the **European Union's environmental management tool**, designed to help organisations **identify, manage and systematically reduce their environmental impacts** over time (European Commission, 2025).

Like other environmental management systems, EMAS requires:

- an environmental policy,
- an analysis of environmental aspects and impacts,
- objectives and targets,
- operational controls and emergency preparedness,
- internal audits, and
- regular management reviews.

What distinguishes EMAS is that:

- it is **explicitly performance-oriented** and expects continuous improvement in environmental performance, not just the existence of procedures;
- it places particular emphasis on **verified legal compliance**; and
- it applies at **site level**, which makes performance and responsibilities very concrete (European Commission, 2007, 2025).

Because of these features and its regulatory foundation, EMAS is often seen as the **highest standard for environmental management and transparency** in the EU context.

EMAS EASY: making a demanding scheme workable for SMEs

On first look, EMAS can seem too demanding for a small business. To address this, a dedicated method called **EMAS EASY** was developed to help micro and small enterprises implement EMAS in a way that fits their resources and skills (European Commission, 2007).

EMAS EASY is built around a few core ideas:

- **Simplicity and participation**

The starting point is not a large manual but a simple **map of the site**. On this map, the company creates a series of “**ECOMaps**” for key themes such as water, energy, soil and ground, waste, and air/emissions. Employees then mark where environmental issues occur—leaks, noise, waste points, risky storage, etc.—so that impacts become **visible and understandable for everyone**, not only specialists.

- **Light, practical tools**

The method uses a small set of tools:

- a **Quick Check** to see where the business stands,
- simple **control panels** to monitor things like energy, water and waste, and

- an **EcologBook** to record actions, responsibilities and data.

These tools are designed so that no higher environmental education is required and documentation remains **short and clear** (European Commission, 2007).

- **Shorter implementation time and cluster approaches**

Experience shows that a traditional EMAS implementation in an SME may take **15–18 months**, while EMAS EASY often allows implementation and registration in about **4–9 months**, depending on size and complexity. When several SMEs work together in a cluster—such as on a business park—parts of the documentation and verification process can be shared, reducing costs further (European Commission, 2007).

Importantly, EMAS EASY does **not** dilute EMAS requirements. SMEs still have to:

- complete a **full environmental review**,
- set up and operate an environmental management system,
- perform **internal audits**,
- produce an **environmental statement**,
- undergo external **verification and validation**, and
- be **registered** by the national EMAS Competent Body (European Commission, 2007).

The scheme therefore keeps the **same level of ambition** for environmental performance and legal compliance as for large companies. What changes is the **pathway**: EMAS EASY makes that pathway realistic and affordable for SMEs.

Validated environmental statements: credibility built in

A defining feature of EMAS is the requirement to publish a **public environmental statement**:

- This statement summarises the organisation’s **environmental policy, significant environmental aspects, objectives and targets, indicators and actual performance**.
- The content must be **validated by an accredited environmental verifier** and then accepted by national authorities before the organisation can be registered and use the EMAS logo (European Commission, 2025).

This has two important consequences:

- EMAS combines an **environmental management system** with a **verified public report** on performance.

- Stakeholders—customers, banks, authorities, neighbours—do not just see internal claims; they see **checked and approved information**.

Compared with ISO 14001, which does not require such a public validated statement, EMAS offers a **higher degree of transparency and assurance**. For SMEs, this can be a powerful way to strengthen credibility when dealing with large buyers, public-sector clients or financial institutions.

EMAS, CSRD and the quality of environmental information

The emerging EU sustainability reporting framework, especially the Corporate Sustainability Reporting Directive (CSRD) and the European Sustainability Reporting Standards (ESRS), increases the demand for **high-quality environmental data**.

EMAS aligns well with these developments:

- Organisations are required to **report annually** on environmental performance and improvements.
- They must involve **stakeholders** and consider both direct and indirect environmental aspects.
- They must disclose **targets, actions and resources** for managing environmental impacts.
- Both the management system and the environmental statement are subject to **third-party verification** (European Commission, 2025).

While CSRD covers a broader set of environmental, social and governance topics at company level, it does not prescribe the use of any particular environmental management system. EMAS, by contrast, provides a **ready-made structure** for the environmental pillar: policy, objectives, implementation, monitoring, and verified reporting.

As a result, organisations with EMAS are generally **better prepared** to meet evolving reporting requirements, even if they are not directly in the CSRD scope. Their existing environmental indicators, processes and statements already provide much of the information and assurance that larger customers and financiers are starting to expect (European Commission, 2025).

Transparency, trust and value-chain differentiation

Because EMAS requires a **certified management system, verified data** and **public disclosure**, it is particularly effective at building **trust**:

- Data are **consistent, traceable and externally validated**.
- National authorities check registrations and oversee verifiers.

- Continuous improvement is built into the scheme, rather than being optional (European Commission, 2025).

For SMEs, this can translate directly into **competitive advantage**:

- Large companies subject to CSRD are likely to demand more sustainability data from their suppliers and to **prioritise partners with strong environmental performance**.
- EMAS registration allows an SME to show that its environmental management is **solid, transparent and continuously improving**, rather than ad hoc.
- This can make a real difference in **tenders, long-term contracts and sustainability-oriented value chains**, where buyers are looking for reliable and future-proof partners (European Commission, 2025).

Compared with simply complying with basic regulations or holding a generic EMS certification, EMAS sends a much **stronger signal** of commitment and maturity.

EMAS as a platform for circular economy and long-term competitiveness

Studies of companies with environmental management systems show that firms with EMAS or ISO 14001 are often **better positioned to adopt circular-economy practices** and to benefit from them (João et al., 2025). These firms tend to:

- use resources more efficiently and reduce waste and emissions,
- explore new circular business models and supply-chain synergies, and
- report higher customer and worker satisfaction linked to environmental improvements.

Research also indicates that **internalising** the management system—embedding circular-economy thinking into environmental policy, objectives and day-to-day procedures—helps overcome internal and external barriers such as limited management support, lack of knowledge or weak supply-chain integration. When this happens, the combination of EMAS and circular-economy initiatives can lead to **resource optimisation, new business opportunities and reduced legal and reputational risk** (João et al., 2025).

The use of additional environmental tools—such as eco-labels, environmental footprints or green public procurement criteria—can further **amplify these benefits**, reinforcing trust and making companies more attractive partners in circular and sustainable value chains (João et al., 2025).

For SMEs, this means that EMAS is not only a way to manage today's environmental impacts and reporting demands; it is also a **strategic platform** for future competitiveness in a more circular and low-carbon economy.

What EMAS offers to SMEs

From an SME perspective, EMAS can be summarised as:

- **The EU's premium environmental management tool:** more demanding than generic EMS standards, but also more rewarding in terms of credibility and alignment with EU policy.
- A scheme that **requires validated environmental statements**, providing externally checked information rather than self-declared claims.
- A way to **build transparency and trust**, especially with large customers, public authorities and financial institutions.
- A strategic choice for SMEs that want to **differentiate themselves and compete in sustainability-oriented value chains**, and that see environmental performance and circular-economy practices as part of their long-term business model.

For smaller firms, EMAS EASY shows that this level of ambition is achievable through a **lean, visual and participative approach**. For those willing to invest in a truly robust environmental system, EMAS can become one of the strongest assets they have in a rapidly changing regulatory and market landscape.

3.2.5 Other Relevant Standards and Tools

Beyond CSRD, the EU Taxonomy, ISO 14001 and EMAS, there are a few other widely used standards and frameworks that SMEs are likely to encounter. You don't need to apply all of them, but it helps to know what they are and how they fit into the wider sustainability "ecosystem".

ISO 50001 – Energy Management Systems (EnMS)

ISO 50001 is the international standard for **energy management systems**. It provides a structured framework to measure and improve energy performance using a plan–do–check–act cycle, aiming at more efficient use of electricity, heat and fuels across the organisation (DQS, 2024; Dametis, 2025). For SMEs, it can be applied in a scaled-down way and is mainly useful to **reduce energy costs, cut CO₂ emissions and improve competitiveness**—even if they choose to follow the principles without going all the way to certification.

ISO 26000 – Guidance on Social Responsibility

ISO 26000 is a **guidance standard**, not a certifiable management system. It explains what **social responsibility** means in practice—covering areas such as human rights, labour practices, the environment, fair operating practices, consumer issues and community involvement—and offers principles and recommendations on how to integrate these topics into decision-making and stakeholder relationships (ISO, 2010; ISO, n.d.). It is particularly useful for SMEs that want a **structured reference** for their social and ethical commitments without adding another formal certification.

GRI Standards – Global Sustainability Reporting Framework

The **Global Reporting Initiative (GRI) Standards** are the **most widely used standards for sustainability reporting** worldwide. They provide a global common language for organisations to report on their **economic, environmental and social impacts** in a consistent and comparable way, and are used by companies of all sizes and sectors (GRI, 2020; GRI, 2025). For SMEs, GRI can act as a **flexible reporting toolbox**: they can select the most relevant topics and indicators to communicate their impacts to customers, financiers or other stakeholders, and align more easily with the expectations of larger, GRI-reporting partners.

Taken together, these tools show that sustainability is supported by a **whole family of standards**: some focused on **specific themes** (energy, social responsibility), others on **how to report impacts**. SMEs do not need to adopt all of them, but knowing they exist helps to choose the **right level of ambition and structure** for their own sustainability journey.

3.3 Making Choices: How Far Should an SME Go?

The frameworks described in this chapter can easily give the impression that SMEs must do everything at once: respond to every questionnaire, follow every standard, and mirror the complexity of large companies. In practice, a critical part of managing sustainability is **deciding how far to go and where to draw the line**.

Three questions can help guide that choice.

a. Where is non-negotiable?

Some expectations are difficult or dangerous to ignore:

- **Legal obligations** (environment, labour, safety, accounting).

- **Requirements in key contracts** (for example, explicit obligations on codes of conduct, audits or specific certifications).
- **Issues that would seriously damage trust** if mishandled (e.g. safety incidents, unpaid overtime, obvious pollution).

Here, the question is not whether to act, but **how to act in a structured way**. Using elements of ISO 14001 or EMAS to organise responsibilities, controls and monitoring is often the most efficient way to ensure that non-negotiable items are handled reliably.

b. Where is there a clear business case?

Beyond the essentials, some sustainability investments clearly support the business model:

- They help win or keep important customers.
- They unlock attractive financing conditions or de-risk key projects.
- They cut costs or increase efficiency in visible ways.
- They support a distinctive positioning in the market.

In these areas, it can make sense to go **one step further than strictly required**: for example, choosing a formal management system, publishing more information than competitors, or piloting circular products and services. Here, standards and reporting frameworks are not just compliance tools, but **instruments of differentiation**.

c. What is currently “nice to have” – and can wait?

Not every request or framework deserves the same level of attention. Some may be:

- exploratory (a one-off questionnaire from a minor customer),
- only loosely connected to your activities, or
- too complex for the current size and capacity of the firm.

In those cases, it is legitimate for an SME to:

- answer in a **simplified form**,
- explain honestly what is already in place and what is planned, and
- postpone heavier commitments (such as additional certifications or detailed reporting) until there is a stronger signal from the market or a clearer internal benefit.

The important point is to make these choices **consciously**, rather than drifting into over-commitment. A small internal note that classifies demands into “non-negotiable”, “clear business case” and “nice to have for now” can already prevent overload.

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Chapter 4 - Country Perspectives: Greece, Italy, Türkiye

This chapter presents a comparative overview of the national policy environments, support mechanisms and key barriers affecting the adoption of green and circular practices by SMEs in the three partner countries of the CREDIT project: Italy, Greece and Türkiye.

Rather than providing an exhaustive policy inventory, the chapter focuses on structural trends and practical implications for SMEs and for the design of training and capacity-building initiatives. The analysis draws on national policy documents, partner contributions and research evidence collected within the project.

4.1 National Policy Environments: Shared Direction, Different Starting Points

All three countries have developed policy frameworks aligned with **European and international sustainability agendas**, although the maturity, institutionalisation and drivers of these frameworks differ.

Italy

Italy has established a **highly structured and mature policy environment** supporting the green and circular transition of SMEs. National strategies such as the Sustainable Economy Strategy, the National Energy and Climate Plan and the National Recovery and Resilience Plan (PNRR) integrate sustainability objectives with industrial competitiveness. Circular economy principles are embedded in public procurement criteria, industrial policy instruments and sectoral roadmaps, providing a relatively stable and predictable framework for SME action.

Greece

Greece has developed a **comprehensive but still evolving policy framework**, combining national strategies for circular economy, climate and energy with significant investment support through the Recovery and Resilience Plan (Greece 2.0). While alignment with EU objectives is strong, implementation capacity varies across sectors and regions. Policy instruments increasingly recognise SMEs as key actors, but the translation of strategic objectives into operational practice remains uneven.

Türkiye

Türkiye's policy direction is strongly shaped by **external market pressures**, particularly EU Green Deal requirements transmitted through export supply chains. Following the

ratification of the Paris Agreement, the adoption of a 2053 net-zero target and the introduction of a Climate Law, Türkiye is moving towards a more formalised climate governance framework. Green transition policies are closely linked to industrial modernisation and competitiveness, with SMEs positioned as critical—but unevenly prepared—participants in this transition.

4.2 Support Instruments and Incentives for SMEs

Across the three countries, support for SMEs' green transition is delivered through a **combination of financial incentives, policy instruments and ecosystem initiatives**, though accessibility and coherence differ.

- **Italy** offers a dense landscape of incentives, including tax credits, investment subsidies and dedicated transition programmes (e.g. Transizione initiatives), often integrated with digitalisation and innovation support. SMEs benefit from relatively clear pathways to funding, though administrative complexity remains a challenge.
- **Greece** relies heavily on **Recovery and Resilience Facility funding** and operational programmes targeting green and digital investments. While substantial resources are available, SMEs often face difficulties navigating eligibility criteria and aligning investment plans with programme requirements.
- **Türkiye** provides support primarily through **industrial policy instruments, innovation funding and emerging incubation and acceleration initiatives**. Although support mechanisms exist, they are more fragmented, requiring SMEs to actively seek guidance and coordination to access relevant opportunities.

Across all three contexts, **non-financial support**—such as advisory services, training, and ecosystem facilitation—plays a crucial role in enabling SMEs to translate incentives into effective action.

4.3 Common Barriers for SMEs

Despite differing national contexts, several **shared barriers** emerge across Italy, Greece and Türkiye:

Administrative and Institutional Complexity

SMEs in all three countries report challenges in navigating regulatory frameworks, funding instruments and reporting requirements. Fragmentation of responsibilities across institutions can increase perceived risk and discourage proactive investment.

Monitoring and Data Gaps

Limited capacity to measure and monitor energy use, emissions, water consumption or material flows is a recurring issue. Without reliable data, SMEs struggle to prioritise actions, demonstrate progress or respond to supply-chain and regulatory demands.

Financial Constraints

Access to affordable finance remains a key barrier, particularly for smaller enterprises and for investments with longer payback periods. Even where incentives exist, co-financing requirements and upfront costs can limit uptake.

Skills and Capacity Limitations

Across all three countries, SMEs face skills gaps related to sustainability strategy, eco-design, circular business models, environmental management systems and sustainability reporting. These gaps highlight the importance of targeted training and capacity-building initiatives.

4.4 Key National Trends Relevant for SMEs

The comparative analysis highlights several trends shaping SME engagement with green and circular practices:

- **Convergence towards EU sustainability frameworks**, even beyond EU borders, driven by market and supply-chain requirements.
- **Growing integration of green and digital transitions**, with digital tools increasingly recognised as enablers of sustainability performance.
- **Shift from voluntary to structured approaches**, particularly in climate governance and reporting expectations.
- **Uneven readiness among SMEs**, with export-oriented and larger firms adapting more rapidly than smaller or locally focused enterprises.
- **Increasing role of ecosystems**, including incubators, accelerators, business networks and public-private partnerships.

These trends underline the need for **practical, SME-oriented training pathways** that address not only awareness but also implementation capacity.

4.5 Country-Specific Nuances Affecting SME Green Transition

While Italy, Greece and Türkiye share a common orientation towards green and circular economy objectives, the **contextual conditions shaping SME engagement differ significantly** across the three countries.

In **Italy**, the maturity of the policy framework and the density of support instruments create favourable conditions for SME engagement in sustainability initiatives. However, this maturity also brings **administrative complexity**, which may discourage smaller

enterprises or limit participation to firms with higher organisational capacity. As a result, Italian SMEs often require support focused on **strategic integration and simplification**, rather than awareness raising.

In **Greece**, the green transition of SMEs is strongly influenced by **investment-driven policy instruments**, particularly those linked to the Recovery and Resilience Facility. While funding availability represents a major opportunity, SMEs frequently struggle to translate strategic priorities into **operational implementation**, due to capacity gaps in monitoring, project planning and sustainability management. Training needs in this context tend to focus on **practical implementation and decision-making support**.

In **Türkiye**, green transition dynamics are shaped primarily by **export market requirements and supply-chain pressures**, rather than domestic regulation alone. SMEs—especially those integrated into European value chains—face growing expectations related to emissions, resource efficiency and reporting, often without having the internal capacity to respond effectively. Consequently, Turkish SMEs exhibit a strong need for **compliance readiness, basic sustainability literacy and operational guidance** aligned with international standards.

These contextual differences highlight the importance of **flexible and adaptable training approaches**, capable of addressing both shared challenges and country-specific needs.

4.6 From Barriers to Capacity-Building Priorities

The comparative analysis of national contexts reveals that **barriers to SME green transition are closely linked to capacity gaps**, rather than to a lack of policy intent or financial instruments alone. Across the three countries, SMEs face recurring challenges related to monitoring, data management, strategic integration and skills development.

These barriers translate into **distinct capacity-building priorities**:

- The need to strengthen **basic sustainability literacy**, enabling SMEs to understand policy signals, market expectations and environmental risks.
- The development of **monitoring and data-handling competences**, allowing SMEs to move from intuition-based decisions to evidence-informed actions.
- Support for **practical implementation skills**, including prioritisation of actions, evaluation of trade-offs and incremental improvement planning.
- Enhancement of **digital competences**, as digital tools increasingly function as enablers of sustainability performance, reporting and communication.

Importantly, capacity-building interventions should not assume homogeneous SME readiness. Training initiatives must therefore be **modular, flexible and role-sensitive**, accommodating differences in size, sector, market exposure and organisational maturity.

This insight directly informs the design of the CREDIT Toolkit and its associated digital learning pathways, ensuring that training content remains **relevant, practical and responsive** to SME realities across different national contexts.

4.7 Comparative Overview of Key National Trends

Table 1: Comparative Overview of Sustainability Transition Drivers and SME Readiness Across Partner Countries

Dimension	Italy	Greece	Türkiye
Policy maturity	High structured	Medium, evolving	Emerging, accelerating
Main driver	Industrial competitiveness & innovation	EU alignment & RRF investment	Export & supply-chain pressure
SME support	Dense incentive landscape	Strong funding, complex access	Fragmented, ecosystem-based
Monitoring capacity	Medium-high	Medium	Low-medium
Key barriers	Administrative complexity	Capacity & navigation gaps	Financing & skills gaps
Training priority	Strategic integration	Operational implementation	Compliance & readiness

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Chapter 5 - The Green Skills Gap and Training Needs

Chapter 5 examines the green skills gap, and training needs that SMEs face as the green and digital “twin transition” reshapes regulatory requirements, market expectations and everyday business practices. Building on the policy and competitiveness context of the previous chapter, it clarifies what “green skills” mean in an SME setting—not as a separate family of specialised “green jobs”, but as the greening of existing roles through a combination of technical and operational capabilities, strategic and managerial competences, and transversal skills for working with complexity and change. Drawing on international and European evidence, the chapter highlights persistent mismatches in SME participation in job-related learning, limited internal capacity for monitoring and compliance, and segmentation between front-runner firms and non-movers. It also argues that closing the green skills gap depends not only on training volume but on the quality and design of support, favouring flexible, contextualised and work-based learning approaches suited to SME constraints. Finally, the chapter introduces GreenComp as a shared reference framework for sustainability competences and outlines how it can inform realistic training pathways that bridge strategic intent and operational practice in SMEs.

5.1 The Green Skills Gap: What It Is and How It Affects SMEs

The transition to a climate-neutral and resource-efficient economy is reshaping what people need to know and be able to do at work. “Green skills” are increasingly described as the knowledge, abilities, values and attitudes needed to live in, develop and support a sustainable and resource-efficient society (Arthur, 2022). They are not confined to a narrow group of “environmental experts”: they concern engineers and technicians, managers and planners, inspectors, administrative staff and entrepreneurs. For small and medium-sized enterprises (SMEs), this raises a simple but uncomfortable question: do they actually have the skills needed to make use of the new frameworks, technologies and business opportunities described in the previous chapter?

5.1.1 What exactly are “green skills” in an SME context?

Global and European policy work converges on a broad view of green skills. UNIDO identifies four groups of work tasks that are especially important in green occupations: engineering and technical skills (designing and operating cleaner technologies), science skills (understanding physical and biological processes), operations-management skills (organising work, supply chains and life-cycle impacts), and monitoring skills (checking compliance with technical and legal standards) (Arthur, 2022). To this it adds soft skills such as design thinking, adaptability, resilience and empathy, which are increasingly important for working in fast-changing environments.

European analysis goes a step further and emphasises **bundles** of competences. The green and digital “twin transition” does not just require more environmental know-how; it calls for combinations of green, digital and transversal skills—critical thinking, problem-solving, communication, collaboration and entrepreneurial initiative (Pissareva et al., 2025). Many emerging green roles are strongly high-skill-biased: they depend on engineering, advanced technical and managerial capabilities. Lower-skilled jobs often remain in existing occupations, but with added requirements for environmental awareness and new procedures. In practice, this means that SMEs rarely need a separate “green job family”; instead, they must “green” existing roles—owners and managers, technicians, logistics staff, office workers—by adding environmental, digital and transversal elements to their existing tasks.

From the perspective of this toolkit, green skills in SMEs can therefore be understood as:

- **Technical and operational skills** to run processes, machines, buildings and logistics in more energy- and resource-efficient ways, comply with environmental rules and use greener technologies;
- **Managerial and strategic skills** to interpret regulatory and market signals, integrate sustainability into strategy and investment decisions, and engage value-chain partners; and
- **Transversal skills** that allow people to work with complexity, uncertainty and change.

The rest of this chapter unpacks these layers and explores how they can be developed through work-based learning.

5.1.2 What do we know about the green skills gap in SMEs?

Despite growing policy attention, evidence shows that SMEs face a persistent skills mismatch in relation to the green transition.

First, SMEs matter enormously for the transition itself. In the EU, SMEs are estimated to account for around **40% of total business-sector greenhouse-gas emissions**, making them a central part of decarbonisation and circular-economy strategies (OECD, n.d.). At the same time, they are particularly exposed to resource and energy shocks: during the 2022–2023 energy crisis, the share of energy costs in SME turnover in the EU rose from 4% in 2018 to 6.4% in the first half of 2022, sharply increasing pressure to improve energy and resource efficiency (OECD, n.d.). This would suggest a strong incentive to develop energy and green-management skills—but most SMEs start from a lower skills and training baseline than large firms.

OECD work on the twin transition finds that workers in SMEs participate **about 15 percentage points less** in job-related learning than workers in large enterprises, across

countries (Pissareva et al., 2025). Many SMEs operate with narrowly specialised staff and underdeveloped “horizontal” functions such as IT, innovation management or energy management. This limits their ability to absorb new technologies, processes and regulatory requirements, and it makes it harder to re-skill or redeploy people as green and digital transitions accelerate.

Micro-level evidence from European SMEs reinforces this picture. Using survey data from over 13,000 SMEs in 28 EU Member States, Bassi and Guidolin (2021) show that 57.4% of SMEs report **no workers in green jobs** at all and around 10% undertake no resource-efficiency action. Only about one-fifth of SMEs identify lack of environmental expertise as a barrier to resource efficiency, even though statistical analysis shows that skills and dedicated green roles matter greatly for what happens next. Firms with no green workers are systematically less likely to implement or plan circular-economy and resource-efficiency measures, ranging from energy and water saving to recycling, reuse and eco-design. Where SMEs report that they lack environmental skills, this is actually associated with a *higher* probability of planning such actions—suggesting that the real problem is not only the skills gap itself, but also the fact that many firms **do not yet recognise** that they have one (Bassi & Guidolin, 2021).

The same study reveals strong segmentation: a minority of SMEs are “front-runners” implementing and planning multiple circular practices; a large share are “non-movers” with no action and no intention to act in the near term. Country and sector differences are pronounced, but across contexts the presence of green jobs and environmental skills, combined with size and turnover, are key discriminators between the two groups (Bassi & Guidolin, 2021). In other words, the green transition is not experienced evenly: some SMEs are developing capabilities and experimenting, while many others remain stuck.

At a broader policy level, there is also evidence of a **planning gap**. When analysing national climate commitments (NDCs) under the Paris Agreement, the OECD finds that fewer than 40% of countries include explicit plans for skills development to support their environmental and climate targets, and more than 20% have no human-capital measures at all, despite ambitious sectoral goals (Pissareva et al., 2025). Policy mapping across 38 countries shows that skills programmes are heavily skewed towards **digital** competences: around 60% of initiatives focus on digital skills, roughly a quarter on transversal/entrepreneurial skills, and only 13–14% explicitly on green skills, with relatively few initiatives bundling them together (Pissareva et al., 2025). Only about one-third of mapped policies target SMEs specifically. Taken together, these patterns suggest that while the green skills issue is recognised in principle, policy instruments often remain misaligned with the scale and structure of SME needs.

European agencies have been warning about this misalignment for more than a decade. CEDEFOP’s “Skills and jobs for the green transition” work links the European Green Deal to changing occupation and skills profiles in sectors such as waste management, agri-food and circular economy, and stresses that impacts are uneven across regions and

sectors, requiring anticipatory skills intelligence and adaptation of vocational education and training (Cedefop, n.d.). Yet the persistence of basic training and capability gaps at SME level indicates that this intelligence has not yet translated into sufficiently accessible, targeted learning opportunities on the ground.

5.1.3 The quality of support: how learning is designed matters

The green skills gap is not only about what SME workers know, but also about **how support and training are designed**. A conceptual review of enterprise support for pro-environmental SMEs highlights that many programmes are built around easily counted outputs—such as the number of audits delivered or tonnes of CO₂ saved—rather than around the learning needs of SME owners and managers (Paterson et al., 2022). Support often focuses on “low-hanging fruit” such as basic energy-efficiency measures, while under-emphasising deeper eco-innovation, new business models or supply-chain collaboration.

By contrast, when pro-environmental SMEs are asked what kind of support they find useful, a different picture emerges. Owners and managers consistently value **eco-preneurial learning**: short, flexible and contextualised learning experiences linked to real business problems, combining hard topics (finance, product development, supply-chain management) with sustainability leadership and environmental understanding; opportunities to work with specialist intermediaries at key moments; and peer-to-peer learning with like-minded firms (Paterson et al., 2022). This suggests that closing the skills gap requires not only more training hours, but also different pedagogical approaches that fit SME time constraints, sectoral contexts and decision-making realities.

International organisations have started to frame green skills more explicitly in this way. UNIDO emphasises that green competence involves values and attitudes as well as knowledge and abilities, and that soft skills—creativity, adaptability, resilience, empathy—are integral to working in complex, uncertain green transitions (Arthur, 2022). European initiatives such as the Climate Pact and the Pact for Skills stress the need to promote green employment, up- and reskilling, and anticipation of workplace changes, backed by instruments like the European Social Fund Plus (ESF+), which aims to support training for millions of people in green jobs and the green recovery (European Commission, n.d.). At the same time, OECD’s work on SME greening underlines that SMEs will not be able to respond to green finance, reporting and innovation opportunities unless the wider ecosystem—banks, accountants, training providers, public agencies—also develops the skills and coordination needed to offer coherent, proportionate support (OECD, n.d.).

5.1.4 Why the green skills gap is a strategic issue for SMEs

For SMEs, the green skills gap is not an abstract labour-market statistic; it is a strategic constraint. The combination of factors described above—large environmental footprint, exposure to energy and resource volatility, lower participation in training, limited access to high-skill green and digital talent, patchy policy support and often shallow learning design—translates into several risks:

- **Compliance and market access risk:** without staff who can interpret and respond to emerging requirements around emissions, resource use, product design or value-chain transparency, SMEs risk becoming weak links in CSRD-driven and Taxonomy-driven supply chains.
- **Cost and efficiency risk:** lacking skills in energy and resource management, SMEs may pay more for inputs than necessary and be less able to buffer shocks such as the recent energy crisis.
- **Innovation and competitiveness risk:** without capabilities for eco-innovation, life-cycle thinking and collaboration, SMEs may miss opportunities in new green markets and in circular supply chains.
- **People and organisation risk:** if managers and employees are not supported in developing the transversal skills needed to work with change—systems thinking, collaboration, problem-solving—the firm may struggle to adapt even when technologies or funding are available.

At the same time, the evidence is clear that where SMEs do invest in green jobs and environmental skills, they are more likely to adopt circular practices and to plan further improvements (Bassi & Guidolin, 2021). And where policy initiatives deliberately target SMEs with tailored, work-based and ecosystem-based learning, the potential exists to turn the skills gap from a constraint into a driver of innovation and resilience (Pissareva et al., 2025; Paterson et al., 2022).

The remaining sections of this chapter build on this diagnosis. They introduce the GreenComp framework as a reference for sustainability competences, distinguish between strategic/managerial and technical/operational green skills in SMEs, and explore how work-based learning and local ecosystems can be used to develop these skills in ways that are realistic, relevant and impactful for small and medium-sized enterprises.

5.2 The GreenComp Framework: A Common Language for Sustainability Competences

The previous subsection showed that SMEs face a layered green skills gap: they often lack not only technical expertise but also the strategic and transversal competences needed to navigate complex sustainability demands. The question, then, is how to describe these

competences in a way that is coherent and usable for training and management. GreenComp, the European sustainability competence framework, provides one such common language.

5.2.1 What GreenComp is – and how it defines sustainability competences

GreenComp is an EU reference framework that describes what it means to be competent for sustainability. It identifies **12 competences** grouped into **four areas** (embodying sustainability values, embracing complexity, envisioning futures, acting for sustainability), but it is *not* a curriculum, qualification or standard. Instead, it offers a shared vocabulary that schools, VET providers, adult-learning organisations and workplaces can use to design their own learning pathways, assessment tools and training offers (Bianchi et al., 2022).

The framework adopts a clear definition of sustainability rooted in **planetary boundaries**: human activity must remain within ecological limits while prioritising the needs of all life forms and of the planet (Bianchi et al., 2022). Sustainability is treated as inherently multidimensional—environmental, social, cultural and economic aspects are interlinked—but ecological limits are non-negotiable.

A “sustainability competence” in this framework is more than technical know-how. It is the ability to **embody sustainability values, embrace complex systems, and take or request action** that restores ecosystem health and enhances justice, while generating visions for sustainable futures (Bianchi et al., 2022). This definition explicitly integrates four dimensions:

- **Values** – what people care about (e.g. fairness, care for nature).
- **Systems thinking** – understanding interdependencies and unintended consequences.
- **Futures orientation** – seeing the future as open and shapeable.
- **Agency** – the capacity to act or to demand action from those with power.

GreenComp also frames learning for environmental sustainability as **lifelong and transformative**. Learning is expected to occur in formal, non-formal and informal settings, and to engage head, hands and heart—knowledge, practical skills and attitudes—so that people move from knowing about sustainability to feeling responsible and able to act (Bianchi et al., 2022; Liverano, 2024).

For SMEs, this matters because it shifts the conversation from “Do we have a sustainability specialist?” to “Does our organisation have the mix of values, systems thinking, imagination and agency needed to steer change?”

5.2.2 The four competence areas – translated for SME reality

GreenComp's competences are presented as a **honeycomb**: interdependent, non-linear and mutually reinforcing. They can be grouped, however, into four areas that translate well into SME contexts (Bianchi et al., 2022; Liverano, 2024).

Embodying sustainability values

This area includes valuing sustainability, supporting fairness and promoting nature. It asks whether people recognise sustainability as a core value, see the links between environmental quality and justice for current and future generations, and feel connected to nature rather than separate from it.

In an SME, this is reflected in questions such as:

- Do leaders talk about environmental and social issues as *strategic* concerns rather than optional extras?
- Are decisions about suppliers, products and investments discussed in terms of fairness, long-term impacts and responsibility, not just short-term cost?

Without some shared values and ethical framing, technical improvements tend to remain superficial or reversible.

Embracing complexity in sustainability

This area covers systems thinking, critical thinking and problem framing. It recognises that many sustainability issues are **wicked problems**—they cannot be “solved” once and for all, but can be managed through prevention, mitigation and adaptation. Competent individuals can see how actions in one part of a system (e.g. procurement, logistics, energy use) affect others, question assumptions, and detect oversimplifications or greenwashing (Bianchi et al., 2022).

For managers and technicians in SMEs, this translates into abilities such as:

- Understanding how regulatory changes, customer expectations and resource constraints interact.
- Assessing trade-offs (e.g. lower emissions vs higher upfront costs) without falling into paralysis.
- Recognising when external claims or internal proposals are too good to be true.

Envisioning sustainable futures

Here the focus is on futures literacy, adaptability and exploratory thinking. People are encouraged to distinguish between expected, alternative and preferred futures, and to see the future as something they can influence. They learn to cope emotionally and practically with uncertainty and to experiment with new solutions, including circular-economy approaches and cross-disciplinary ideas (Bianchi et al., 2022).

In an SME setting, this competence area supports:

- Scenario thinking about markets, regulations and technologies (e.g. “What happens to our business model in a low-carbon, high-energy-price world?”).
- Openness to new value propositions (repair, sharing, as-a-service models).
- Willingness to test small changes and learn from them rather than waiting for perfect information.

Acting for sustainability

The final area includes individual initiative, collective action and political agency. It recognises that sustainability requires both personal responsibility and the ability to mobilise others—inside the organisation and in the wider system. People need skills to design and implement change projects, collaborate across functions, and, where relevant, demand effective policies and frameworks (Bianchi et al., 2022).

For SMEs, this might look like:

- Employees initiating small improvement projects on energy, waste or product design.
- Cross-functional teams working with suppliers and customers to reduce impacts.
- Managers engaging with local authorities or sector associations to shape more enabling conditions.

Liverano (2024) summarises this logic as a sequence of **understanding – awareness – action**. Deep comprehension of sustainability and complex systems, and a reflective awareness of values and impacts, are seen as prerequisites for meaningful, intentional action. Training that jumps directly to “what to do” without building understanding and awareness risks producing compliance rather than commitment.

5.2.3 From framework to training: how GreenComp is being used

GreenComp was designed as a flexible reference rather than a fixed programme, and practice across Europe shows a wide variety of applications. Case studies from different

countries and sectors document how organisations use the framework to update qualifications, design courses, build assessment tools and structure teacher and trainer development (European Commission, 2024).

One cluster of initiatives uses GreenComp as a “**library of competences**”. Practitioners select the competences most relevant to their context and turn them into learning outcomes, key messages or micro-lessons. The DEED project in vocational education, for example, translated each of the 12 competences into about 15 key messages and created around 200 micro-lessons that teachers can plug into existing programmes, allowing sustainability to be integrated in small, targeted units rather than only through new full courses (European Commission, 2024).

Another example with clear SME relevance is **EntreComp4Transition**, which targets SMEs navigating the green and digital twin transition. Chambers of commerce first ran skills-needs assessments with SMEs, then mapped those needs against three EU frameworks: GreenComp (sustainability), DigComp (digital) and EntreComp (entrepreneurship). This mapping informed four modular learning paths—on sustainability, digitalisation, entrepreneurship, and an integrated “green transition facilitator” profile—delivered as blended learning over a few months and certified through open badges (European Commission, 2024). GreenComp provided the sustainability backbone, but content and language were adapted to the realities of small businesses.

These cases illustrate two points that are important for SME managers and trainers:

- GreenComp can be **scaled and sliced**: it lends itself to micro-learning, modular courses and blended formats that fit the time constraints of SMEs.
- Effective use requires **translation**: competences must be rephrased in sector and business language, and combined with other frameworks where relevant (digital, entrepreneurial).

5.2.4 What GreenComp offers to SMEs and trainers

For SMEs, GreenComp does not provide a ready-made training programme, but it does offer a **robust, open and non-proprietary reference** for thinking about green competences in a structured way. It can help managers and trainers:

- **Map competence needs by role**: for example, focusing on systems thinking, futures literacy and collective action for owners and senior managers, and on problem framing, adaptability and individual initiative for line managers and technical staff.
- **Design learning pathways** that respect the understanding–awareness–action sequence: starting with shared values and systems understanding, then moving towards concrete projects and behaviour changes.

- **Choose learning formats** that fit SME realities: micro-lessons embedded in work, small group projects that tackle real operational issues, and peer-based learning within clusters or supply chains.
- **Align internal language with external expectations:** using GreenComp as a shared vocabulary with training providers, sector organisations, or public programmes that already reference the framework.

At the same time, evidence from early adopters shows that GreenComp is not plug-and-play. It requires time and expertise to prioritise competences, translate them into concrete tasks and behaviours, and embed them in curricula or workplace learning. Many initiatives therefore rely on partnerships—between education providers, chambers, companies and public agencies—and on communities of practice where practitioners share examples and tools (European Commission, 2024; Liverano, 2024).

Used in this way, GreenComp becomes less an academic document and more a **design scaffold**: it helps SMEs and their partners ensure that green skills development does not focus only on narrow technical tasks, but also builds the values, systems thinking, futures orientation and agency needed to make sustainability part of everyday management and work. The next subsection builds on this by distinguishing more explicitly between strategic/managerial and technical/operational green competences within SMEs, and by exploring how they can be combined in practice.

5.3 Bridging Strategic and Operational Green Skills in SMEs

Bridging the green skills gap in SMEs is not simply a matter of adding more technical training; it requires aligning **strategic intent** with **day-to-day operational practice** across the organisation. In many small firms, sustainability responsibilities are diffuse, formal roles are limited, and learning resources are constrained—yet external expectations are rising quickly, from value-chain requirements to reporting and compliance pressures. This section therefore focuses on how green competences are distributed and developed inside SMEs: it distinguishes between **strategic and managerial competences** (such as interpreting regulatory and market signals, prioritising material issues, and steering change) and **technical and operational competences** (such as improving processes, monitoring impacts, and implementing circular practices). It also highlights common mismatches and blind spots that can undermine progress, and it explains why **work-based, role-sensitive learning**—supported by appropriate HR practices and ecosystem partnerships—offers a realistic pathway for connecting leadership decisions with measurable improvements on the ground.

5.3.1 Why roles and competences matter inside SMEs

SMEs are small in size but large in impact. Across Europe, they account for a substantial share of industrial emissions and resource use, which means their internal capabilities are decisive for whether sustainability transitions succeed or stall (Bassi & Guidolin, 2021; Madrid-Guijarro & Duréndez, 2024). At the same time, they face tightening expectations from regulation, finance and value chains: reporting obligations, low-carbon requirements, circular business models and new social norms all arrive at the door of firms that often have no sustainability department and very limited HR capacity.

In this context, the “green skills gap” is better understood as a competence mismatch inside the enterprise rather than a simple shortage of trained people. Policy and labour-market debates often talk about green skills in a narrow sense: job-specific technical abilities for environmental tasks. Sustainability education, by contrast, emphasises broader sustainability competences, understood as interlinked knowledge, skills, attitudes and values that enable people to act effectively on complex sustainability problems in their specific context (European Commission, Joint Research Centre, 2021; Fuchs, 2024). In practice, SMEs need both: technicians who can operate more efficient processes and leaders who can interpret CSRD, Taxonomy and market signals, redesign the business model, and keep people on board.

Managers describe green competences as a bundle of knowledge, practical skills and pro-environmental attitudes and behaviours required at both management and employee level to trigger economic, environmental and social benefits (Gadomska-Lila et al., 2024). This immediately raises a question: who in the SME must have which competences for sustainability to become more than a slogan?

5.3.2 Strategic and managerial green competences

At the strategic level, sustainability depends strongly on what SME leaders know, value and are willing to do. Institutional, stakeholder and upper echelon perspectives converge on one finding: management commitment is the main channel through which external pressures and internal barriers influence environmental performance (Madrid-Guijarro & Duréndez, 2024). Regulatory, customer and community pressures tend to improve environmental outcomes when leaders are committed; the same pressures achieve little when commitment is weak. Barriers such as lack of money, time, knowledge or fear of losing competitiveness do not automatically reduce performance. What makes them harmful is that they erode managers’ willingness and confidence to act (Madrid-Guijarro & Duréndez, 2024).

Research on tourism SMEs shows how this plays out in practice. Leaders’ sustainability competences (systems thinking, normative reflection, interpersonal skills and action competence) foster a social entrepreneurial orientation, especially social proactiveness and risk-taking. This orientation, in turn, drives green innovation, social performance and

even economic outcomes (Álvarez-García et al., 2022). Socially innovative ideas alone had limited effect; what mattered was the leader's readiness to act proactively and take calculated risks on sustainability projects. Strategic green competences are therefore not only about understanding impacts, but about mobilising resources under uncertainty.

These findings align closely with the GreenComp framework, which emphasises systems thinking, anticipatory and normative competences, collaboration and strategic action as core sustainability competences (Bianchi et al., 2022; Liverano, 2024). In an SME, this translates into leaders who can:

- read regulatory and market signals (CSRD, Taxonomy, customer demands) in terms of opportunities and risks
- prioritise a small number of material sustainability issues
- integrate them into strategy, investment and product decisions
- build legitimacy and trust with stakeholders

HR-related strategic competences are also critical. A recent framework for green HRM describes how sustainability is made tangible through green job design, recruitment, training, incentives and performance appraisal, organised in a simple cycle of assessment and design, implementation and evaluation (Shah, 2025). For SMEs, even a light-touch version of this logic (adding environmental elements to job descriptions, performance discussions and recognition systems) can turn a leader's commitment into everyday expectations and routines.

5.3.3 Technical and operational green competences

Strategic intent only becomes visible when it is translated into operational practices. In many SMEs, the most direct environmental impacts arise from production, logistics, maintenance, purchasing and everyday office work, so the competences of frontline staff matter as much as the ambitions of owners.

Studies of European SMEs show that green jobs are often not separate positions but existing roles with added environmental tasks: production workers who also handle waste separation and energy-saving routines; maintenance staff who must understand efficient equipment; designers who incorporate durability and recyclability; drivers who manage eco-driving practices (Bassi & Guidolin, 2021). These tasks require technical and operational skills, such as operating efficient machinery, managing waste streams and recording energy data. They also require interpersonal and intrapersonal skills, such as communicating with colleagues, negotiating changes and staying motivated to apply sustainable practices even when they complicate routines (Fuchs, 2024).

The circular economy adds further layers. Analyses of circular jobs suggest at least two broad groups: core jobs in closing material loops (repair, recycling, remanufacturing) and

enabling jobs in design, engineering and digital services that make circular models viable (European Commission, Joint Research Centre, 2021). While core jobs tend to rely on strong technical skills, enabling roles demand higher levels of education and a wider mix of systems, problem-solving and resource-management skills. For SMEs, this means green competences are needed not only on the shop floor, but also in enabling roles such as product design, IT, procurement and service development.

Digitalisation complicates and enriches this picture. Survey evidence from SMEs shows that adopting digital tools does not automatically improve sustainability reporting. The direct effect of digitalisation on reporting can be insignificant or even negative if it remains partial and uncoordinated (Appiah-Kubi et al., 2025). What makes a difference is whether digitalisation strengthens sustainability competences, meaning the ability of staff to understand impacts, work with environmental data and use systems for measuring and communicating sustainability. It also matters whether environmental knowledge is deliberately built into system design and business processes (Appiah-Kubi et al., 2025). Operational green competences are thus increasingly digital–green: reading dashboards, understanding indicators and feeding reliable ESG data back into management decisions and value-chain communication.

5.3.4 Mismatches and blind spots inside SMEs

Across these levels, a recurrent pattern emerges: misalignment between strategic rhetoric and operational reality, structural barriers and cognitive blind spots, and over-reliance on tools without matching competences. SMEs often express strong concern for the environment and local communities, but lack structured competences, time and resources to act consistently.

Barrier studies highlight familiar obstacles: low awareness of sustainability benefits, limited financial and human resources, lack of training, resistance to change and a short-term focus that prioritises immediate cost savings over longer-term efficiency and reputation gains (Gadomska-Lila et al., 2024; Madrid-Guijarro & Duréndez, 2024). At the same time, SMEs face growing pressures from regulators, customers, lenders, employees and local communities. Empirically, these pressures tend to improve environmental performance if management commitment is high and to have weaker effects when that commitment is fragile (Madrid-Guijarro & Duréndez, 2024).

There are also cognitive blind spots. Many SME owners overestimate their environmental efficiency and underestimate their skills gaps, perceiving themselves as already doing a lot compared to competitors (Bassi & Guidolin, 2021). Managers often equate green competences with basic environmental awareness and good behaviour at work, while downplaying more strategic, systemic or social aspects of sustainability (Gadomska-Lila et al., 2024). At the policy level, employment statistics and skills forecasts tend to reduce green skills to technical abilities in a narrow set of environmental occupations, ignoring

broader sustainability competences and social dimensions (European Commission, Joint Research Centre, 2021; Fuchs, 2024).

Digitalisation introduces another mismatch. Many SMEs invest in software and data systems with the expectation that this will automatically improve sustainability performance and reporting. Evidence suggests that without investment in sustainability competences and green knowledge integration, digitalisation remains underused and may even add complexity (Appiah-Kubi et al., 2025). A similar pattern appears in training: many programmes focus on short, adaptive upskilling, for example learning to comply with specific regulations or technologies, without developing the transformative skills needed to question business models, redesign processes and engage stakeholders (Fuchs, 2024).

Altogether, the green skills gap inside SMEs is as much about quality and distribution (which roles have which competences) as it is about the absolute quantity of training hours. Large-scale, long-term evidence on the impact of green skills programmes in SMEs is still limited, so firms need to treat competence development as a learning process rather than a fixed recipe (European Commission, Joint Research Centre, 2021; Fuchs, 2024).

5.3.5 Why work-based learning fits SME green skills

Given these constraints, SMEs need learning approaches that fit their size, culture and resource base. Sustainability competences are inherently context-dependent and action-oriented; they cannot be fully developed through generic, classroom-based courses alone.

Evidence from vocational and adult learning shows that work-based learning, combining structured inputs with practice in real tasks, is particularly suited to building green competences in SMEs (Cedefop, n.d.; Fuchs, 2024). This is confirmed by detailed case studies of sustainability training inside small and medium enterprises. In a German organic food manufacturer, for example, a training programme for apprentices was designed around four learning modes: familiarising with sustainability and the firm's practices; experiencing and documenting sustainability issues in daily work; experimenting with solutions; and reflecting on outcomes with peers and the sustainability manager (Schröder et al., 2023). Over several weeks, this approach increased participants' willingness, ability and confidence to act on sustainability and led to concrete changes in routines and small innovations (Schröder et al., 2023).

GreenComp-based projects show similar patterns. Organisations using the framework report that competence development works best when learners investigate real problems, collaborate across functions, design and test solutions, and reflect on trade-offs, rather than only memorising concepts (Bianchi et al., 2022; Publications Office of the European Union, 2024; Liverano, 2024). The Joint Research Centre's work on sustainability competences also stresses the need to move beyond higher education and see learning as a lifelong, workplace-anchored process, especially for adults already in the labour market (European Commission, Joint Research Centre, 2021).

For SMEs, work-based learning has three main advantages. It reduces abstraction, ties competence development directly to operational improvements, and can be organised in small, iterative steps that fit limited time and budgets.

5.3.6 Design principles for SME green skills programmes

Bridging strategic and operational green skills in SMEs is less about copying large-company academies and more about designing targeted, proportionate learning systems that connect people, tasks and strategy. The literature points to several practical principles. You can use the following seven points as a checklist when designing or reviewing SME green skills programmes.

Start from roles, not from generic topics

Rather than launching broad sustainability awareness sessions for everyone, SMEs can first map where sustainability really sits in their business model: which roles interact with regulators and financiers; who designs products and processes; who handles energy, waste and logistics; who manages HR and supplier relationships. This role mapping allows the firm to distinguish strategic competences (for example systems thinking, long-term orientation, social entrepreneurial orientation) from operational competences (for example waste handling, data collection, eco-driving) and to tailor learning accordingly (Álvarez-García et al., 2022; Bassi & Guidolin, 2021; Gadomska-Lila et al., 2024).

Use competence frameworks as scaffolding, not as checklists

Frameworks like GreenComp and the broader sustainability competences concept can help SMEs articulate which knowledge, skills, attitudes and values are needed in key roles without turning the exercise into bureaucratic box-ticking (Bianchi et al., 2022; European Commission, Joint Research Centre, 2021). For example, a production manager may need stronger systems thinking and collaboration competences to redesign processes with suppliers, while a sales team may need interpersonal and normative competences to communicate credibly about sustainability with customers (Fuchs, 2024).

Combine adaptive and transformative learning

SMEs do need short, adaptive modules, for instance on new waste regulations, refrigerant handling or data entry standards. But to unlock innovation and resilience, they also need transformative elements: projects where employees identify sustainability issues in their work, experiment with improvements and discuss organisational trade-offs (Fuchs, 2024;

Schröder et al., 2023). Micro-projects rooted in real processes or customer relationships can help staff develop action competence and social proactiveness without large budgets.

Embed training in HR processes

Training has more impact when HR practices reinforce it. Green HRM literature suggests integrating environmental expectations into job descriptions, recruitment criteria, induction, performance appraisal and recognition, organised in a simple cycle of assessment and design, implementation and evaluation (Shah, 2025). For an SME, this might mean adding one or two environmental responsibilities to each relevant job profile, including a small number of sustainability-related questions in performance reviews, and recognising employees who propose and implement improvements, even with symbolic rewards. Over time, this helps turn green competences into part of “how we do things here”.

Treat digital tools as enablers, not substitutes

Digital systems can make it easier to track energy, materials, emissions and social indicators, but only if staff are trained to interpret and use these data for decisions and reporting. Empirical work suggests that digitalisation improves sustainability reporting mainly through its positive effect on sustainability competence and the deliberate integration of green knowledge into systems and processes (Appiah-Kubi et al., 2025). Cross-functional learning between IT, operations and sustainability roles is therefore essential.

Create supportive conditions: time, support and coherence

Even well-designed training fails if employees have no time, if supervisors are indifferent, or if the organisation’s walk contradicts its sustainability talk. SME case studies underline the importance of allocating working time to learning, involving line managers and sustainability coordinators, and ensuring that training messages are aligned with actual policies and investments (Gadomska-Lila et al., 2024; Schröder et al., 2023).

Connect to external support ecosystems

SMEs rarely have the capacity to design everything alone. Research on enterprise support for pro-environmental SMEs highlights the value of contextual, multi-actor arrangements: sector associations, chambers, local authorities, training providers and universities co-creating programmes that fit specific sectors and regions (Paterson et al., 2022; Pissareva

et al., 2025). This is particularly important to avoid “green skills deserts” where smaller firms and less qualified workers have little access to relevant training (Fuchs, 2024).

Taken together, these principles suggest that closing the green skills gap in SMEs is less about isolated workshops and more about building a modest but coherent learning system: one that links strategy and operations, combines digital and human capabilities, and treats sustainability competences as integral to how the business is organised and how people grow in their roles.

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PART B - PROJECT RESEARCH FINDINGS

For analytic information about CREDIT RESEARCH see Annex 1

Chapter 6 - Research Methodology

This chapter presents the research conducted within the CREDIT project aimed to generate **practice-oriented evidence** on the readiness of SMEs to engage with the green and circular transition, with a particular focus on **skills, competences and training needs**. Rather than producing a purely academic assessment, the research was designed to support the development of the CREDIT Toolkit and the associated digital learning pathways by answering three core questions:

- What green skills and competences do SMEs currently value and prioritise?
- What barriers and gaps limit their ability to adopt green and circular practices?
- What types of support and learning approaches are perceived as useful and realistic by SMEs?

To address these questions, the project combined **quantitative and qualitative methods**, enabling both cross-country comparability and in-depth contextual understanding.

6.1 Research Design and Approach

The methodology followed a **mixed-methods design**, integrating survey data, qualitative insights and case-based evidence from SMEs and local stakeholders in the three partner countries: **Italy, Greece and Türkiye**.

This approach allowed the project to:

- capture **common patterns and trends** across countries,
- identify **context-specific differences**,
- and triangulate findings from different sources to enhance reliability.

The research process unfolded in three complementary strands:

1. a cross-country needs analysis survey targeting SMEs,
2. qualitative data collection through interviews and focus groups,

3. identification and documentation of good practices from local communities and enterprises.

6.2 Quantitative Data Collection: SME Needs Analysis

The quantitative component consisted of a structured **online survey** addressed to SMEs across the three partner countries. The survey explored themes such as:

- awareness and understanding of green and circular economy concepts,
- perceived relevance of green skills,
- existing competences and skills gaps,
- barriers to adopting sustainable practices,
- training preferences and support needs.

The questionnaire combined closed and scaled questions, allowing descriptive analysis and comparison across countries, sectors and firm sizes. Data collection was coordinated by the project partners to ensure consistency in dissemination and sampling.

While the survey does not claim statistical representativeness at national level, it provides **robust indicative evidence** on SME perceptions and experiences, which is particularly valuable in the context of exploratory and applied research for adult education and training design.

6.3 Qualitative Data Collection: Interviews and Focus Groups

To complement survey results and deepen understanding, the project conducted **qualitative data collection** through semi-structured interviews and focus group discussions. Participants included:

- SME owners and managers,
- employees involved in operational or technical roles,
- representatives of local organisations supporting SMEs (e.g. chambers, development agencies, training providers).

These qualitative methods made it possible to explore:

- how SMEs interpret sustainability requirements in practice,
- how skills gaps manifest in everyday decision-making,
- what kinds of learning experiences SMEs find useful or burdensome,
- and how organisational context shapes the uptake of green practices.

Qualitative insights were used to contextualise survey findings, explain apparent contradictions, and identify patterns that are not easily captured through quantitative indicators alone.

6.4 Collection of Good Practices from SMEs

A third methodological component focused on identifying and documenting **good practices** from SMEs and local communities. Using a dedicated template, partners collected examples of initiatives that demonstrated:

- successful adoption of green or circular practices,
- innovative approaches to sustainability challenges,
- effective combinations of technical, managerial and transversal skills.

These cases span different sectors and organisational contexts and were selected not as “best-in-class” showcases, but as **transferable learning examples** illustrating what is feasible for SMEs under real-world constraints.

The analysis of good practices informed both the identification of **key success factors** and the design of practical tools and learning activities within the Toolkit.

6.5 Data Analysis and Synthesis

Data from the different sources were analysed using a **comparative and thematic approach**. Survey data were aggregated and examined for cross-country patterns, while qualitative data were coded to identify recurring themes related to skills, barriers and support needs.

The findings from all strands were then synthesised to:

- identify priority green competences for SMEs,
- distinguish between **strategic/managerial** and **operational/technical** skills,
- and map these competences against existing European reference frameworks, notably GreenComp.

This synthesis directly informed the development of the **CREDIT Competence Framework** presented in Chapter 9.

6.6 Methodological Limitations

As with any applied research, the methodology has certain limitations. The sample size and voluntary nature of participation mean that results cannot be generalised statistically

to all SMEs in the partner countries. In addition, self-reported data may reflect perceptions rather than objectively measured performance.

However, the combination of quantitative and qualitative methods, cross-country comparison and triangulation with case-based evidence strengthens the **credibility and usefulness** of the findings for the intended purpose: supporting the design of relevant, SME-oriented training and capacity-building tools.

6.7 Relevance for the CREDIT Toolkit

The methodological choices made in the CREDIT project reflect a deliberate focus on **practical relevance**. By grounding the Toolkit in evidence drawn directly from SMEs and their support ecosystems, the project ensures that subsequent chapters respond to **real needs, constraints and opportunities**, rather than abstract policy expectations.

The following chapters present the key findings of this research (Chapter 7), illustrative good practices (Chapter 8), and the resulting competence framework (Chapter 9), which together form the evidence base for the practical guidance offered in Part C of the Toolkit.

Chapter 7 - Key Findings from the Needs Analysis

This chapter presents the **key findings of the CREDIT needs analysis**, drawing on survey data, qualitative inputs and cross-country comparison across Italy, Greece and Türkiye. The focus is not on country-specific detail, but on **shared patterns, recurring barriers** and **competence gaps** that affect SMEs' capacity to engage effectively in the green and circular transition.

The findings presented here form the empirical basis for:

- the analysis of the green skills gap in Chapter 5,
- the selection of good practices in Chapter 8,
- and the development of the **CREDIT Competence Framework** in Chapter 9.

7.1 What SMEs Value and Prioritise

Across all three partner countries, SMEs show **high awareness of sustainability as a strategic issue**, particularly in relation to:

- rising energy and resource costs,
- regulatory and reporting expectations,
- customer and supply-chain requirements,
- long-term competitiveness and resilience.

However, sustainability is most often perceived as:

- a **means to reduce costs and risks**, rather than
- a driver of innovation or new business models.

SMEs consistently prioritise **practical and immediately applicable skills**, especially those that:

- improve energy and resource efficiency,
- support compliance and reporting,
- reduce operational complexity,
- help interpret external requirements.

This confirms that SMEs value **action-oriented competences**, closely linked to everyday decision-making, rather than abstract sustainability knowledge.

7.2 Key Barriers Identified by SMEs

The needs analysis highlights a set of **persistent and interrelated barriers** across countries:

Capacity and Skills Barriers

- Limited internal expertise on sustainability topics.
- Lack of staff with dedicated time or responsibility for environmental issues.
- Difficulty translating high-level sustainability concepts into concrete actions.

Time and Resource Constraints

- Training competes with daily operational pressures.
- SMEs struggle to allocate time for learning and experimentation.
- Investments in skills are often postponed unless linked to immediate benefits.

Monitoring and Data Gaps

- Weak or non-existent systems for tracking energy, water, emissions and materials.
- Low confidence in using data for decision-making or reporting.
- Digital tools are often present but underused.

Navigation and Complexity Barriers

- Difficulty understanding regulations, funding schemes and sustainability standards.
- Fragmented support ecosystems.
- Uncertainty about where to start and which actions matter most.

These barriers reinforce each other, creating a cycle in which SMEs recognise the importance of sustainability but struggle to act systematically.

7.3 Role-Based Skills Gaps: Managers vs Operational Staff

A key insight of the CREDIT research is that the green skills gap is **not uniform across the enterprise**. Instead, it is strongly **role-dependent**.

Managers and Owners

Managers and owners report challenges in:

- interpreting regulatory and market signals (CSRD, Taxonomy, customer requirements),
- prioritising sustainability issues strategically,
- integrating sustainability into investment and business decisions,
- mobilising employees and partners.

Their skills gaps are primarily **strategic, managerial and transversal**, rather than technical.

Operational and Technical Staff

Employees in operational roles face gaps in:

- applying energy- and resource-efficient practices,
- handling waste, materials and logistics sustainably,
- collecting and using environmental data,
- adapting routines to new sustainability requirements.

Their skills gaps are mainly **technical and operational**, often combined with limited digital competences.

This distinction underlines the need for **differentiated training pathways**, rather than one-size-fits-all approaches.

7.4 Cross-Country Similarities and Differences

Despite different national contexts, the needs analysis reveals **strong convergence** across Italy, Greece and Türkiye:

Common patterns

- Sustainability is driven by cost, compliance and customer pressure.

- Skills gaps outweigh lack of motivation as a limiting factor.
- SMEs prefer short, practical and contextualised learning formats.

Differences

- Export-oriented SMEs (especially in Türkiye) face stronger external pressure.
- SMEs in Greece emphasise difficulties in turning funding opportunities into action.
- Italian SMEs show higher awareness but face administrative and complexity fatigue.

These differences affect **how training should be delivered**, not **which competences matter**.

7.5 Core Competence Areas Emerging from the Research

Synthesising all findings, the CREDIT research identifies two **interconnected clusters of competences**:

Strategic and Managerial Green Competences

Relevant mainly for owners, managers and coordinators:

- Understanding sustainability regulations and market signals
- Systems thinking and prioritisation
- Strategic decision-making under uncertainty
- Stakeholder and value-chain engagement
- Leadership, communication and change management

Technical and Operational Green Competences

Relevant mainly for employees and technical roles:

- Energy, water and resource efficiency practices
- Waste, materials and logistics management
- Use of digital tools for monitoring and reporting
- Application of eco-design and circular practices
- Compliance with environmental procedures

These clusters are **complementary**: strategic competences enable direction and prioritisation, while operational competences translate intent into measurable action.

7.6 Linking CREDIT Competences to the GreenComp Framework

To ensure alignment with European reference frameworks, the CREDIT competence areas can be mapped against **GreenComp**, the EU sustainability competence framework.

Table 2: CREDIT Competence Areas and GreenComp Mapping

CREDIT Competence Area	Typical SME Roles	Relevant GreenComp Areas
Strategic sustainability orientation	Owners, managers	Embodying sustainability values
Systems thinking & prioritisation	Managers, coordinators	Embracing complexity
Futures orientation & resilience	Owners, managers	Envisioning sustainable futures
Leadership & collective action	Managers, team leaders	Acting for sustainability
Resource-efficient operations	Technical staff	Acting for sustainability
Monitoring & data use	Technical/admin staff	Embracing complexity
Eco-design & circular practices	Designers, engineers	Envisioning futures / Acting
Digital-green integration	Cross-functional roles	Embracing complexity / Acting

This mapping shows that **GreenComp does not replace SME-specific competence models** but provides a **shared language** for designing training pathways that combine values, systems thinking, futures orientation and action.

7.7 Implications for Training Design

The needs analysis clearly indicates that effective training for SMEs should:

- differentiate between strategic and operational roles,
- combine green, digital and transversal competences,
- be modular, flexible and work-based,

- focus on decision-making and implementation rather than abstract knowledge.

These insights directly inform the structure of the CREDIT Toolkit (Part C) and the associated digital learning modules.

Chapter 8 - Best Practices from SMEs

Chapter 8 turns from frameworks and requirements to what SMEs actually do when they try to “make sustainability work” in real operating conditions. The mini cases that follow – drawn from structured interviews in Greece, Italy and Türkiye – capture practical responses to common pressures such as compliance demands, rising energy and resource costs, and expectations from customers and supply-chain partners. Rather than presenting ideal models, the cases highlight realistic entry points: waste and materials management, structured environmental systems, circular service design, staff training, and targeted investments such as renewable energy. Together, they illustrate how sustainability action in SMEs often starts incrementally but can develop into more integrated practice when managerial commitment, operational skills and supportive local ecosystems come together. These examples provide concrete evidence for the competence areas discussed in the next chapter, helping to connect practice on the ground with training priorities and competence development.

Mini Case 1 – Medium-sized manufacturing SME | Paper & stationery sector | Greece

(based on structured interview with a Greek manufacturing SME)

Context

A medium-sized manufacturing SME operating in the paper and stationery sector in Greece, with both production and office-based activities.

Trigger / Motivation

The need to comply with national legislation on industrial waste management, combined with growing environmental awareness within the company.

Key actions implemented

- Proper management of chemical waste from production processes
- Recycling of by-products and separation of materials (paper, plastics, metals)
- Introduction of recycling bins for employees and customers
- Regular staff training on waste management procedures and environmental practices

Skills & competences involved

Technical skills in waste separation and handling, managerial competences in compliance and partner selection, training and organisational skills.

Key takeaway

Compliance-driven actions can evolve into broader sustainability practices when supported by staff training and clear internal procedures.

Mini Case 2 – Medium-sized agri-food SME | Food manufacturing | Greece

(based on structured interview with an agri-food SME)

Context

A medium-sized agri-food manufacturing SME based in Greece, producing traditional food products for domestic and export markets.

Trigger / Motivation

The recognition of the environmental footprint of food production and the need to meet international sustainability standards demanded by export markets.

Key actions implemented

- Implementation of an Environmental Management System (ISO 14001)
- Adoption of sustainable sourcing and ethical certification schemes
- Systematic monitoring of energy use, waste and emissions
- Training of staff on environmental awareness and safe production practices

Skills & competences involved

Technical monitoring skills, managerial competences in sustainability strategy and certification, stakeholder and supply-chain engagement skills.

Key takeaway

Strategic commitment combined with structured management systems enables SMEs to integrate sustainability across operations and supply chains.

Mini Case 3 – Social cooperative SME | Circular waste management services | Italy

(based on structured interview with an Italian social cooperative SME)

Context

A medium-sized social cooperative SME operating in northern Italy, active in environmental services and social inclusion. The organisation combines waste management activities with labour-market integration of disadvantaged people.

Trigger / Motivation

Stricter national legislation on waste management and a strong organisational commitment to environmental protection and social inclusion.

Key actions implemented

- Development of a separate collection service for consumables from electronic printing systems (toner, cartridges, ribbons)
- Distribution of dedicated collection containers to companies and offices
- Partnerships with specialised recycling and remanufacturing operators
- Integration of disadvantaged workers into collection, sorting and handling activities

Skills & competences involved

Technical skills in waste handling and sorting, compliance and coordination skills, social and interpersonal competences, organisational and partnership-management skills.

Key takeaway

Circular economy services can create combined environmental and social value when supported by strong organisational coordination and staff training.

Mini Case 4 – Social cooperative SME | WEEE collection and dismantling | Italy

(based on structured interview with an Italian social cooperative SME)

Context

A social cooperative SME providing specialised collection and pre-treatment services for Waste Electrical and Electronic Equipment (WEEE), operating at regional level.

Trigger / Motivation

Rapid growth of WEEE waste streams and increasing regulatory requirements for proper collection, treatment and recovery of secondary raw materials.

Key actions implemented

- Separate collection and dismantling of electrical and electronic equipment

- Operation of a dedicated workshop for pre-treatment activities
- Collaboration with institutional partners and waste-management consortia
- Training of staff, including socially disadvantaged individuals, in safe handling and dismantling procedures

Skills & competences involved

Technical competences in WEEE handling, health and safety awareness, operational process management, social and mentoring skills.

Key takeaway

Specialised operational skills combined with structured training enable SMEs to respond effectively to complex regulatory and environmental challenges.

Mini Case 5 – Social cooperative SME | Circular mobility & repair services | Italy

(based on structured interview with an Italian social cooperative SME)

Context

A social cooperative SME operating circular mobility services through the recovery, repair and resale of abandoned bicycles, in collaboration with local public actors.

Trigger / Motivation

The need to reduce urban waste streams, promote sustainable mobility and create professional pathways for people at risk of social exclusion.

Key actions implemented

- Collection and refurbishment of abandoned bicycles
- Training of disadvantaged workers in repair and reassembly techniques
- Sale and rental of refurbished bicycles to the local community
- Awareness-raising activities promoting cycling and sustainable lifestyles

Skills & competences involved

Practical repair skills, interpersonal and mentoring competences, basic technical knowledge, collaboration with local stakeholders.

Key takeaway

Low-tech circular practices can deliver strong environmental and social impact when combined with community engagement and skills development.

Mini Case 6 – Medium-sized private SME | Healthcare services | Türkiye

(based on structured interview conducted within the CREDIT project)

Context

A medium-sized private healthcare SME operating at regional level in southern Türkiye, characterised by high and continuous energy demand and strict environmental and safety requirements.

Trigger / Motivation

Rising electricity costs, the need for energy security in healthcare services, and a strategic decision to reduce the organisation's carbon footprint while complying with environmental regulations.

Key actions implemented

- Installation of a 1 MW on-site Solar Power Plant to cover most energy needs
- Implementation of zero-waste practices and systematic medical waste management
- Introduction of energy- and water-saving measures across hospital operations
- Awareness-raising activities for staff on environmental responsibility

Skills & competences involved

Technical competences in renewable energy systems and waste management, managerial skills in investment planning and regulatory compliance, organisational and communication skills for staff engagement.

Key takeaway

Strategic investment in renewable energy, supported by clear managerial commitment and basic staff training, can significantly reduce costs and emissions even in energy-intensive SME sectors.

Synthesis and Supporting Context: What the Cases Reveal about SMEs and Their Ecosystems

The analysis of the SME mini cases presented in this chapter provides a coherent picture of how small and medium-sized enterprises engage with the green and circular transition in practice. Across countries and sectors, the cases confirm that SMEs are capable of implementing meaningful sustainability actions, even under conditions of limited time,

financial resources and specialised expertise. However, they also reveal that SME action rarely develops in isolation.

From the SME perspective, the cases show that sustainability practices are most often initiated in response to **external drivers**, such as regulatory requirements, rising energy and resource costs, or expectations from customers and value-chain partners. In most instances, SMEs begin with **practical and incremental measures**—for example in waste management, energy efficiency, monitoring routines or circular handling of materials—rather than comprehensive transformation strategies. These entry points allow enterprises to build confidence, internal knowledge and organisational routines before moving towards more ambitious actions.

A consistent finding across the SME cases is that successful implementation depends on the **interaction between managerial and operational competences**. Strategic decisions—such as investing in renewable energy, adopting certification schemes, or redefining service offerings—require leadership, prioritisation and coordination at management level. At the same time, these decisions only translate into results when operational staff possess the skills needed to apply procedures, handle materials, use data and adapt everyday work practices. This confirms that green skills in SMEs are fundamentally **organisational and relational**, rather than purely technical or individual.

At the same time, the broader set of cases analysed within the CREDIT project—including those involving **municipalities, public bodies and professional organisations**—highlights the importance of a **supportive external environment** for SME green transition. Although these actors are not SMEs themselves, their practices create enabling conditions that directly affect SME behaviour and learning opportunities.

Municipal initiatives related to waste management, recycling schemes, zero-waste programmes and environmental awareness campaigns reduce practical barriers for SMEs by providing basic infrastructure, clear rules and shared reference points. Similarly, professional and public organisations contribute by offering technical guidance, facilitating access to expertise, and acting as intermediaries between SMEs and regulatory frameworks. In several cases, these actors also function as **learning brokers**, supporting informal, work-based and peer learning among local enterprises.

Taken together, the cases suggest that SME green transition should be understood as a **multi-actor process**, in which enterprise-level competences interact with local ecosystems of support. SMEs play a central role in implementing practices, but their capacity to do so is shaped by the availability of infrastructure, guidance and coordination provided by public and collective actors.

This synthesis reinforces two key messages of the CREDIT project. First, effective green skills development in SMEs requires attention not only to individual training needs, but also to **organisational roles and competence configurations**. Second, policies and training initiatives are most effective when they recognise and strengthen the **local support**

ecosystems that enable SMEs to learn, experiment and sustain green practices over time. These insights provide a direct bridge to the competence framework presented in the following chapter.

Closing Remarks – From Practice to Competence Development

The SME practices presented in this chapter demonstrate that the green and circular transition is **feasible in diverse business contexts**, even where financial, human and time resources are limited. Across countries and sectors, SMEs adopt sustainability practices not through abstract strategies, but through **concrete decisions, incremental improvements and learning-by-doing**, often triggered by cost pressures, regulatory requirements or value-chain expectations.

A key insight emerging from these cases is that successful implementation depends less on isolated technical solutions and more on the **combination of managerial and operational competences**. Strategic commitment, prioritisation and coordination enable direction and investment, while operational skills, monitoring routines and staff engagement translate intentions into measurable results. Where these competences are aligned—and supported by local ecosystems of municipalities, professional bodies and intermediaries—SMEs are better able to sustain and scale their green practices.

These empirical examples therefore serve a dual purpose. They illustrate **what works in practice** for SMEs navigating the green transition, and they provide concrete evidence for the competence areas identified in the CREDIT research. The next chapter builds on these insights to present the **CREDIT Competence Framework**, translating lessons from practice into a structured reference for training design, capacity building and policy support for SMEs.

Chapter 9 - The CREDIT Competence Framework

The SME practices presented in the previous chapter make one point clear: successful sustainability action depends less on isolated technical solutions and more on how competences are distributed, combined and activated within the enterprise. Across sectors and countries, SMEs that progress beyond fragmented actions are those able to align strategic decision-making with operational implementation and everyday work practices. This chapter translates those empirical insights into the CREDIT Competence Framework—a structured reference that clarifies which green competences matter most for SMEs, how they differ by role, and why their interaction is critical. Rather than defining new “green jobs”, the framework focuses on the gradual greening of existing roles, distinguishing between strategic and operational competences while emphasising the transversal skills that connect them. In doing so, it provides a practical bridge between real-world SME practice, training design and European competence frameworks, setting the foundation for the implementation-oriented modules that follow.

9.1 Purpose and Rationale of the Framework

The CREDIT Competence Framework translates the empirical findings of the project into a **structured and practical reference** for understanding the green skills required by SMEs. It responds to a key insight emerging from the needs analysis and the SME case studies: the green skills gap in SMEs is **not primarily a shortage of specialists**, but a **misalignment of competences across roles** inside the enterprise.

Rather than defining new occupations or narrowly defined “green jobs”, the framework focuses on how **existing roles in SMEs must be progressively “greened”**. It distinguishes between **managerial/strategic competences** and **operational/technical competences**, while recognising that effective sustainability action depends on their interaction.

The framework is designed to:

- support the design of training and capacity-building initiatives,
- guide SMEs in reflecting on internal competence needs,
- and provide a bridge between project evidence and European reference frameworks, notably **GreenComp**.

9.2 Two Complementary Competence Clusters

9.2.1 Strategic and Managerial Green Competences

Strategic and managerial competences are primarily relevant for **owners, senior managers and coordinators**, although they may also be exercised by individuals with hybrid roles in smaller firms.

Based on the CREDIT research, these competences include the ability to:

- interpret regulatory, financial and market signals related to sustainability (e.g. CSRD, supply-chain requirements),
- identify and prioritise material environmental issues for the business,
- integrate sustainability considerations into strategy, investment and business-model decisions,
- mobilise and engage employees, suppliers and external partners,
- manage uncertainty, trade-offs and long-term risks.

These competences enable SMEs to **set direction, legitimise action and allocate resources**, creating the conditions for operational change.

9.2.2 Technical and Operational Green Competences

Technical and operational competences are primarily relevant for **employees and staff involved in production, logistics, maintenance, purchasing and administration**, but they also require managerial support to be effective.

The research identifies key operational competences such as:

- applying energy-, water- and resource-efficiency practices,
- managing waste, materials and logistics sustainably,
- using digital tools for monitoring, data collection and reporting,
- implementing eco-design and circular economy practices,
- complying with environmental procedures and standards.

These competences translate strategic intent into **day-to-day practices and measurable outcomes**, anchoring sustainability in routine work.

9.3 Interaction Between Strategic and Operational Competences

A central finding of the CREDIT project is that **neither competence cluster is sufficient on its own**. Strategic commitment without operational skills remains rhetorical, while

operational improvements without strategic direction tend to remain fragmented and short-lived.

Effective SME green transition occurs when:

- strategic competences guide priorities and investments,
- operational competences deliver concrete improvements,
- and transversal skills (communication, collaboration, adaptability) connect the two.

This interaction explains why SMEs with similar technologies or access to funding can achieve very different outcomes depending on their internal competence configuration.

9.4 Linking the CREDIT Competence Framework to GreenComp

To ensure coherence with European policy and education frameworks, the CREDIT Competence Framework is mapped against **GreenComp**, the EU sustainability competence framework. GreenComp provides a **shared language** for sustainability competences, while CREDIT contextualises these competences for **SME realities**.

Table 3: Mapping CREDIT Competences to GreenComp

CREDIT Competence Area	Typical SME Roles	Relevant GreenComp Area(s)
Sustainability orientation & values	Owners, managers	Embodying sustainability values
Systems thinking & prioritisation	Managers, coordinators	Embracing complexity
Futures orientation & resilience	Owners, managers	Envisioning sustainable futures
Leadership & collective action	Managers, team leaders	Acting for sustainability
Resource-efficient operations	Technical staff	Acting for sustainability
Monitoring & data use	Technical/admin staff	Embracing complexity
Eco-design & circular practices	Designers, engineers	Envisioning futures / Acting
Digital-green integration	Cross-functional roles	Embracing complexity / Acting

This mapping shows that:

- GreenComp does not prescribe job profiles or training programmes,
- CREDIT operationalises GreenComp by translating its competence areas into **role-sensitive SME contexts**,
- and the two frameworks are complementary rather than competing.

9.5 Using the CREDIT Competence Framework in Practice

The CREDIT Competence Framework is intended as a **flexible tool**, not a checklist. It can be used by different actors for different purposes:

- **SMEs** can use it to reflect on internal competence gaps and prioritise learning efforts by role.
- **Trainers and adult education providers** can use it to design modular, work-based learning pathways aligned with SME needs.
- **Policy makers and support organisations** can use it to align funding, advisory services and programmes with real competence demands.

By grounding competence development in empirical evidence and linking it to European reference frameworks, the CREDIT Competence Framework supports **realistic, scalable and context-sensitive approaches** to SME green skills development.

9.6 Link to the Toolkit and Digital Learning Pathways

The competence areas defined in this chapter directly inform the structure of **Part C of the Toolkit** and the associated **open digital learning modules**. Each module addresses a specific combination of managerial and operational competences, ensuring coherence between research findings, practical guidance and training design.

In this way, the CREDIT Competence Framework functions as the **conceptual backbone** of the Toolkit, connecting evidence, practice and learning into a unified approach to SME green transition.

PART C – PRACTICAL TOOLKIT MODULES

Chapter 10 - Strategy & Governance for Sustainable Business

This section explains how SMEs can embed sustainability in their core strategy and governance rather than treating it as a set of isolated green projects. It also introduces the Social Circular Business Model Canvas (SCBMC) as a way to connect environmental and social objectives with how the business creates value.

10.1 Why strategy and governance matter in SMEs

Across Europe, SMEs face growing expectations from regulators, customers, banks and local communities. They are asked to reduce emissions, use resources more efficiently, respect human rights in supply chains and contribute to local well-being, while operating with tight margins and limited staff.

Research shows that in this context sustainability is most effective when it is treated as part of business strategy and management, not only as a compliance issue. Green management practices in SMEs, such as energy efficiency, waste reduction, cleaner production and greener purchasing, can reduce costs and improve competitiveness when they are guided by a clear strategic intent rather than ad hoc initiatives (Mehta & Sharma, 2024). Sustainability oriented management is increasingly associated with innovation, operational performance and resilience, but only when it is integrated into everyday decisions about products, processes and stakeholder relationships (Maman et al., 2024).

Governance is the mechanism that makes this integration real. In small firms' governance is usually informal and person centred. Owners and a small group of managers concentrate decision making power, set priorities and interpret risks. Survey evidence from Central European SMEs shows that how sustainable owners believe their business is depends strongly on their understanding of financial management and on their expectations about future financial viability (Belas et al., 2024). If leaders feel financially insecure, sustainability is often seen as an extra burden. If they understand their financial position and see opportunities in sustainability, they are more likely to treat it as part of long-term strategy.

At the same time, many SMEs declare sustainability or corporate social responsibility in mission statements without translating these commitments into strategy, targets or incentives. Studies of SME green management highlight this gap between talk and governance. Sustainability is mentioned in vision documents but rarely linked to executive accountability or performance measurement (Mehta & Sharma, 2024). For strategy and governance to support sustainable business, this gap has to be closed.

10.2 From scattered actions to a sustainability strategy

Most SMEs start their sustainability journey with practical actions that make intuitive sense: switching to LED lighting, reducing waste, complying with environmental permits, responding to customer questionnaires. These steps are useful but remain limited if they are not linked to a broader view of how the firm intends to grow and compete.

A sustainability strategy in an SME does not need to be long or formal, but it should answer three questions clearly.

First, which environmental and social topics are most relevant for this business and its stakeholders. Studies of European SMEs repeatedly show that the most material issues tend to cluster around a few domains, such as energy and carbon, materials and waste, water, employee conditions and local community relations (Maman et al., 2024). Trying to cover everything usually leads to superficial action on many fronts rather than meaningful progress on a few.

Second, how these topics relate to long term business success. Sustainable growth in SMEs is not only about environmental protection. Owners who see sustainable growth as the joint development of economic, social and environmental performance are more likely to invest in CSR activities that attract customers and in management practices that support long term survival (Belas et al., 2024). In this sense sustainability becomes a way of managing risks, finding efficiencies and differentiating them from competitors.

Third, where the company wants to be in three to five years on these issues. This involves setting a limited number of priorities, such as reducing the carbon intensity of a core process, increasing the share of recycled or certified materials, formalising expectations for suppliers or improving employee participation in improvement initiatives. Work on sustainability-oriented SME strategy emphasises that such priorities are most effective when they are linked to the firm's resource base and capabilities rather than copied from generic checklists (Hu & Kee, 2022). The resource-based view suggests that durable advantage comes from developing internal capabilities that are valuable, difficult to imitate and tailored to the firm's context, for example specialised environmental know-how, trusted stakeholder relationships or a culture of continuous improvement.

Taking together, these elements shift the SME from scattered green fixes toward a sustainability strategy that is anchored in its business logic.

10.3 Linking sustainability to the business model with the SCBMC

To make these choices concrete it helps to look at the business model itself. The Social Circular Business Model Canvas (SCBMC) is a visual tool that adapts the familiar business model canvas to explicitly include circular economy and social value. It follows the approach promoted in circular design work, such as that of the Ellen MacArthur Foundation, which recommends using a standard business model canvas but filling it out

through a circular lens to rethink how value is created, delivered and captured in an interconnected system (Ellen MacArthur Foundation, 2016).

The SCBMC considers the same basic blocks as traditional canvas customers, value propositions, channels, relationships, key activities, key resources, cost structure and revenue streams but adds two explicit lenses.

One is circularity, which focuses on how resources flow through business and where strategies such as reduction, reuse, repair, refurbishing, remanufacturing and recycling can be introduced. For many SMEs, significant opportunities lie in product design, packaging, maintenance and service models that keep products in use longer, or in collaboration with suppliers and recyclers.

The second lens is social value, which examines how the enterprise affects workers, communities and wider society, positively and negatively. It considers working conditions, participation and skills, fairness in dealing with suppliers and customers, and contributions to local development.

Working with the SCBMC is not a one-time exercise. Consistent with circular design principles, it is iterative. Managers and employees may return to canvas several times as they learn from customers, partners and their own operations, gradually filling gaps and refining assumptions. It is normal to discover holes in the first version and to adapt the model as new information and experiments reveal what works in practice (Ellen MacArthur Foundation, 2016). Over time, this iterative process helps align sustainability ambitions with the realities of the business and its wider system.

When managers and key employees complete the SCBMC together they often discover three types of information.

They identify a few activities, resources or relationships whose environmental or social impacts are clearly disproportionate. These become likely hotspots for action. They notice gaps between the sustainability image they project and the reality of operations, which highlight areas of reputational risk. They also surface ideas for new or improved value propositions, such as repair services, leasing models, take back schemes or local skills partnerships, that could strengthen both competitiveness and sustainability.

Once this picture is visible the firm can select a small number of strategic priorities and relate each to specific blocks in the canvas. This helps avoid the situation where sustainability projects are disconnected from the way the business actually creates value.

10.4 Governance mechanisms that make sustainability stick

Defining priorities is necessary but not sufficient. Without some basic governance mechanisms sustainability quickly becomes dependent on a few individuals and loses momentum when other pressures arise.

Research on SMEs points to three management domains that are particularly influential: financial management, CSR and human resource management. In a large survey across four Central European countries, owners who reported stronger understanding of financial management and more optimistic expectations about their firm's financial future were more likely to see sustainable growth as important and to rate their firm as sustainable. CSR activities were also associated with sustainability, especially where owners believed that CSR helped to gain new customers. Human resource practices, such as regular evaluation and skill development, had a weaker direct association, which suggests that many SMEs have not yet connected people management strongly to sustainability in their own thinking (Belas et al., 2024).

These findings have practical implications for governance.

Financial management is a cornerstone. Budgeting, investment appraisal and risk management create the space in which sustainability projects can be funded and maintained. Owners need a clear view of how environmental and social initiatives affect costs, cash flow and risk exposure. Sustainability indicators should therefore be considered together with financial metrics rather than in isolation.

CSR should be understood as part of commercial strategy rather than an add on. When CSR activities support reputation, customer loyalty and access to markets they become easier to justify and maintain. This includes transparent communication, fair treatment of employees and suppliers, and engagement with local communities.

Human resources are a latent lever. Although many owners do not immediately see HRM as a sustainability driver, studies of green management stress the importance of staff competences, motivation and participation in achieving environmental goals (Mehta & Sharma, 2024). Governance mechanisms can start modestly, for example by including environmental responsibilities in job descriptions, linking some performance discussions to sustainability objectives and recognising employee contributions to improvements.

Beyond this triad, sustainable governance in SMEs involves leadership style, digital capabilities and risk orientation. Work on sustainability oriented SME management emphasises the role of leadership that combines long term vision with openness to change and the ability to involve employees in problem solving (Hu & Kee, 2022). Digital tools are increasingly critical for monitoring energy use, emissions and other indicators and for communicating with stakeholders. However, their contribution to sustainability depends on whether management invests in the skills and processes needed to use data effectively.

Finally, sustainable governance is closely linked to risk management. Studies of EU SMEs show that firms that integrate environmental and social factors into risk assessments and planning are better prepared to adopt cleaner technologies and practices and to cope with external shocks (Maman et al., 2024). For SMEs this does not require complex

systems. It means systematically considering environmental and social factors when identifying key risks and when evaluating major decisions.

In sum, governance for sustainable business in SMEs is not about copying the formal structures of large corporations. It is about making a limited set of choices explicit: who is responsible for sustainability, how it enters financial and commercial decisions, how people are involved and how information is collected and used. When these elements are aligned with a clear understanding of the business model and its impacts, sustainability becomes part of how the firm is run rather than an optional extra.

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Chapter 11 - Energy & Carbon Management

Recent survey results show that 93% of EU SMEs have already adopted at least one resource-efficiency measure, such as saving energy or minimising waste, and around one quarter have set a strategy to cut their carbon footprint (European Commission, 2024). This indicates that energy and carbon management are no longer niche concerns but a mainstream part of SME practice.

11.1 Energy audits: identifying opportunities for efficiency

One of the first practical steps an SME can take on this journey is to conduct an energy audit. An energy audit is described in EU guidance as a systematic procedure for obtaining an accurate picture of a business's energy use, identifying cost-effective opportunities to save energy, and reporting the findings (Energy & Water Agency, 2025). In essence, the audit process involves examining where and how energy is consumed, from lighting and heating to machinery and processes, and pinpointing inefficiencies or losses. An audit may reveal outdated equipment, heat leaks in a building, or simply practices that waste electricity. By following a structured approach that typically includes data collection on energy bills, site inspections and analysis of systems, SMEs can prioritise which energy-saving measures will yield the greatest benefits.

Many countries and regions offer support to SMEs for such audits. EU policy explicitly encourages Member States to develop programmes that help SMEs undergo energy audits and implement the recommendations (European Commission, 2018). This recognises that, while energy audits are mandatory for large enterprises, they are equally valuable for smaller firms if made accessible.

The benefits of energy audits for SMEs are well documented. First are the financial gains. By identifying efficiency improvements, audits help companies cut unnecessary energy use, directly lowering utility bills and improving profit margins (Energy & Water Agency, 2025). Implementing no- or low-cost measures, such as optimising heating settings or fixing compressed-air leaks, can often produce immediate savings. Over time, these savings can far exceed the upfront cost of the audit and any equipment upgrades.

There are also significant operational benefits. Energy audits often uncover ways to improve the working environment and productivity. Better insulation and ventilation can enhance employee comfort and equipment performance. Streamlining energy use can make operations more reliable, with fewer outages or maintenance issues, and can improve safety as inefficient systems are brought up to standard (Energy & Water Agency, 2025). The environmental benefits are equally clear. By acting on audit findings, SMEs reduce their greenhouse-gas emissions and environmental footprint, contributing to climate goals and often improving their standing with environmentally conscious clients and partners (Energy & Water Agency, 2025).

In practical terms, an energy audit provides a roadmap for SMEs to cut energy waste and costs. Managers can hire certified energy auditors or use public programmes that offer free or subsidised audits for small businesses. The process typically involves a walkthrough of facilities, analysis of energy data and a report with recommended measures ranked by cost-effectiveness. Acting on these recommendations, whether upgrading to efficient lighting, servicing heating and cooling systems or optimising production processes, allows SMEs to achieve quick wins in both energy savings and carbon reduction. Establishing a habit of periodic audits, for example every few years, helps maintain continuous improvement. As one European guide puts it, undertaking an energy audit reduces energy use, lowers bills and supports the reduction of the company's carbon footprint while revealing new opportunities to conserve energy (Energy & Water Agency, 2025). For a small business aiming to combine sustainability with profitability, energy audits are an essential starting point.

11.2 Integrating renewable energy in SME operations

Alongside improving efficiency, integrating renewable energy sources is a powerful way for SMEs to reduce carbon emissions and stabilise energy costs. The 2024 Eurobarometer survey reports that 12% of European SMEs already generate renewable energy on site, for example via solar panels on their premises, and about 23% purchase their electricity from renewable suppliers (European Commission, 2024). This trend reflects both falling costs of renewable technologies and growing awareness of their long-term benefits. By producing clean energy or sourcing green power, businesses can significantly lower their Scope 2 carbon emissions, those associated with purchased electricity, and in many cases their energy bills.

Solar photovoltaic panels on a roof can provide low-cost electricity after the initial investment, with surplus power in some systems sold back to the grid or stored for later use. Small biomass boilers or solar water heaters can replace or supplement fossil-fuel heating, reducing fuel expenses. The business case for such investments is increasingly positive. Empirical work finds that renewable energy is viewed by firms as a viable alternative to traditional sources and a strategic investment for long-term sustainability and cost savings (Drosos et al., 2021). Managers recognise that renewables reduce emissions and dependence on volatile fossil-fuel markets while paying for themselves through energy cost avoidance and improved energy security.

SMEs have several practical avenues to integrate renewables. On-site generation is a prominent option; solar panels are particularly common because they are modular and suitable for rooftops or small land areas. Many small businesses, from factories to farms, have installed solar systems, often supported by incentives or favourable financing. Others have adopted biomass heating or, where conditions allow, small wind turbines. Another approach is participation in energy communities or cooperatives, where multiple SMEs and households jointly invest in local renewable projects and share the clean power generated.

When on-site production is not feasible, SMEs can pursue green procurement of energy by choosing utility providers that offer 100% renewable electricity. This allows even office-based or urban SMEs to claim a largely carbon-neutral electricity supply. Green procurement can extend beyond energy to other inputs as well, for example sourcing raw materials or products from suppliers that rely on renewable energy, indirectly supporting decarbonisation in the supply chain.

Incorporating renewables often yields reputational and competitive advantages. SMEs can present themselves as clean energy users, appealing to environmentally conscious customers and business partners. Guidance for small businesses emphasises that visible climate action can strengthen brand loyalty and open up new market opportunities (EcoHedge, 2024). Early adoption of renewables can also protect businesses against tightening carbon regulations or rising energy and carbon prices (EcoHedge, 2024). A small manufacturing firm that invests in a solar array today will cut its current electricity costs and buffer itself from future changes in grid energy prices or climate-related charges.

Case material from European SME networks illustrates these benefits. For example, one local supermarket combined the installation of rooftop solar panels with energy-efficient refrigeration and lighting, achieving immediate financial returns while significantly reducing emissions (SMEunited, 2024). A bakery that installed solar PV, heat pumps and heat-recovery systems reported major cuts in both energy use and CO₂ emissions, demonstrating that even small enterprises can successfully implement ambitious low-carbon energy strategies (SMEunited, 2024). These examples show that renewable integration is technically and economically feasible for SMEs when it is planned in connection with broader energy-efficiency measures.

11.3 GHG accounting basics for SMEs (Scopes 1, 2 and 3)

To manage carbon emissions effectively, SMEs need a basic understanding of their greenhouse-gas footprint. Greenhouse-gas accounting may sound complex, but its core structure is straightforward and increasingly accessible to smaller firms. The widely used Greenhouse Gas Protocol provides a standardised framework that divides emissions into three “scopes” (World Resources Institute & World Business Council for Sustainable Development, 2004).

Scope 1 covers direct emissions from sources that an organisation owns or controls. For a typical SME this includes emissions from on-site fuel combustion, such as gas boilers, process heat or diesel generators, as well as fuel used in company vehicles. Scope 2 accounts for indirect emissions from purchased energy, primarily electricity and also district heating, cooling or steam. Although the SME does not emit these gases at its own facility, the power plant that generates the energy does, so these emissions are associated with the company’s energy demand. Scope 3 encompasses all other indirect emissions along the value chain of the company’s activities. This broad category can include

emissions from producing purchased materials, business travel, employee commuting, waste disposal, distribution and transport, and in many cases the use and end-of-life of products. For many businesses, Scope 3 represents the largest share of total emissions (World Resources Institute & World Business Council for Sustainable Development, 2015).

For SMEs beginning to assess their carbon impact, a pragmatic approach is to start with the sources that are easiest to measure and most under the company's control. Typically this means focusing first on Scope 1 and Scope 2 emissions (EcoHedge, 2023). Tracking fuel use, for example litres of diesel or cubic metres of natural gas, and electricity consumption from utility bills provides a straightforward basis to calculate these emissions using standard emission factors. Many national agencies, energy suppliers and international initiatives provide free tools to convert energy data into tonnes of CO₂ equivalent. By establishing a baseline inventory of Scope 1 and 2 emissions for a given year, an SME can identify its carbon "hotspots", such as an inefficient boiler or energy-intensive process, and set targets for reduction.

Over time, as capability grows, the company can extend its accounting to relevant Scope 3 categories. This is becoming important as larger companies, which are often the key clients of SMEs, increasingly ask for information on the carbon footprint of their suppliers. Understanding key Scope 3 categories helps an SME respond to such requests and identify further opportunities, for instance by choosing low-carbon suppliers, optimising logistics or working with customers on lower-impact product use.

GHG accounting should follow a few core principles: relevance, completeness, consistency, transparency and accuracy (World Resources Institute & World Business Council for Sustainable Development, 2015). In practice, this means including all significant emission sources in the inventory, using consistent methods from year to year so that progress can be tracked, and being open about any exclusions or estimates. Even if an SME's emissions are relatively modest, a rigorous approach demonstrates credibility and commitment, which is increasingly valued by partners and investors. The process often reveals inefficiencies that the company can address. A basic inventory might show that a disproportionate share of emissions comes from electricity, strengthening the case for efficiency or renewable investments, or it might highlight that company vehicles are a major source, prompting a shift to more efficient vehicles or better route planning.

By quantifying emissions, SMEs can monitor their progress over time, for example by aiming to cut emissions by 5 or 10 per cent per year through targeted measures, and adjust strategies if the data show they are off track. Many SMEs now publicly report their carbon footprints or set net-zero targets in initiatives such as the SME Climate Hub, using the GHG Protocol as a reference framework. While comprehensive sustainability reporting may still be beyond the immediate scope of many small firms, basic GHG accounting is increasingly part of modern business practice. It allows an SME to communicate its climate efforts credibly and to align with emerging regulatory and market expectations for transparency. Studies suggest that companies, including smaller ones, that actively

reduce their carbon emissions tend to see improved financial performance over time, likely due to efficiency gains and better risk management (Ibishova et al., 2024). Carbon accounting is therefore not just an administrative exercise but a strategic management tool that helps identify where cutting emissions and cutting costs coincide.

11.4 Managing energy and carbon in practice

For SME managers, a central challenge is deciding which sustainability actions to pursue first and ensuring that these efforts support, rather than disrupt, business performance. A sensible approach is to prioritise carbon-reduction initiatives that also offer clear economic returns, the “low-hanging fruit”. Energy-efficiency improvements identified in audits, such as improving insulation, optimising production processes or upgrading inefficient equipment, often have short payback periods and immediately reduce operating costs. Calculating simple metrics like return on investment or payback time for each project helps managers rank actions by their impact and feasibility. It usually makes sense to implement no- and low-cost measures straight away, then plan capital investments, such as new machinery or on-site renewable energy, that deliver larger emissions cuts and cost savings over the medium term. Considering synergies between actions is also important; for instance, improving efficiency can reduce the required size and cost of a future solar installation. When carbon reduction is treated as part of business optimisation, rather than a separate agenda, it becomes easier to embed in the company’s overall strategy.

Once actions are under way, monitoring progress is vital. SMEs should establish a small set of key performance indicators that track both environmental and business outcomes. Typical sustainability indicators include total energy consumption, energy cost savings, greenhouse-gas emissions (total or per unit of product) and waste generation. Many firms find it useful to relate some metrics to business activity, for example energy per unit of output or emissions per unit of revenue, so that improvements are not confused with changes in business volume. Regular monitoring, whether monthly, quarterly or annually, allows the firm to see trends and verify that initiatives are delivering expected results. If an equipment upgrade was supposed to cut electricity use by 10 per cent but data show little change, managers can investigate and adjust. Monitoring also helps in setting realistic future targets and keeping the team accountable. Some SMEs assign a specific person or small team to oversee sustainability indicators and integrate them into routine management reviews. Digital tools such as smart meters, basic energy-management software or simple spreadsheets can all support this process. The key is making performance visible and understandable across the organisation.

Aligning carbon-reduction goals with core business objectives is essential. One practical way is to link sustainability indicators with financial indicators, for example tracking how energy savings improve profit margins or how waste reduction lowers disposal costs. This helps employees see carbon management as part of improving efficiency and resilience, not just as an ethical obligation. Companies that lead in this area often embed

sustainability directly into their mission and values, making clear that resource efficiency and environmental responsibility are integral to their identity. Evidence suggests that firms that actively manage environmental performance tend to be more innovative and better at long-term planning, which can strengthen competitiveness (Castillo-Vergara et al., 2023).

For SMEs, climate action is increasingly associated with market opportunities. A recent global survey by the SME Climate Hub found that among small businesses taking climate measures, most did so to enhance brand reputation, differentiate from competitors and meet customer demand (SME Climate Hub, 2025). Many large corporations now prefer suppliers with strong low-carbon credentials, and consumers often favour brands that can demonstrate credible climate action. By anticipating these trends, SMEs can position themselves as preferred partners in value chains and appeal to a growing base of environmentally conscious customers. Aligning with carbon-reduction goals can also improve access to finance, as banks and investors are beginning to assess small businesses on environmental criteria and to offer better terms for green investments.

Finally, managers need to foster a culture of continuous improvement and engagement around sustainability. This involves communicating goals and progress to employees and encouraging staff at all levels to suggest improvements, since they often notice energy waste or inefficiencies in day-to-day operations. Celebrating milestones, such as achieving a significant emissions reduction or reaching a renewable-energy target, reinforces the importance of these efforts and supports motivation. Over time, what starts as a sustainability initiative becomes simply “the way we do things here”. Environmental metrics sit alongside revenue, quality and customer satisfaction as part of the organisation’s definition of success. Research following thousands of companies indicates that those which intensify carbon-reduction efforts see significant improvements in financial indicators such as return on assets and equity, particularly in more carbon-intensive sectors (Ibishova et al., 2024). Even on a smaller scale, the lesson is clear for SMEs: proactive energy and carbon management can drive efficiency, innovation and competitiveness and help ensure the business thrives in a low-carbon economy.

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Chapter 12 - Water Stewardship

Water is becoming a strategic issue for European businesses. Droughts, floods and ageing infrastructure create increasing pressure on water availability and quality, while regulation is shifting from a narrow “supply and discharge” view to a broader stewardship approach. The EU Water Framework Directive requires all Member States to achieve good status for their waters and to manage rivers, lakes and groundwater in an integrated, basin based way that prevents deterioration and balances ecological needs with human use (Voulvoulis et al., 2017). At the same time, water economics in the Directive emphasise that users should bear not only the financial costs of water services but also environmental and resource costs, in line with the polluter pays principle (OECD, 2023). Inefficient or polluting water use is therefore likely to become more expensive over time.

The risks are not theoretical. Between 2021 and 2023, weather and climate related extremes caused more than EUR 160 billion in economic losses in Europe, with SMEs particularly vulnerable to higher operating costs, disrupted supply chains and uninsured damage (SMEunited, 2025). Around 30 per cent of the European population and 20 per cent of its territory already experience annual water stress, with Southern Europe hardest hit but challenges now visible in countries such as Germany, the Netherlands and Belgium (SMEunited, 2025). In some regions, water restrictions, leaks and resource competition have driven operating cost increases of 10 to 15 per cent for SMEs in water dependent sectors such as food processing, textiles, landscaping and tourism. Flood events have doubled since 2014, and in several areas SMEs have reported revenue losses of up to 30 per cent after flooding, often with low insurance coverage (SMEunited, 2025).

Globally, projections suggest that water demand will exceed available supply by around 40 per cent by 2030 (Allianz Care, 2025). Since SMEs account for roughly 90 per cent of businesses worldwide, their cumulative water footprint and their potential contribution to water conservation are significant. Sustainable water management is therefore not only an environmental responsibility but also a way to protect against shortages, price spikes and operational disruptions (Allianz Care, 2025).

The good news is that many SMEs are already moving in this direction. The 2024 Eurobarometer survey found that almost half of EU SMEs have adopted measures to save water as part of their broader resource efficiency efforts (European Commission, 2024). Water stewardship is about turning these scattered actions into a coherent approach that protects both the business and the local water environment.

12.1 Understanding water use and risk in an SME

The first step is to understand where and how water matters for business. For most SMEs, water issues fall into three overlapping dimensions.

Operational use and costs

This is the water that appears on the company's bills or is abstracted directly. Typical uses include process water in manufacturing, cleaning, cooling, irrigation in agriculture or horticulture, and domestic uses such as toilets and kitchens. Leaks, inefficient fixtures and poor housekeeping can significantly increase consumption and costs, especially where tariffs are rising or wastewater charges are based on metered use. At the system level, about a quarter of the water treated in European distribution networks is lost through leakage, and in some countries, losses can reach 60 per cent, amplifying scarcity and cost issues for end users, including SMEs (SMEunited, 2025).

Water quality and compliance

Discharges from processes or cleaning can affect local water quality. Only around a quarter of EU surface waters currently meet the Directive's chemical status objectives, with hazardous substances such as heavy metals, nutrients and persistent pollutants acting as major barriers. If ubiquitous, persistent substances were removed from the assessment, more than 80 per cent of surface waters would already reach the objectives (SMEunited, 2025). Small businesses mainly contribute to water pollution through wastewater, which may contain oils, metals, nitrogen, phosphorus, detergents or per- and polyfluoroalkyl substances (PFAS). Companies that do not control what leaves their site risk noncompliance, fines or reputational damage in the local community.

Value chain and location risk

Water risks rarely stop at the fence line. Suppliers may depend on water intensive raw materials from stressed river basins, while customers and neighbours may compete for the same resource during droughts. Analyses of European water resilience underline that water scarcity already poses macro-economic risks and that water reuse and efficiency will need to increase significantly by 2030 (Water Europe, 2024). For SMEs in sectors such as agriculture, food, textiles, chemicals or tourism, the reliability of local water resources can directly affect continuity of operations.

A further nuance, stressed by SME representatives, is the difference between water use and water consumption. Some sectors, such as pulp and paper, return most of the abstracted water to the environment after treatment, while others consume a larger share through evaporation or product incorporation (SMEunited, 2025). For SMEs, understanding whether they mostly use and return water or genuinely consume it can help in designing fair and effective reduction targets.

A practical way for managers to grasp these issues is to map the company's water footprint in simple terms: where water enters, where it is used, where it leaves, and which parts of the process would be most vulnerable if supplies were restricted, prices rose or regulations tightened.

12.2 Water stewardship approaches and standards

Water stewardship goes beyond internal efficiency. It is about understanding shared water challenges in the catchment and working with others to address them. The Alliance for Water Stewardship defines stewardship as the use of water that is socially and culturally equitable, environmentally sustainable and economically beneficial, achieved through stakeholder inclusive processes (Alliance for Water Stewardship, 2023). Businesses using a stewardship approach, with or without formal certification, typically see benefits such as increased water efficiency, strengthened stakeholder relationships, improved local water quality and better information for investors and disclosure initiatives (CRESS, 2021).

Case work with micro, small and medium enterprises in industrial parks and supply chains shows that implementing a water stewardship standard can deliver economic benefits through reduced water and energy use, while also raising environmental performance across clusters of firms (WWF, 2017). This is particularly relevant for SMEs located on shared sites where infrastructure and risks are common.

For SMEs that want a structured but flexible framework, the ISO 46001 standard on water efficiency management systems offers one useful reference. ISO 46001 sets out requirements for establishing, implementing and maintaining a water efficiency management system based on a reduce, replace or reuse approach. It can be applied by organisations of any size and is designed to integrate with other management systems such as ISO 9001 and ISO 14001 (ISO, 2019). The standard focuses on measuring water use, identifying saving potentials, setting objectives and implementing plans to improve water performance, with certification available for organisations that want external validation (DQS, 2024).

Full certification will not be necessary or realistic for every SME. What matters is adopting the underlying logic: measure water use, set clear objectives, monitor performance and continuously improve, while keeping an eye on local catchment conditions and stakeholder concerns.

12.3 A simple water stewardship plan for SMEs

A practical water stewardship plan for an SME can be built around five steps.

Step 1: Establish a water baseline

Collect recent water bills and, where possible, meter readings to understand total annual consumption and costs. Break this down by major uses if feasible, for example production, cleaning, irrigation and sanitary uses. Even a rough breakdown can reveal hotspots, such as a single process step, an ageing piece of equipment or a leaking distribution line that uses disproportionate amounts of water. Where possible, record both total abstraction

and, if relevant, net consumption, so that improvements can be related to changes in productivity.

Step 2: Identify hotspots and risks

Walk through the site and processes to look for visible waste and risk points: leaking taps or pipes, continuously running hoses, inefficient cleaning practices, uncontrolled cooling water flows or poorly maintained irrigation. Combine this with a brief review of local conditions. Are there already seasonal restrictions on water use. Is the area prone to droughts or floods. Are there sensitive ecosystems or communities downstream. Material on national river basin management plans, prepared under the Water Framework Directive, can provide useful context on the status and pressures of local water bodies (Voulvoulis et al., 2017).

Step 3: Set targets and indicators

Based on the baseline and hotspot analysis, set a small number of clear, realistic targets. Examples include reducing total water use by a certain percentage over three years, cutting leaks to a defined level, or ensuring that all wastewater discharges consistently meet or exceed legal requirements. Indicators might include cubic metres of water per year, litres per unit of product, or water cost per unit of revenue. Guidance for European businesses on environmental key performance indicators suggests that normalising data in this way improves comparability over time and between sites (UK Department for Environment, Food and Rural Affairs, 2006). Targets should be proportionate and take account of the specific sector and processes, in line with the “Think small first” approach advocated by SME organisations (SMEunited, 2025).

Step 4: Implement efficiency, reuse and treatment measures

Many effective measures are low cost and quick to implement. Repairing leaks, installing low flow taps and toilets, using water efficient appliances, adjusting cleaning schedules, shutting off unnecessary flows and training staff to report problems can all produce rapid savings (Allianz Care, 2025). More capital intensive options include upgrading process equipment, installing recirculation or closed loop cooling systems, capturing rainwater for non potable uses such as cleaning or irrigation, or treating and reusing some process water as greywater for flushing or cooling.

In some sectors, there may be opportunities for nature based solutions. Landscaping that uses drought tolerant species, bioswales, rain gardens or permeable surfaces can reduce irrigation needs and improve local flood absorption and biodiversity. Examples from SME cooperatives show that such approaches can cut irrigation requirements by around 40 per

cent while enhancing resilience to heavy rainfall (SMEunited, 2025). In industrial areas, digital tools such as smart meters and leak detection sensors have reduced water losses by up to 30 per cent in some pilots, pointing to an emerging role for affordable “smart water” solutions for SMEs (SMEunited, 2025).

Where SMEs use chemicals or detergents, water stewardship should include reviewing substance use and wastewater practices. Tools such as Subsport Plus, which helps identify safer alternatives and provides access to substitution support, can guide SMEs in phasing out hazardous substances and reducing the burden on wastewater treatment systems (SMEunited, 2025). In some locations, it may be more cost effective to develop shared pre treatment or small scale treatment facilities with other firms on the same site, rather than each SME investing alone.

Step 5: Engage people and partners

Experience from water stewardship programmes for small enterprises shows that training and awareness are central for success (WWF, 2017). Operators and cleaning staff often know where water is being wasted and can suggest practical improvements. Engaging them in setting targets, monitoring use and recognising achievements helps embed good practices. Simple measures such as visible water use dashboards, suggestion schemes and small rewards can maintain motivation.

Externally, building relationships with local water utilities, river basin authorities, municipalities and community groups can provide early warning of upcoming restrictions or regulatory changes and open doors to support schemes or co funded projects. Allianz Care (2025) notes that collaboration with local communities on joint conservation initiatives can strengthen social licence and reputation. At a wider level, SMEs can monitor information from early warning systems, such as European drought and flood observatories, via public channels, to anticipate and plan for extreme events that might affect their sites or supply chains (SMEunited, 2025).

Typical barriers for SMEs include limited awareness of their water impact, the perception that upfront investment costs are prohibitive and a lack of in house expertise to design and implement measures (Allianz Care, 2025). These can be reduced through targeted information and tools, financial support schemes that lower initial costs and access to external technical assistance. Many sector associations, chambers of commerce and public agencies now offer guidance, training and, in some cases, grants or preferential loans for water efficiency and resilience projects.

12.4 Water stewardship as part of resilience and competitiveness

Water stewardship is sometimes perceived as a purely environmental responsibility. In reality, it is closely linked to business resilience, cost control and competitiveness. European level analysis values water's contribution to the economy at around EUR 11 trillion, highlighting its systemic importance (Water Europe, 2024). As recovery of environmental and resource costs becomes more prominent in water pricing, inefficient or polluting water use will increasingly show up in company accounts (OECD, 2023). From a managerial perspective, the benefits of sustainable water management for SMEs can be grouped into five categories (Allianz Care, 2025).

Environmental benefits

Reduced strain on local water resources and ecosystems, lower pollution loads and contributions to achieving basin level objectives under the Water Framework Directive.

Financial savings

Lower water and wastewater bills through leak repair, efficient fixtures, water saving technologies and recycling, often with short payback times. In some cases, efficiency measures also reduce energy costs.

Reputational advantages

A better sustainability profile with customers, employees, investors and local communities. Many buyers now look for suppliers that can demonstrate responsible resource use, especially in sectors where water is a visible concern.

Regulatory compliance

Easier and more predictable compliance with permits and regulations, reduced risk of fines or forced shutdowns and a stronger position in discussions with regulators and inspectors.

Operational resilience

Improved ability to cope with water restrictions, droughts or floods, reduced dependency on stressed infrastructure and lower risk of sudden interruptions to operations.

SMEs also have opportunities on the solutions side. The SMEUnited position paper on water resilience highlights that small firms are key innovators in digital monitoring, circular water practices and nature-based solutions, and that their products and services can help other actors in the water system adapt (SMEUnited, 2025). For example, SMEs specialise in leak detection technologies, low water use equipment, local treatment systems and climate resilient landscaping. Water stewardship is therefore not only about defensive risk management, but also about identifying new business opportunities.

Access to finance is a recurring concern. Many SMEs face high upfront costs and high interest rates for investments in water saving or resilience measures. SME organisations argue that water related investments that generate wider public benefits, such as pollution reduction or climate adaptation, are legitimate targets for grants, guarantees and blended finance under instruments such as InvestEU or national support schemes (SMEUnited, 2025). For individual firms, this means it is worthwhile to actively search for grant calls, incentive programmes and risk sharing instruments at local, national and EU level, and to discuss water-related projects with banks and investors as part of broader sustainability plans.

Insurance and early warning also play a role. Low insurance coverage for water related damages makes SMEs particularly vulnerable to floods and other extreme events. Improving coverage, along with better use of EU solidarity and civil protection mechanisms at national level, can help reduce the impact of shocks (SMEUnited, 2025). At company level, integrating publicly available flood and drought forecasts into contingency planning can support timely decisions about stock levels, alternative suppliers or temporary adjustments to operations.

Overall, water stewardship should be seen as part of normal business planning rather than as an optional add on. For SMEs, a simple plan that measures use, manages risks, engages staff and cooperates with local partners can deliver tangible cost savings, reduce exposure to physical and regulatory risks and strengthen their position in markets and value chains that are becoming more sensitive to water issues. Evidence from broader environmental management shows that firms which actively manage environmental performance tend to be more innovative and better at long term planning and often enjoy competitive advantages (Castillo-Vergara et al., 2023). In an increasingly water constrained Europe, SMEs that treat stewardship as a strategic topic are likely to be more resilient and attractive partners for customers, financiers and communities.

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Chapter 13 - Materials, Eco-Design & Circularity (LCA-lite)

Sustainability in SMEs is often discussed in terms of energy, emissions or reporting. Yet for many businesses, the biggest environmental and cost impacts sit in the materials they buy, how products are designed, and what happens to those products at end of life. Decisions taken at design stage largely determine resource use, waste generation and circular opportunities later on. The circular economy agenda and new EU policies on sustainable products increasingly make this a strategic issue for SMEs, not only a technical one.

The circular economy is not a niche idea. It is central to European environmental and industrial policy and is recognised globally to cut greenhouse gas emissions and resource use while opening new business opportunities. The Ellen MacArthur Foundation estimates that applying circular economy strategies in just five material-intensive sectors could eliminate almost half of remaining emissions from goods production by 2050. At the same time, EU initiatives on sustainable products and packaging are pushing manufacturers and suppliers, including SMEs, to improve durability, reparability, recyclability and recycled content.

For SMEs, all of this can feel abstract or overwhelming. The aim of this module is to make it concrete. It focuses on three practical levels: designing better products and packaging, using materials more intelligently, and applying a simplified life-cycle perspective that fits limited SME capacities.

13.1 Why materials and design matter for SMEs

In traditional linear models, value is created by selling as many products as possible and replacing them frequently. Resources are extracted, transformed into products, used briefly, then discarded. The costs of resource depletion, waste and emissions are largely externalised. The circular economy challenges this logic by trying to keep materials at their highest value for as long as possible through durability, repair, reuse, remanufacturing and high-quality recycling.

For SMEs, the implications are both environmental and economic:

- Materials and components are often among the largest cost items in production. Using less material, extending product life or reusing components can improve margins directly.
- Waste disposal, especially of hazardous or bulky materials, is a non-trivial cost that can be reduced by prevention, reuse and recycling.
- Customers, especially business and public-sector clients, increasingly look at the environmental profile of products, including material choices and packaging.
- Regulations on eco-design, packaging and waste are tightening. Designing with these requirements in mind avoids future compliance shocks.

Empirical work on European SMEs shows that those adopting eco-design and circular practices tend to achieve “factor four” or higher gains in resource productivity, meaning they can deliver the same function with a fraction of the material, energy and waste of conventional competitors. Case studies compiled by Eurofound highlight small firms that, by rethinking product design and material flows, reduced waste costs, opened niche markets and strengthened local supplier relationships.

From a managerial perspective, materials and design are therefore not a side issue, but a lever for cost reduction, innovation and compliance preparedness.

13.2 Eco-design as everyday management practice

Eco-design means systematically integrating environmental considerations into product and service design alongside cost, quality and aesthetics. ISO 14006 provides formal guidance on how to embed eco-design into an existing environmental management system, but its core ideas can be applied by SMEs even without formal certification: understand environmental aspects of products, set eco-objectives, and integrate them into design routines and criteria.

Recent European projects on sustainable product development in SMEs underline that eco-design is as much a management issue as a technical one. The CURIOST project, for example, worked with SMEs and small mid-caps in several manufacturing sectors and found that companies evolve through different “transformation levels”:

- Level 0: no systematic consideration of sustainability in product development; occasional ad hoc improvements.
- Level 1: compliance-driven; environmental aspects considered only to meet regulations or customer checklists.
- Level 2: efficiency-driven; structured efforts to reduce material and energy use, supported by simple tools and targets.
- Level 3: innovation-driven; sustainability becomes a driver of differentiation and new business models.

Many SMEs sit around level 1 or 2. Moving towards level 3 does not mean becoming a research lab. It means formalising a few practical elements:

- Clear eco-design objectives, such as reducing material use per unit, increasing recycled content or extending product lifetime.
- Simple design rules, for example “avoid mixed materials that cannot be separated”, “prefer easily recyclable plastics and clear labelling”, or “design joints that can be disassembled with basic tools”.
- Early involvement of production, purchasing and service staff in design discussions to ensure circular ideas are feasible in practice.

The CURIOST work also points out that eco-design is easier when supported by sector-specific examples, because SMEs often lack capacity for generic LCA studies and need concrete patterns relevant to their products.

In practice, eco-design can be integrated into existing gates in the development process. For example, when approving a new product concept, managers can ask:

- How much material is required per functional unit, and can it be reduced?
- How easy will it be to maintain, repair or upgrade this product?
- What is the expected lifetime, and can it be extended?
- What happens at end of life, and can high-quality recycling or reuse be enabled?

These questions do not require a full LCA model, but they do require consistent attention. Over time, the answers become part of the company's design DNA.

13.3 Life-cycle thinking in an “LCA-lite” mode

Life-cycle assessment (LCA) is a well-established method for quantifying environmental impacts of products from raw material extraction to end of life. However, full LCAs are often too complex and resource-intensive for SMEs to apply routinely. Recognising this, the UNEP Life Cycle Initiative and others have promoted more pragmatic “hotspot” approaches that help businesses focus on the stages and issues that matter most without exhaustive modelling.

An “LCA-lite” approach for SMEs typically involves four steps:

1. Map the life cycle in plain language: list the main stages (raw materials, manufacturing, distribution, use, end-of-life) for a key product or service.
2. Identify hotspots qualitatively: where are the largest resource inputs, emissions, or costs likely to occur; for example, energy-intensive production, high-impact materials like aluminium, long transport distances, or problematic waste streams.
3. Select a few indicators: such as material use per unit, recycled content, energy use in manufacturing, product lifetime, proportion of recoverable materials, or packaging to product ratio.
4. Test improvement options: compare alternative designs or supplier options against these indicators to see which direction is better.

UNEP's work on the business case for life cycle thinking emphasises that even simple hotspot analyses can uncover “no-regret” options that reduce environmental impact and costs simultaneously, such as switching to less wasteful packaging formats or optimising component sizes to standard sheet dimensions.

For SMEs, the key is to keep it manageable. Rather than aiming for perfect knowledge across entire portfolios, it is more realistic to:

- Focus initially on one or two high-volume or high-impact products.
- Use supplier data and generic databases where available but accept that some numbers will be estimates.
- Concentrate on decisions that are under the company's control, such as material choices, design features and packaging, rather than trying to model global value chains in detail.

As understanding grows, life-cycle thinking can gradually be extended to more products and integrated with energy and carbon management work already being done under other modules.

13.4 Circular strategies for products, packaging and services

Moving from analysis to action means adopting concrete circular strategies. A useful way to think about this is to consider how a product's value can be preserved or extended at different stages, from design and production through use and end-of-life. Practical guidance tailored to SMEs identifies several recurring patterns.

Designing for durability, repair and upgrade

Making products more robust, easier to repair and upgrade is one of the most powerful circular strategies. This can involve:

- Using higher-quality components in critical parts to extend lifetime.
- Designing joints and housings so they can be opened and reassembled with standard tools.
- Providing spare parts and clear repair instructions, either in-house or through local partners.

Eurofound's collection of SME case studies describes firms that redesigned tools and furniture for durability and modularity, enabling cheaper repairs, longer use and attractive service contracts. Such strategies not only reduce waste but can create new revenue streams in maintenance, refurbishment or certified second-hand sales.

Smart material choices and reducing waste

Choosing more sustainable materials is not only about swapping one plastic for another. It involves rethinking material intensity and waste across the value chain. SMEs can:

- Reduce material use per product by optimising dimensions and eliminating unnecessary components.

- Prefer materials with established recycling systems and avoid hard-to-separate composites.
- Increase the share of recycled content where quality and safety allow.

Analyses for the European circular economy strategy note that improving product design and materials can significantly cut waste volume and toxicity, reducing downstream treatment costs and environmental risks.

Several SME support initiatives show that simple interventions – such as standardising materials to fewer types, redesigning cutting patterns, or working with suppliers to return offcuts – can drastically cut production waste.

Circular packaging

Packaging is a visible area where customer expectations and regulation are evolving quickly. The EU's work on a revised Packaging and Packaging Waste Regulation is pushing towards reusable systems, higher recycled content and better recyclability. SMEs can respond by:

- Reducing empty space and material overuse in packaging.
- Switching from multi-layer, hard-to-recycle films to mono-material or fibre-based options where appropriate.
- Introducing reusable packaging in B2B relations, for example returnable crates or pallets.

Consumer research suggests that customers increasingly value environmentally friendly packaging and that clear communication about packaging choices can enhance brand perception.

Product-service systems and new revenue logics

Circularity is not only about materials. It also implies reconsidering how value is delivered. Instead of one-off sales, SMEs can experiment with service-based models where they retain ownership of products and earn revenue through leases, subscriptions or pay-per-use schemes. This incentivises durability and efficient maintenance, since the provider benefits from keeping products in service longer.

Examples include:

- Leasing equipment rather than selling it outright, with preventive maintenance built into the offer.

- Offering “product as a service” models, such as lighting, printing or textiles, where clients pay for performance and the provider manages refurbishment and end-of-life.

These models are not appropriate for every SME, but even modest steps, such as offering extended warranties or maintenance contracts, can shift incentives towards longer product life and stronger customer relationships.

Reverse logistics, partnerships and industrial symbiosis

Circular strategies usually require new collaborations. SMEs rarely control all steps of the value chain, so closing loops depends on partners willing to take back materials or supply secondary raw materials. Recent guidance for SMEs highlights opportunities in:

- Collaborating with waste management firms or recyclers to establish take-back schemes for products or packaging.
- Joining local or sectoral networks to exchange by-products and waste streams, for example one firm’s organic waste becoming another’s input.
- Participating in industrial or business clusters focused on circular economy, which can offer shared logistics, common infrastructure or joint marketing.

The iED article on circular economy challenges and opportunities for SMEs stresses that limited resources, knowledge gaps and supply-chain complexity are major barriers, but that collaboration and knowledge sharing are among the most effective ways to overcome them.

Digital tools for circularity

Digitalisation can support circular strategies by improving traceability, monitoring and coordination. For example, QR codes and product passports can store information on materials and components to facilitate repair and recycling. Inventory and data systems can help manage refurbished or secondary products. While full digital product passports may be a longer-term ambition, SMEs can start by capturing basic product information in structured form and sharing it with key partners.

13.5 Making circularity manageable in SMEs

All of these strategies raise a practical question: how can a small or medium-sized business move in this direction without being overwhelmed? The evidence from European projects and SME case studies suggests a few success factors.

First, management commitment and a clear mandate are critical. Several studies recommend appointing a “circular economy champion” or integrating circular responsibilities explicitly into an existing role, such as operations or quality management.

This person does not need to be a full-time specialist, but they need time and support to coordinate initiatives, collect information and liaise with external partners.

Second, SMEs benefit from starting with focused pilots rather than trying to redesign everything at once. For instance:

- Select one product line or packaging type for a circular redesign project.
- Apply an LCA-lite hotspot analysis to understand where the biggest impacts and costs are.
- Test a limited set of eco-design and circular interventions, measure the outcomes, and then scale successful approaches to other parts of the business.

Interreg experience shows that pilot projects, combined with simple tools and peer exchange, help SMEs progress from seeing circularity as abstract to treating it as practical business improvement.

Third, external support and networks matter. SMEs that engage with cluster initiatives, business support organisations or EU-funded projects often gain access to expertise, tools and funding that they could not mobilise alone. Eurofound's work on design for sustainable development emphasises the role of local networks in sharing knowledge and reducing the cost and risk of experimentation.

Finally, it is important to connect circular initiatives with overall business strategy. This means:

- Tracking not only environmental indicators, but also how circular measures affect costs, revenues and risk exposure.
- Aligning circular priorities with customer expectations and regulatory trends, for example anticipating eco-design or packaging requirements in target markets.
- Communicating improvements clearly and honestly, avoiding exaggerated or vague claims.

When circularity is linked to competitiveness, compliance and innovation, it is more likely to survive changes in personnel or market conditions. As the circular economy becomes more embedded in EU policy and markets, SMEs that invest in better materials management, eco-design and life-cycle thinking will be better placed to meet customer demands, comply with emerging rules and secure their position in evolving value chains.

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Chapter 14 - Sustainable Procurement

Procurement is one of the most powerful levers SMEs have to reduce environmental and social impacts across their value chain, because purchased goods and services embed materials, energy use, labour conditions and logistics. Sustainable procurement, as defined in ISO 20400, means integrating environmental, social and economic considerations into procurement decisions across the life cycle, without losing sight of quality, cost and reliability (ISO, 2017). For SMEs, the goal is not to build a parallel “green” bureaucracy, but to make purchasing routines smarter, more resilient, and easier to justify to customers, financiers and public buyers.

14.1 The business case

Sustainable procurement is closely tied to risk, continuity and competitiveness. Case evidence from European SMEs shows that sustainability practices tend to be triggered by external expectations and market access needs, but become valuable internally once they start improving efficiency, resilience and decision-making quality (Moursellas et al., 2023). Procurement is often where these benefits become tangible: better supplier choices can reduce exposure to volatile resource prices, improve delivery reliability, and lower the risk of compliance or reputational problems. Over time, procurement decisions also shape innovation capacity and customer trust, especially when firms can demonstrate credible improvements in materials, packaging, waste reduction and logistics (Moursellas et al., 2023).

Sustainable procurement also helps SMEs remain “compatible” with tightening EU expectations. Even when SMEs are not directly regulated, they increasingly face requests for evidence on sourcing, environmental performance and supply-chain practices from larger clients and public procurers. Aligning procurement with recognised principles (life cycle thinking, transparency, supplier engagement) positions SMEs as lower-risk, higher-trust partners.

14.2 Drivers and barriers: what actually changes procurement behaviour

Evidence suggests three recurring drivers behind sustainable procurement adoption in SMEs: leadership intent, stakeholder pressure, and usable information (Chatzistamoulou & Tyllianakis, 2022; Hinterhuber & Khan, 2025). Research using the theory of planned behavior indicates that sustainable procurement is more likely when managers (1) believe it creates value (attitudes), (2) perceive it as expected by key stakeholders (subjective norms), and (3) feel they have the capability and tools to implement it (perceived behavioral control) (Hinterhuber & Khan, 2025). This matters for practice: changing procurement is rarely achieved by awareness alone; it also depends on simple tools, clear criteria, and confidence that the firm can apply them consistently.

Barriers are equally consistent. SMEs often lack time, specialised expertise, and structured supplier information. They also operate in supply markets where sustainability information can be incomplete or inconsistent, forcing trade-offs between price, availability and sustainability performance (Moursellas et al., 2023). Evidence on European SMEs further suggests that “greener” firms tend to be better informed, implying that access to relevant information channels and guidance is itself a competitive factor in sustainability transition (Chatzistamoulou & Tyllianakis, 2022). For managers, this highlights a practical priority: build an internal baseline of supplier and product information that can be reused, rather than re-starting from zero for every tender or questionnaire.

14.3 ISO 20400 adapted to SME reality: the core principles in manageable steps

ISO 20400 is guidance, not a certifiable standard, and it can be applied in a light but disciplined way (ISO, 2017). For SMEs, the most actionable principles are:

a. Align procurement with strategy and priorities

Define a small set of sustainability priorities that matter most to the business (for example, packaging reduction, energy-intensive equipment, recycled content, hazardous substances, labour standards). Procurement criteria should reflect these priorities rather than trying to cover everything.

b. Use life-cycle thinking and life-cycle costing when it matters

Life-cycle thinking means considering impacts from production and transport through use and end-of-life, not only the purchase price. The EU “Buying Green!” handbook provides practical routes for applying life-cycle costing and environmental criteria in tendering, which SMEs can adapt even for private purchasing (European Commission, 2016).

c. Focus effort where risk and leverage are highest

Not every purchase needs deep analysis. Use a risk-based approach that concentrates attention on a few categories with high spend, high impact, and real influence (ISO, 2017).

d. Engage suppliers as partners, not only as objects of screening

ISO 20400 emphasises supplier engagement and improvement, which is often more feasible for SMEs than heavy auditing (ISO, 2017). This is also supported by empirical work showing that relationship-based capabilities can translate sustainability intent into better performance through knowledge sharing and joint improvements (Ibrahim et al., 2025).

e. Create transparency that is proportionate

Transparency does not necessarily require complex systems at the start. For priority inputs, consistent documentation of origin, specifications, and basic performance indicators is often enough to reduce risk and improve credibility.

These principles fit well with what procurement research on SMEs already shows: supplier selection is typically dominated by cost, quality and delivery, but can be strengthened through structured criteria and purchasing strategies that reduce dependency and improve long-term performance (Ferreira & Silva, 2022). Sustainability criteria should be designed to complement these traditional criteria rather than replace them.

14.4 A short procurement policy and a focused priority map

A written procurement policy helps create consistency and reduces “person-dependent” buying. For SMEs, a one to two page policy is usually sufficient, as long as it clarifies: (1) why sustainable procurement matters for the business, (2) which priorities matter most, (3) what minimum supplier expectations look like, and (4) who is responsible for applying and reviewing it (Sustain-Ed, n.d.).

Prioritisation can be done using three filters:

- **Spend:** where money concentrates
- **Impact:** where environmental or social impacts are likely high
- **Influence:** where the SME has leverage or realistic alternatives

This aligns with ISO 20400’s proportionality logic and prevents sustainable procurement from becoming an unmanageable list of ideals (ISO, 2017).

14.5 Embedding sustainability into supplier selection, contracting and follow-up

A practical way to integrate sustainability is to adjust existing supplier selection routines rather than invent new ones. A lightweight supplier questionnaire can add a small set of questions on topics such as environmental management, legal compliance, key material risks, and willingness to collaborate on improvements. The goal is to collect evidence that is relevant and comparable, not to demand “perfect” supplier systems.

This approach is consistent with SME purchasing research, which shows the importance of selecting criteria that are feasible to verify and that improve purchasing outcomes, including continuity and quality (Ferreira & Silva, 2022). It also reflects the reality that SMEs can rarely afford extensive auditing, so they benefit from simple documentation and periodic review for the highest-impact suppliers.

Contracting should translate expectations into a few clear clauses, for example:

- packaging or recycled-content specifications,

- requirements to disclose relevant product composition or origin,
- basic incident and non-compliance notification,
- annual provision of a small set of agreed indicators for key suppliers.

Monitoring can remain light. An annual review meeting with priority suppliers, supported by basic indicators, is often enough to identify improvements and manage risk.

14.6 Supplier engagement, green knowledge and capability building

Empirical evidence suggests that environmental performance improves when SMEs develop “green absorptive capacity”, meaning the ability to acquire, share and apply environmental knowledge through relationships and supply chain practices (Ibrahim et al., 2025). In procurement terms, this supports a shift away from purely transactional buying toward improvement-oriented supplier relationships. Practical examples include joint packaging reduction, shared materials efficiency initiatives, or co-development of lower-impact inputs.

This engagement logic also fits the behavioral evidence: perceived capability and access to workable tools are critical for sustaining procurement change (Hinterhuber & Khan, 2025). In other words, SMEs are more likely to persist when supplier engagement is designed as a manageable learning process rather than a compliance burden.

14.7 Circular and traceable procurement: linking purchasing to circularity and logistics performance

Circular procurement focuses on life-cycle value: durability, repairability, recycled content, reuse, take-back and reduced waste. Evidence indicates that circular economy practices and supply chain traceability can strengthen sustainability performance, especially when combined with logistics improvements (Zhou et al., 2023). For procurement, this translates into practical actions such as:

- specifying recycled or remanufactured inputs where feasible,
- preferring suppliers with take-back, repair or recycling programs,
- requiring basic disclosure on composition and origin for priority materials,
- selecting logistics providers that can support emissions reduction and traceability goals.

Traceability does not have to start with advanced digital systems. SMEs can begin with batch-level records, supplier declarations, and consistent documentation that can later be upgraded as requirements grow.

14.8 Public procurement: what SMEs should know to access green purchasing markets

Public procurement is a major market channel in Europe, and green public procurement criteria are increasingly embedded in tenders. Evidence suggests that procurement policy design affects SME participation, with transparency and accessibility being critical (Hoekman & Taş, 2022). SMEs often struggle with documentation demands and complex tendering processes, so practical enablers include simplified requirements, better lot design, and supplier development mechanisms that reduce transaction costs (Hoekman & Taş, 2022). The “Buying Green!” handbook can also help SMEs anticipate what public buyers may ask for and prepare product and supplier evidence accordingly (European Commission, 2016).

14.9 A pragmatic roadmap for SME managers

A workable sequence for SMEs is:

1. Identify two or three high-impact purchasing categories.
2. Write a short policy that clarifies priorities and minimum expectations.
3. Add a small set of sustainability questions into supplier selection.
4. Turn requirements into a few contract clauses for priority suppliers.
5. Review performance annually, focusing on improvements and risk reduction.
6. Gradually strengthen traceability and circular criteria where it delivers value.

Done well, sustainable procurement becomes part of normal purchasing discipline, producing better information, stronger supplier relationships and improved resilience. It also helps SMEs stay competitive in value chains and procurement markets where sustainability evidence is increasingly expected (OECD, 2024a; OECD, 2025a; OECD, 2025b).

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Chapter 15 - Green Logistics and Mobility for SMEs

Transport and logistics decisions shape a large share of an SME's climate footprint and operating costs. They also influence reliability, customer satisfaction, and exposure to disruption (fuel price volatility, congestion, extreme weather, new urban access rules). Across Europe, transport emissions remain a major challenge, with road transport dominating the sector's emissions profile, which makes logistics a high impact area for practical action (European Environment Agency, 2025).

For SMEs, "green logistics" is best understood as improving how goods move and how mobility is organised so that the same service is delivered with less energy, fewer emissions, and lower waste. The strongest results typically come from a sequence of actions: measure what matters, reduce unnecessary kilometres and empty running, increase vehicle and load efficiency, then shift to lower carbon fuels and modes where feasible. Evidence from empirical research shows that green logistics practices are associated with stronger sustainability performance and can support competitiveness when implemented systematically rather than as isolated initiatives (Jayarathna et al., 2024; Agyabeng-Mensah & Tang, 2021).

15.1 Where emissions and costs usually sit

Most SMEs find that logistics emissions concentrate in a few predictable places:

1. Vehicle kilometres and empty running
Unplanned routing, fragmented deliveries, and low backhaul utilisation increase both cost per delivery and emissions per unit.
2. Load and packaging inefficiency
Poor palletisation, oversized packaging, low fill rates, and product damage create avoidable transport volume and returns.
3. Urban delivery constraints
Congestion, limited delivery windows, and access restrictions raise idling time and reduce productivity.
4. Warehousing and handling
Energy use for lighting, heating, refrigeration, and material handling equipment adds a secondary but relevant footprint.

A practical implication is that route planning and load management often deliver the fastest payback, while vehicle replacement and alternative fuels usually require longer time horizons and financing.

15.2 Green logistics practices that reliably improve sustainability performance

Research linking green logistics to sustainability performance highlights that results come from a bundle of practices rather than a single “silver bullet”. Jayarathna et al. (2024) find that green logistics practices relate to sustainability performance through three interrelated categories: logistics capabilities, resource related practices, and people related practices. They also emphasise that these elements interact in nonlinear ways, which is a strong argument for a whole system approach rather than one off actions.

Logistics capabilities

These are the operational and organisational capabilities that reduce waste in movement and handling, such as:

- Route optimisation and delivery planning (consolidation, time windows, dynamic re routing)
- Collaboration with customers and carriers (shared forecasts, flexible delivery slots, consolidated drops)
- Smarter network choices (micro hubs, cross docking, fewer split shipments)
- Data and visibility (basic traceability of shipments, delivery performance analytics)

Resource related practices

These are the “technical” levers that reduce energy and emissions per kilometre or per tonne kilometre, including:

- Higher load factors and fewer empty runs (backhauls, shared transport)
- Eco driving and speed management
- Tyre management and preventive maintenance
- Lower carbon vehicles and fuels where feasible (for example electric vans for urban routes, biofuels or renewable fuels where compatible)
- Packaging reduction and damage prevention to cut returns

People related practices

A recurring finding in the literature is that skills, routines, and incentives determine whether technical measures actually work. Agyabeng-Mensah and Tang (2021) show that green human capital supports the adoption of green logistics practices, and that these

practices link to improved competitiveness and, through that, better social and financial performance. For SMEs, the practical message is simple: training and role clarity are not “soft extras”; they are enabling conditions for performance gains.

15.3 Route optimisation and delivery planning: the highest value starting point

For many SMEs, route optimisation is the fastest, least capital intensive way to cut emissions.

Actions with high SME feasibility:

- Consolidate deliveries and reduce split shipments. Combine orders into fewer drops, negotiate delivery windows, and avoid “next day by default” where customers accept alternatives.
- Reduce empty kilometres. Use backhauls, collaborate with nearby firms, or work with carriers that can pool freight.
- Improve stop planning and loading. Basic changes such as sequencing stops by geography, standardising loading plans, and reducing waiting times can deliver material savings.
- Use simple digital tools. Even lightweight route planning tools can reduce kilometres travelled, improve punctuality, and lower fuel consumption. The key is not sophisticated software, but consistent use and learning.

This is also where SMEs can create measurable KPIs quickly: kilometres per delivery, litres per 100 km, deliveries per route, failed delivery rate, and load utilisation.

15.4 Green fleets and low carbon mobility choices

Fleet choices should match route profile, payload, and infrastructure availability.

Practical decision logic for SMEs:

- First, reduce demand for vehicle kilometres. If routing and consolidation reduce kilometres by 10–20%, the required fleet capacity may drop, improving the business case for later upgrades.
- Then, improve existing vehicles
 - preventive maintenance, tyre pressure management, and aerodynamic add ons where relevant
 - eco driving training and monitoring. These measures are usually low cost and can be implemented rapidly.
- Finally, plan fleet transition in phases. Urban and short range operations are often the most suitable entry point for electrification. Longer distance freight may

require different pathways (vehicle renewal cycles, partner carriers, contractual requirements, and fuel availability). SMEs that do not operate their own fleet can still influence emissions through contracting: setting expectations for vehicle standards, load factors, and reporting.

15.5 Greener logistics through supplier collaboration and traceability

Green logistics performance is rarely fully controllable by a single SME, especially when transport is outsourced. Collaboration therefore becomes a central lever.

Effective collaboration practices include:

- joint problem solving on packaging, pallet configuration, and return reduction
- shared forecasting to reduce urgent shipments and partial loads
- agreed KPIs and simple reporting cycles with logistics providers
- coordination of delivery slots and unloading processes to reduce idling and waiting time

Empirical research supports the idea that green performance improves when firms build capabilities for coordination and learning rather than relying only on compliance checklists (Jayarathna et al., 2024; Agyabeng-Mensah & Tang, 2021). For SMEs, this means focusing on a small number of high impact partners and building practical “working agreements” around data, routines, and targets.

15.6 Measuring logistics emissions in a credible and proportionate way

Measurement is increasingly requested by customers and is also necessary for internal prioritisation. A practical approach is to track logistics emissions at shipment or route level, using recognised methods.

Two widely used references are:

- ISO 14083, which provides a method for quantification and reporting of greenhouse gas emissions arising from transport chain operations (CLECAT, 2024).
- The GLEC Framework, which offers an accessible approach to calculate and report logistics emissions and aligns with ISO 14083 methodologies (Smart Freight Centre, 2023).

For SMEs, the goal is not perfect data from day one. A credible start often looks like:

- define the boundary: own fleet and key outsourced transport legs
- collect basic activity data: fuel use, kilometres, payload estimates, shipment counts
- use consistent emission factors and document assumptions

- improve data quality over time (better load data, more precise distances, fewer estimates)

A simple but effective KPI set:

- total logistics emissions (tCO₂e) and emissions intensity (per delivery, per tonne, or per euro of revenue)
- kilometres travelled and empty running share
- average load factor or fill rate
- failed deliveries and returns rate
- fuel consumption per kilometre (for own fleet) or carrier reported intensity (for outsourced)

15.7 A compact implementation roadmap for SME managers

Step 1: Baseline and hotspots (2–4 weeks)

Map transport flows, top routes, key carriers, and the main cost and emissions drivers.

Step 2: Quick wins (1–3 months)

Consolidation, routing discipline, load planning, eco driving, maintenance routines, packaging fixes.

Step 3: Supplier and customer alignment (3–6 months)

Negotiate delivery windows, build shared KPIs with carriers, address waiting time and returns drivers, start basic traceability for high impact products.

Step 4: Fleet and modal strategy (6–24 months)

Plan vehicle renewal or carrier requirements, explore low emission options for the routes where they fit, and integrate logistics into broader sustainability reporting needs.

Step 5: Continuous improvement

Review KPIs quarterly, update targets, and treat logistics as an operational excellence area where cost control and decarbonisation reinforce each other.

This approach reflects what the evidence suggests: sustainability performance improves when green logistics is treated as a system of capabilities, resources, and people, supported by measurement and learning, not as a checklist of isolated actions (Jayarathna et al., 2024; Agyabeng-Mensah & Tang, 2021).

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Chapter 16 - Digital Tools for Green Business

Digital tools can make sustainability management easier for SMEs because they reduce manual work, improve data quality, and turn scattered information into decisions. They help answer three recurring questions that SMEs face from customers, financiers, and public buyers: What are your impacts, how do you measure them, and how do you improve them over time.

A good way to think about digitalisation in sustainability is not as buying one “ESG platform”, but as building a light data backbone that connects day to day operations (energy, materials, transport, suppliers) to a small set of key indicators that the business can actually use.

16.1 Building a light sustainability data backbone

Most SMEs already hold relevant sustainability data, but it sits in different places: invoices, utility bills, spreadsheets, ERP systems, maintenance logs, and supplier documents. The first step is to define a minimal data backbone with three layers:

- a. Activity data (what happens). Examples: electricity and fuel consumption, tonnes of materials purchased, kilometres travelled, packaging volumes, water use, waste streams, and key supplier inputs.
- b. Methods and factors (how you convert activity into indicators). Examples: agreed emission factors, calculation rules, and assumptions for turning energy and logistics into greenhouse gas and resource indicators.
- c. Outputs (what you report and manage. Examples: a small KPI set for management, plus a format that can feed customer questionnaires, tenders, or voluntary reporting.

For SMEs, this backbone should remain proportional. The goal is to standardise a few high impact data flows and reuse them many times, instead of repeatedly answering similar questions in different formats.

16.2 Practical measurement tools SMEs can use now

Greenhouse gas accounting at SME scale

Many SMEs start with organisational greenhouse gas accounting because it is the most requested metric and often overlaps with efficiency opportunities. A widely used non prescriptive approach is to align calculations with an established standard for organisational greenhouse gas quantification and reporting, such as ISO 14064 1

(International Organization for Standardization, 2018). This supports consistency, transparency, and auditability without requiring complex systems from day one.

In practice, SMEs can digitise greenhouse gas accounting through:

- Structured spreadsheets and templates (sufficient for early stages if they are consistent and documented)
- Simple carbon accounting applications that import energy bills and fuel use
- ERP extensions that link purchasing and logistics data to emissions estimates

The most important choice is not the software brand, but the discipline of storing sources, assumptions, and calculation logic so results can be explained, updated, and improved.

Energy monitoring and energy management

Energy is often the fastest place to see benefits because the same data supports cost control and emission reduction. SMEs can combine:

- Smart meters or submetering for major energy users
- Simple dashboards that track monthly consumption and intensity (for example per unit output)
- Alerts for unusual spikes that signal leaks, faulty equipment, or operational drift

Where SMEs want a more structured approach, ISO 50001 provides a management system framework for continuous improvement in energy performance. Many SMEs adopt its logic without formal certification by focusing on energy review, performance indicators, and action plans.

Materials and life cycle thinking

For products, packaging, and key materials, SMEs increasingly need life cycle oriented information. At minimum, this means tracking material types, recycled content, and end of life pathways. For more advanced work, SMEs can use simplified life cycle assessment approaches, and where capacity allows, align with EU methods such as the Product Environmental Footprint and Organisation Environmental Footprint guidance, which were developed to improve comparability and credibility of environmental claims and data (European Commission, 2021).

A widely used entry level LCA software option is openLCA, which supports structured modelling while still being accessible for smaller teams (GreenDelta, n.d.). SMEs do not need full LCA coverage for all products immediately. A realistic start is to assess one flagship product line or the highest volume packaging formats.

16.3 Supply chain data, traceability, and product information

Digital tools become particularly valuable in supply chains because SMEs are asked to provide evidence, not only statements. Three practical data domains matter most:

Supplier information and documentation

Track supplier certifications, policies, declarations of conformity, and key sustainability attributes in one place. Even a simple shared folder structure and spreadsheet index can reduce the time spent responding to repeated requests.

Traceability and origin data

For high risk or high value inputs, basic traceability reduces operational and reputational risk. SMEs can start with batch level tracking for critical materials and gradually move toward richer digital documentation where required by customers or regulation.

Product level sustainability information and Digital Product Passports

EU policy is moving toward more structured product information flows. The Ecodesign for Sustainable Products Regulation creates a framework for Digital Product Passports to improve the availability of product sustainability information across value chains (Regulation (EU) 2024/1781, 2024). For SMEs, this matters even if they are not first in scope, because customers may request product attributes that are designed to be passport ready, such as material composition, reparability data, and compliance documentation.

A practical implication is that SMEs benefit from organising product data early: bills of materials, packaging specifications, safety datasheets, and durability or repair information. This reduces future friction when larger buyers standardise their data requests.

16.4 Digital reporting and right sized disclosure

For SMEs, the aim is usually not to produce a large corporate report but to provide credible, reusable information. The emerging EU voluntary sustainability reporting standard for SMEs (often referred to as VSME) is designed to be proportionate and to reduce fragmentation of data requests by providing a common baseline that SMEs can share with banks and business partners (EFRAG, 2024). If an SME adopts a VSME style

structure internally, it often becomes easier to respond to customer portals, tender questions, and finance questionnaires using the same underlying dataset.

Digitally, this can be implemented through:

- A shared data room or structured folder for evidence
- A maintained KPI table that updates at a defined frequency
- Clear ownership of each indicator, including who updates it and where the source data sits

16.5 A curated toolbox for SMEs

The most useful way to curate digital tools is by function. SMEs can combine lightweight options across these categories:

- a. Data capture. Smart meters, utility portals, fuel card exports, telematics summaries, procurement extracts from accounting or ERP, and basic waste contractor reports.
- b. Data management. Spreadsheets with defined templates, simple database tools, or lightweight ESG data platforms. The critical feature is version control and traceability, not sophistication.
- c. Carbon and footprint calculation. Tools that convert energy, fuel, and logistics data into greenhouse gas indicators, ideally with documented factors and exportable calculation logs. ISO aligned approaches support consistency (International Organization for Standardization, 2018).
- d. Materials and LCA lite. Product bill of materials tracking, packaging calculators, and LCA tools such as openLCA for deeper modelling when needed (GreenDelta, n.d.).
- e. Supplier and product data. Supplier document libraries, questionnaires, and traceability tools. As Digital Product Passports develop, product attribute management becomes increasingly important (Regulation (EU) 2024/1781, 2024).
- f. Reporting outputs. A VSME structured dataset and a small set of management KPIs that can be reused across external requests (EFRAG, 2024).

16.6 Green IT: reducing the footprint of digital systems themselves

Digital tools help manage sustainability, but ICT also has an environmental footprint. SMEs can reduce this footprint without harming productivity by focusing on practical choices:

Efficient devices and longer lifetimes

Extending device lifetime through repair, upgrades, and managed refresh cycles reduces embedded impacts. Procurement policies that prioritise durability and repairability support this.

Cloud and data centre impacts

Many SMEs rely on cloud services. The main lever is choosing providers with credible energy efficiency and renewable energy strategies and avoiding unnecessary data storage and processing. At EU level, the European Code of Conduct on Data Centre Energy Efficiency provides guidance and best practices aimed at improving energy performance in data centres (European Commission Joint Research Centre, n.d.). Even if SMEs do not run data centres, this gives a benchmark for evaluating service providers.

Data minimisation and digital sobriety

Unnecessary data retention, duplicate storage, and heavy default settings increase energy use. SMEs can adopt simple practices: defined retention periods, compressing and archiving, avoiding unnecessary video meetings, and limiting high resolution transfers when not needed.

Monitoring ICT energy use

For SMEs with server rooms, equipment, or high IT loads, monitoring electricity consumption of ICT equipment and cooling can reveal quick wins, especially around equipment consolidation, idle shutdown policies, and cooling optimisation.

It is also useful to keep an eye on broader trends. International energy analysis has highlighted the growing attention on data centres and digital infrastructure in electricity demand discussions, including Europe's ambitions and constraints around data centre growth (International Energy Agency, 2025).

16.7 What “good” looks like for an SME

A strong digital approach for an SME is usually defined by a few characteristics:

- One consistent dataset, reused across many requests
- A limited KPI set linked to decisions and investments
- Clear documentation of sources and assumptions
- Proportionate traceability that matches customer and regulatory needs

- ICT practices that avoid waste and support efficiency

When these elements are in place, digital tools stop being an extra administrative layer and become part of normal management. That is the point where sustainability performance becomes easier to improve, easier to explain, and easier to finance.

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Chapter 17 - Biodiversity and Nature for SMEs

Biodiversity and nature are increasingly shaping the business environment in which SMEs operate, not as abstract environmental concerns but as factors that directly influence costs, continuity, risk and market access. Dependence on water, soil, climate regulation and natural materials is built into many everyday business activities, while ecosystem degradation exposes enterprises to supply disruptions, regulatory pressure and reputational risk. This chapter positions biodiversity as a core management issue for SMEs, closely linked to resilience and long-term competitiveness. It introduces the policy and market context driving nature-related expectations, clarifies how SMEs can identify their most relevant dependencies and impacts, and presents proportionate, practical approaches—such as the TNFD LEAP framework—to translate nature-related risks into manageable actions, indicators and business decisions.

17.1 Why nature belongs on an SME manager's agenda

Biodiversity is not limited to protected species or conservation areas. It forms the living infrastructure behind many business fundamentals, including reliable water supply, soil fertility, pollination, climate regulation, flood protection, pest control, and the availability of natural materials. When these systems degrade, SMEs experience higher input costs, supply instability, production disruptions, and growing scrutiny from customers, insurers, and lenders.

Nature loss is a systemic economic risk. The Global Assessment of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) shows that biodiversity is declining globally at unprecedented rates, with around one million species threatened with extinction due to land-use change, climate change, pollution, overexploitation, and invasive species (IPBES, 2019). For SMEs, this translates into tangible operational and financial exposure rather than an abstract environmental concern.

Nature-related risks typically affect SMEs through three main channels. First, physical risks arise from water scarcity, flooding, heat stress, soil degradation, and pest or disease pressure that disrupt operations and logistics. Second, transition risks emerge from evolving standards, procurement requirements, and customer expectations related to deforestation-free sourcing, water stewardship, chemicals management, and habitat impacts. Third, liability and reputational risks can result from non-compliance with environmental permits, conflicts with local communities, or sustainability claims that cannot be substantiated.

The European Policy Context

European policy increasingly links economic resilience with ecosystem restoration. The EU Biodiversity Strategy for 2030 frames nature restoration as a prerequisite for long-

term competitiveness and sets the objective of placing biodiversity on a recovery path by the end of the decade (European Commission, 2020). This direction is reinforced by the EU Nature Restoration Regulation, which establishes binding restoration targets across terrestrial and marine ecosystems (European Union, 2024).

Although most SMEs are not directly regulated by these instruments, their effects are felt indirectly through spatial planning, permitting conditions, sector-specific rules, and value-chain requirements imposed by larger clients. As a result, biodiversity considerations are becoming part of everyday business risk management rather than a niche environmental issue.

A practical way to understand dependencies and impacts

For many SMEs, biodiversity feels too broad to manage. A more effective entry point is to focus on a limited set of business-relevant dependencies and impacts.

Dependencies describe what a business needs from nature to function. Common examples include water availability and quality, soil health, pollination services, climate and hazard regulation, and access to natural materials. Impacts describe how business activities affect ecosystems, such as land disturbance, water abstraction, pollution, waste leakage, or upstream sourcing impacts like deforestation and overfishing.

Clarifying these links allows SMEs to concentrate on areas where ecological degradation could directly affect costs, continuity, or market access.

Applying the TNFD LEAP approach at SME scale

The Taskforce on Nature-related Financial Disclosures (TNFD) provides a structured framework for identifying and managing nature-related risks and opportunities. Its LEAP approach consists of four steps: Locate, Evaluate, Assess, and Prepare. The TNFD explicitly encourages organisations to start with existing data and progressively deepen analysis over time (TNFD, 2023).

A proportionate LEAP application for SMEs can be summarised as follows:

Locate: Identify key operational sites and sourcing regions and assess whether they overlap with areas of high biodiversity value, water stress, flood risk, or deforestation exposure.

Evaluate: Prioritise the most significant dependencies and impacts based on business criticality, potential severity, and ability to influence outcomes.

Assess: Translate priority issues into concrete risks and opportunities, such as supply disruption, cost volatility, compliance exposure, efficiency gains, or preferred supplier status.

Prepare: Define a small number of actions, responsibilities, timelines, and indicators, supported by simple documentation and evidence.

This approach transforms biodiversity from a vague concept into structured, decision-relevant information.

Low-effort biodiversity actions with high relevance for SMEs

Effective biodiversity management does not require complex conservation programmes. Practical actions include improving water efficiency and wastewater quality, reducing hazardous substances and pollution risks, enhancing site-level habitats through native planting or reduced mowing, and prioritising certified or verified raw materials where biodiversity risks are high.

Logistics and packaging choices also matter. Reducing unnecessary transport, improving load efficiency, and minimising packaging waste can significantly reduce pressure on ecosystems while lowering costs.

A focused KPI set for biodiversity management

SMEs benefit from using a small number of defensible indicators linked to their priority issues. Examples include water withdrawal and intensity, number of environmental incidents affecting soil or water, share of high-risk suppliers covered by environmental requirements, waste generation and diversion rates, and basic site-level indicators such as managed habitat area or pollinator-friendly measures.

The objective is not exhaustive measurement but credible tracking of material risks and improvements.

Positioning biodiversity management in the market

Nature-related expectations are increasingly embedded in procurement, finance, and sustainability reporting. SMEs that can clearly explain where they operate and source, what their main dependencies and impacts are, which actions they are taking, and how progress is tracked are easier to retain in value chains and less exposed to reputational risk.

Using a structured framework such as TNFD LEAP enables SMEs to provide consistent, auditable information and to demonstrate that biodiversity is being managed as a business issue rather than treated as an afterthought (TNFD, 2023).

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Below is a **fully rewritten Chapter 18**, deliberately designed to **avoid repetition** with earlier chapters on CSRD, EU Taxonomy, ISO standards, and EMSs. The focus is **exclusively on communication, marketing, credibility, and green-claims risk**, while using reporting frameworks only as *background evidence sources*, not as topics to be explained again.

Chapter 18 - Sustainability Reporting, Green Claims, and Marketing

As sustainability expectations rise, how SMEs communicate their environmental and social performance has become as important as what they do in practice. Customers, value-chain partners, public authorities and financial institutions increasingly scrutinise sustainability claims, while EU regulation is tightening to address misleading or unsubstantiated messaging. For SMEs, this creates a delicate balance: staying silent can weaken market position, but over-claiming exposes the business to legal, reputational and commercial risk. This chapter focuses on that critical interface between internal sustainability practices and external communication. It explains where communication risks typically arise, how the evolving EU framework on green claims reshapes what is acceptable, and how SMEs can use proportionate reporting and disciplined messaging to communicate progress credibly—supporting trust, competitiveness and long-term brand value without falling into greenwashing traps.

18.1 Why sustainability communication has become a strategic risk for SMEs

For many SMEs, sustainability communication has moved from a voluntary branding choice to a regulated and risk-sensitive business activity. Customers, business partners, public authorities, and financial institutions increasingly expect companies to communicate their environmental and social performance clearly, consistently, and credibly. At the same time, regulatory scrutiny of sustainability claims has intensified across the European Union, particularly in response to widespread concerns about greenwashing.

This creates a paradox for SMEs. On the one hand, remaining silent about sustainability efforts can weaken competitiveness, especially in supply chains where larger companies request ESG-related information from suppliers. On the other hand, making sustainability claims without adequate evidence exposes SMEs to legal, reputational, and commercial risks. As a result, sustainability communication is no longer simply a marketing matter but a strategic management issue that sits at the intersection of reporting, compliance, and brand trust.

Importantly, this chapter does not revisit how sustainability data are generated. That has already been addressed through reporting frameworks and management systems earlier in the toolkit. The focus here is instead on **how sustainability-related information is translated into external communication**, and how SMEs can do so responsibly.

18.2 From internal data to external claims: where risks arise

Most greenwashing cases do not stem from intentional deception but from misalignment between internal practices and external messaging. Common problems arise when marketing language runs ahead of actual performance, when claims are vague or exaggerated, or when improvements in one area are presented as evidence of overall sustainability.

For SMEs, these risks are heightened by limited internal capacity. Marketing materials, websites, and tender documents are often prepared without systematic cross-checking against environmental data or management processes. Claims such as “eco-friendly,” “green,” or “sustainable” may be used informally, without a clear definition or substantiation. In an environment of increased regulatory enforcement, such language can trigger investigations or complaints, even if the underlying intention was positive.

The key lesson for SMEs is that **every sustainability claim implies an evidentiary burden**. If a claim cannot be backed up by verifiable information, it should not be used.

18.3 The evolving EU framework on green claims

The European Union has significantly strengthened its approach to regulating environmental claims. The legal landscape now reflects a shift from tolerance of broad, aspirational statements to a requirement for precision, transparency, and evidence.

Under EU consumer and unfair commercial practices law, environmental claims must be truthful, specific, and verifiable (European Commission, 2023a). Building on this, the proposed Green Claims Directive introduces stricter requirements, including prior substantiation of explicit environmental claims and independent verification before claims are communicated publicly (European Commission, 2023b).

For SMEs, the implications are practical rather than theoretical:

- Generic claims without context are increasingly considered misleading.
- Claims must relate to the full life cycle or clearly specify which aspect of a product or service they cover.
- Offsetting claims require transparency and cannot substitute for actual emission reductions.

Although enforcement practices vary across Member States, the direction of travel is clear. Sustainability communication must be treated with the same rigor as financial or safety-related information.

18.4 Right-sized sustainability reporting as a foundation for communication

While this chapter does not revisit reporting frameworks in detail, it is important to clarify their role in communication. Sustainability reporting is not an end in itself but a **source of structured, reliable information** that can underpin external claims.

For SMEs, proportionate reporting approaches such as simplified sustainability statements or voluntary frameworks provide a defensible basis for communication. The key is not the volume of disclosed data but its consistency and traceability. Claims made in marketing materials, tender responses, or websites should be aligned with what the company could reasonably document if challenged.

This alignment is particularly important in B2B contexts, where large customers increasingly rely on supplier-provided sustainability information to meet their own reporting and due diligence obligations. Inconsistent or inflated claims can lead not only to reputational damage but also to loss of contracts.

18.5 Avoiding greenwashing: common pitfalls for SMEs

Research and regulatory guidance consistently identify recurring greenwashing patterns, many of which are especially relevant for SMEs:

- **Vagueness:** Using broad terms without defining scope or impact.
- **Selective disclosure:** Highlighting one positive aspect while ignoring significant negative impacts.
- **Unsubstantiated future claims:** Promising carbon neutrality or sustainability targets without credible plans or milestones.
- **Misuse of labels or certifications:** Referring to standards or symbols without formal certification or outside their intended scope.

Avoiding these pitfalls does not require legal expertise but rather disciplined communication practices. SMEs benefit from adopting a conservative approach, focusing on factual descriptions of actions taken rather than aspirational language.

18.6 Communicating sustainability as progress, not perfection

One of the most effective ways for SMEs to communicate sustainability responsibly is to frame it as a **process of continuous improvement**. Rather than presenting the business as fully sustainable, communication can emphasize learning, incremental change, and transparency about challenges.

Examples of credible messaging include:

- “We have reduced energy consumption in our operations by X% since 2022.”
- “We are working with our main suppliers to reduce packaging waste.”
- “We currently focus on reducing emissions in our own operations and plan to expand this to logistics.”

Such statements are specific, verifiable, and proportionate. They also align with stakeholder expectations that sustainability is a journey rather than a fixed state.

This approach is particularly important for SMEs operating in complex value chains, where full control over impacts is limited. Communicating boundaries and limitations openly can strengthen trust rather than weaken it.

18.7 Branding, marketing, and stakeholder trust

When sustainability communication is credible, it can support differentiation and market positioning. Studies show that transparent environmental communication enhances customer trust and brand loyalty, particularly in B2B markets where reputational risk is shared across supply chains (Delmas & Burbano, 2011).

However, sustainability should support the brand narrative rather than dominate it. For SMEs, sustainability messaging is most effective when integrated into broader value propositions such as quality, reliability, innovation, or local presence. Overemphasizing green credentials without sufficient substance increases scrutiny and risk.

Responsible sustainability marketing therefore balances visibility with restraint. It uses sustainability as evidence of good management rather than as a standalone selling point.

18.8 Key takeaways for SME managers

Sustainability reporting and sustainability communication serve different purposes but must remain aligned. Reporting generates structured information; communication translates that information into market-facing messages. The space between the two is where both opportunity and risk lie.

For SMEs, the strategic priority is not to say more, but to say **only what can be supported by evidence**. In a regulatory and market environment that increasingly penalizes overstatement, credibility has become a competitive asset in its own right.

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Annex 1: Organisational Readiness for Green Transition: Practices, Barriers, and Training Needs in Adult Education Across Europe

[Survey Evidence from the Erasmus+ Project “CREDIT – Green and Circular Economy in Business by Digital Solutions”](#). Research Report.

Annex 2: Glossary

Biodiversity

The variety of living organisms, ecosystems and natural processes that support essential services such as clean water, fertile soil, pollination, climate regulation and resilience to natural hazards.

Circular Economy

An economic model that aims to reduce waste and resource use by keeping materials, products and value in use for as long as possible through reuse, repair, recycling and smarter design.

Corporate Sustainability Reporting Directive (CSRD)

EU legislation that sets rules for how large companies report sustainability information. Although most SMEs are not directly covered, CSRD affects them indirectly through value-chain and financing requirements.

Double Materiality

A way of assessing sustainability issues from two perspectives: how environmental and social factors affect the business (financial materiality) and how the business affects society and the environment (impact materiality).

Eco-design

The integration of environmental considerations into product or service design, with the aim of reducing environmental impacts across the life cycle.

EMAS (Eco-Management and Audit Scheme)

The EU’s environmental management scheme that helps organisations systematically manage, measure and improve environmental performance, supported by verified public reporting.

Environmental Management System (EMS)

A structured set of policies, procedures and practices that help an organisation identify, manage and improve its environmental performance (e.g. ISO 14001, EMAS).

ESG (Environmental, Social and Governance)

A framework used to assess how environmental issues, social practices and governance structures affect a company's performance, risks and long-term resilience.

Green Claims

Statements or messages that suggest a product, service or organisation has positive environmental impacts. Such claims must be specific, truthful and supported by evidence.

GreenComp

The European sustainability competence framework that defines key knowledge, skills and attitudes needed to support sustainability transitions across education and training.

Green Skills

The knowledge, skills and competences that enable individuals and organisations to contribute to environmental sustainability and the green transition.

Greenwashing

The practice of presenting environmental claims that are exaggerated, vague or not supported by evidence, creating a misleading impression of sustainability performance.

ISO 14001

An international standard that provides requirements for establishing and operating an environmental management system, based on continuous improvement.

Key Performance Indicators (KPIs)

Quantitative or qualitative indicators used to monitor performance, progress and risks related to sustainability objectives.

Materiality

The process of identifying which sustainability issues are most important for a business and its stakeholders, based on their impact on performance, risk and societal outcomes.

SMEs (Small and Medium-Sized Enterprises)

Enterprises with fewer than 250 employees, including micro and small businesses, which often operate with limited time, financial and human resources.

Sustainability Strategy

An approach that integrates environmental and social considerations into business objectives, decision-making and operations, aligned with long-term value creation.

TNFD (Taskforce on Nature-related Financial Disclosures)

An international initiative that provides guidance on identifying, assessing and managing nature-related risks and opportunities.

TNFD LEAP Approach

A four-step method (Locate, Evaluate, Assess, Prepare) to help organisations understand dependencies and impacts on nature and translate them into business-relevant actions.

Value Chain

The full range of activities and relationships involved in producing and delivering a product or service, including suppliers, partners, customers and end users.



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