Sustainable European Abrasive Manufacturers

CO_2 Emissions Report

SEAM Member Companies

European Operations — Tracking Progress Towards Net Zero

FY2023 – FY2024 | March 2026

This report has been prepared by FEPA Secretariat on behalf of SEAM member companies. The information contained herein is based on data submitted by member organisations for the fiscal years 2023 and 2024. While every effort has been made to ensure accuracy, SEAM does not accept liability for any errors or omissions. This document is intended for informational purposes only.

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This report provides a comprehensive overview of SEAM's CO_2 Emissions for the fiscal years 2023-2024, detailing our methodology, performance and strategic implications for decarbonisation.

About SEAM

SEAM, the **S**ustainable **E**uropean **A**brasive **M**anufacturers initiative, serves as the dedicated sustainable programme of FEPA (Federation of European Producers of Abrasives). It embodies the European abrasives' collective commitment to fostering a more environmentally sound and socially responsible future within the manufacturing sector.

Through SEAM, member companies collaborate to uphold and advance best practices in environmental management, resource efficiency, and ethical operations. This initiative is pivotal in driving the transition towards a greener economy, setting benchmarks for sustainability that resonate across European operations.

Sustainable Development

Promoting practices that meet present needs without compromising future generations.

Environmental Responsibility

Minimising ecological footprint through efficient resource use and pollution prevention.

Innovation

Driving continuous improvement in processes, products, and operational sustainability.

About FEPA

SEAM is the dedicated sustainability programme of FEPA , the Federation of European Producers of Abrasives. Founded in 1955, FEPA proudly represents approximately 90% of all European abrasive product manufacturers, including world leaders and a significant number of SMEs.

Learn more at fepa-abrasives.org

SEAM Governance

The SEAM Program is overseen by a dedicated Steering Group, a body integral to guiding the programme's strategic direction and ensuring its continued relevance and impact. Members are elected every four years, ensuring fresh perspectives and a robust leadership structure that represents the diverse interests of the SEAM community.

Steering Group Composition

♟️ FEPA President & Vice-President

They ensure the oversight of FEPA Management Committee on the program. The President and Vice President cannot hold an elected seat on SEAM Steering Group at the same time as being part of FEPA Presidency.

Responsibilities: Provide strategic feedback. Report to the Management Committee SEAM activities.

Voting Right: one vote each, 2 votes total.

🚀 FEPA Secretariat

It ensures the oversight of FEPA on the program's administration.

Responsibilities:

- **Administrative:** process applications, administer financials, coordinate meetings with Steering Group.
- **Management:** Plan & execute marketing strategy, report to President & Steering Group.
- **Counselling:** Provide strategic recommendations.

Voting Right: none.

👥 3 SEAM Companies Members (elected)

The elected member's term starts the same year as FEPA Presidency and Management Committee-elected representatives. They can be a representative at the Management Committee

Responsibilities: Provide strategic feedback. Provide non-monetary resources to FEPA Secretariat.

Voting Right: one vote each, regardless of company size, turnover, number of plants, 3 votes total.

Elected Members

👤 Member

Rok Mezgec

Steering Group Member (2022-2026)

Weiler Abrasives (Slovenia)

👤 Member

Antje Schwemberger-Swarovski

Steering Group Member (2022-2026)

Tyrolit AG (Austria)

👤 Member

Mats Sundell

Steering Group Member (2022-2026)

Mirka (Finland)

CO_2 Emissions Report

About the Report

1. Methodology and Reporting Boundaries

The reporting framework is broadly aligned with the Greenhouse Gas Protocol Corporate Accounting and Reporting Standard.

Organisational Boundaries and Reporting Approach

This report aggregates emissions data submitted by SEAM member companies covering their European operations under an operational control approach. Emissions from facilities where member companies have operational control are included in the reporting perimeter.

Definition of a "Plant"

For reporting purposes, a "plant" is defined as follows:

- Where administrative offices are physically located on the same site as a production facility, the plant and the office are counted as one single reporting entity.
- Where an office is stand-alone and no production plant is located within a 5 km radius, the office is counted as one separate reporting entity.

This definition ensures consistent site counting across member companies and prevents double counting of emissions between operational and administrative activities.

The reporting perimeter includes all active plants and qualifying stand-alone offices. Any structural changes (e.g. acquisitions, divestments, or site closures) are reflected in the year in which they occurred.

Reporting Coverage

The reporting cycle includes emissions data submitted by 20 SEAM member companies, covering 60 operational sites (production plants and stand-alone offices) across Europe.

20

Member Companies

60

Operational Sites

The reporting coverage represents over 90% of the total European operational footprint of SEAM members, based on the revenue-weighted coverage methodology described below.

The use of a revenue-weighted coverage metric provides an indication of the proportion of economic activity included in the reporting scope; however, it does not ensure completeness of emissions coverage as required by the GHG Protocol.

This coverage provides a representative overview of operational emissions across the European abrasive manufacturing sector.

Operational Boundary & Information Collected

The following outlines the emission sources included in the reporting boundary and the data collected from SEAM member companies.

Operational Boundary

The following emission sources are included:

Scope 1 – Direct Emissions

- Stationary combustion (e.g. natural gas, fuel oil)
- Mobile combustion (e.g. company-owned vehicles where reported)
- Process-related emissions, where applicable

Scope 2 – Indirect Energy Emissions

- Purchased electricity consumed at manufacturing and operational sites
- Purchased heat or steam, where applicable

No Scope 3 emissions are included in this section of the report.
See "Scope 3 Emissions" on page 21.

Information Collected

Emissions data are self-reported by SEAM member companies using a standardised data collection template. Companies report activity data (e.g. fuel consumption in kWh or litres, electricity consumption in kWh), which are converted into tonnes of CO_2 equivalent (tCO_2e) using recognised emission factors. The list of countries considered within the European reporting boundary is provided in Annex I, page 23.

Company Information	Operational Coverage	Emissions Data
• Company name • Contact person (full name and email address)	• Total number of European plants • Number of European plants reported	• Scope 1 emissions (reported in tonnes of CO_2) • Scope 2 emissions (reported in tonnes of CO_2)

Table 1: Data Collected

Electricity emission factors are based on publicly available national or regional datasets. For the majority of reporting companies, the average electricity emission factor decreased between FY2023 and FY2024, reflecting improvements in grid carbon intensity and/or procurement practices.

Where minor data gaps occurred, companies applied reasonable estimation methodologies based on historical consumption or production data. No material extrapolations were applied at Group level.

Calculation Tools, Data Processing & Reporting Period

SEAM uses a standardised reporting period covering FY2023 and FY2024, with strict data quality requirements to ensure comparability across all member companies.

Calculation Tools and Data Processing

- Companies report activity data (fuel/electricity in kWh or litres), converted to tCO_2e using recognised emission factors.
- SEAM provided a standardised Excel-based tool for consistent Scope 1 & 2 calculations using harmonised factors.
- ~70% of members used the SEAM tool; ~30% used internal systems with supporting documentation.
- The coexistence of tools may introduce minor inconsistencies in emission factor selection or methodologies.

Reporting Period

- Covers FY2023 and FY2024.
- Year-on-year analysis presented on a like-for-like basis where possible.
- Variations reflect changes in production, energy sourcing, efficiency, or emission factors.

Treatment of Missing or Zero Data

- Zero emissions values are not permitted unless substantiated by activity data.
- Companies must submit complete Scope 1 & 2 data; gaps must be resolved before submission.

Exclusions & Future Enhancements

- Biogenic CO_2 not collected in FY2023–FY2024.
- Carbon offsets/removals excluded; gross emissions reported without deductions.
- Biogenic emissions inclusion planned for FY2026 reporting cycle (collected 2027).

~70%

Used the SEAM standardised Excel-based calculation tool

~30%

Used internal corporate carbon accounting systems, providing supporting documentation to ensure methodological transparency.

One member company transitioned from the SEAM Excel tool to its corporate system in FY2024, recalculating FY2023 data. Adjustments were reviewed and incorporated to maintain methodological consistency.

Consolidation Approach, Coverage & Scope 2 Methodology

This section outlines the consolidation principles used to define reporting boundaries and the methodology applied for calculating and substantiating Scope 2 emissions across all member operations.

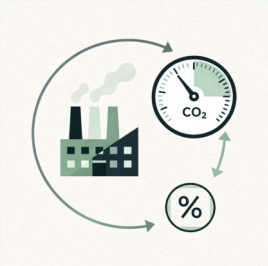
Consolidation Approach and Coverage

Emissions are reported on an absolute basis, without intensity weighting or normalisation. Where a company reports emissions for only part of its operations, the coverage of reported emissions is calculated based on revenue, comparing the revenue of covered entities to the company's total revenue.

Emissions Coverage (%) = (Revenue of covered entities / Total company revenue) × 100

This approach provides transparency on the proportion of company activity represented in the reported emissions data.

The exclusive use of absolute emissions limits the ability to assess efficiency improvements and performance relative to output (recommend intensity metrics).



Scope 2 Methodology

Scope 2 emissions are reported based on total purchased electricity consumption. A distinction between location-based and market-based accounting is not applied within the current reporting framework.

Electricity emission factors are primarily based on the residual mix of the respective Member States, updated annually where available.

In cases where national residual mix data were not available, SEAM requested electricity supplier information or supplier emission certificates from the reporting companies in order to determine the appropriate emission factor.

For facilities reporting the use of renewable electricity, supporting documentation such as guarantees of origin or green electricity certificates was requested to substantiate the reported electricity sourcing.

According to the GHG Scope 2 Guidance, a distinction is made between location-based and market-based emissions (core principle: both methods provide complementary and necessary perspectives on emissions performance). No distinction can lead to:

- Lack of dual accounting approach
- Reduced decision-usefulness of reported data.
- Incomplete representation corporate emission drivers (failed on supply-side decisions).
- Risk of misinterpretation of emissions performance.
- Inability to distinguish between efficiency and procurement effects.
- Lack of visibility on contributions to energy system decarbonization.

Maintaining a consistent and rigorous methodology across all member companies remains essential to ensuring the integrity and comparability of our collective emissions data.

2. Data Quality and Interpretation Considerations

To strengthen the interpretation of year-on-year emissions trends, SEAM conducted a **complementary survey** among member companies following the submission of FY2023 and FY2024 data. It received responses from **19 member companies**, representing approximately **95% of the reporting members**.

The survey examined changes in:

Production & Structure

- Production volumes (increase, decrease, or stable)
- Operational structure (site expansions, closures, consolidation or outsourcing)
- Reporting perimeter adjustments

Methodology & Scope 1 Drivers

- Methodological or metering improvements
- Energy efficiency measures, fuel switching, process optimisation
- Reduced operating hours, weather effects
- Capital investments or pilot projects affecting fuel use or thermal processes

Scope 2 Drivers

- Changes in electricity consumption and sourcing
- Supplier contracts and renewable procurement
- On-site generation and grid emission factors

This diagnostic approach enabled SEAM to distinguish between emissions variations linked to production fluctuations, structural operational changes, methodological updates, and genuine efficiency or decarbonisation measures.

Production-Linked Variation

50% of the year-on-year emissions variation was correlated with changes in production volumes.

Members Reduced Emissions

55% of member companies reduced their Scope 1 and 2 emissions between FY2023 and FY2024.

Structural Improvements

45% of those reductions were not correlated with lower production, indicating structural improvements such as energy efficiency measures, fuel optimisation, or electricity sourcing adjustments.

The survey also confirmed that, while total electricity consumption increased in several cases, the average electricity emission factor **decreased for the majority of members**, reflecting improvements in grid carbon intensity and/or procurement strategies. This complementary assessment enhances transparency and supports a more robust evaluation of decarbonisation progress beyond absolute emissions trends alone.

3. Alignment with Science-Based Decarbonisation Trajectories

To provide additional context to the emissions analysis, SEAM assessed whether year-on-year emissions changes among member companies are broadly aligned with the **Science Based Targets initiative (SBTi) linear decarbonisation trajectory**, which typically requires annual emissions reductions of approximately **4–4.2%** to remain on track for a 1.5°C pathway.

Comparison with the 1.5°C pathway is conceptually aligned with recognised climate frameworks but the use of a single-year comparison limits robustness of conclusions regarding long-term alignment.

For the purpose of this analysis, companies were classified according to the year-on-year change in their combined Scope 1 and Scope 2 emissions between FY2023 and FY2024:

Aligned with SBTi Trajectory	Stable	Increase
Emissions reduction of **4% or more**	Emissions change between **-1% and +1%**	Emissions growth of **more than +1%**

Based on this approach, 11 SEAM member companies achieved emissions reductions consistent with or exceeding the indicative SBTi annual reduction trajectory between FY2023 and FY2024. Several additional companies maintained stable emissions levels, indicating relatively unchanged operational emissions year-on-year.

> **Note:** This analysis reflects **single-year emissions variations** and should be interpreted cautiously. Fluctuations may be influenced by changes in production volumes, operational activity, energy sourcing, or methodology. A single year of reduction does not necessarily indicate long-term alignment with science-based decarbonisation pathways.

Future Benchmarking with SBTi

To strengthen long-term benchmarking, SEAM plans to collect emissions data for the year 2019 during the FY2025 reporting cycle (to be reported in 2026). This year was selected as it represents the last representative industrial year prior to the operational disruptions caused by the COVID-19 pandemic, providing a stable baseline reflecting normal operating conditions. The collection of this data will allow the establishment of a common reference year for the sector. Using this reference year, SEAM will be able to evaluate long-term decarbonisation progress against widely recognised net-zero frameworks, which generally require approximately 90% emissions reduction relative to a baseline year, with any remaining residual emissions addressed through neutralisation mechanisms.

The establishment of a common baseline will significantly improve the ability to track sector-wide progress and assess alignment with long-term climate targets.

Recognised for Climate Leadership

The following companies achieved ≥4% emissions reduction, aligned with the SBTi 1.5°C annual trajectory in FY2024.

We congratulate these member companies on their significant progress in emissions reduction. Their commitment serves as a powerful example of climate leadership within our sector, and we encourage all members to continue driving ambitious decarbonisation efforts in the years ahead.

CO_2 Emissions Report

About the Results

4. Key Insights about SEAM Members Decarbonisation journey

Scope 1 & Scope 2 Performance Overview

Between FY2023 and FY2024, the SEAM Group's combined Scope 1 and Scope 2 greenhouse gas emissions remained broadly stable at Group level (0% change). This stability reflects two contrasting trends:

Scope 1 emissions decreased by 6%. Scope 1 share decreased from 54.7% to 51.5%.

Scope 2 emissions increased by 7%. Scope 2 share increased from 45.3% to 48.5%.

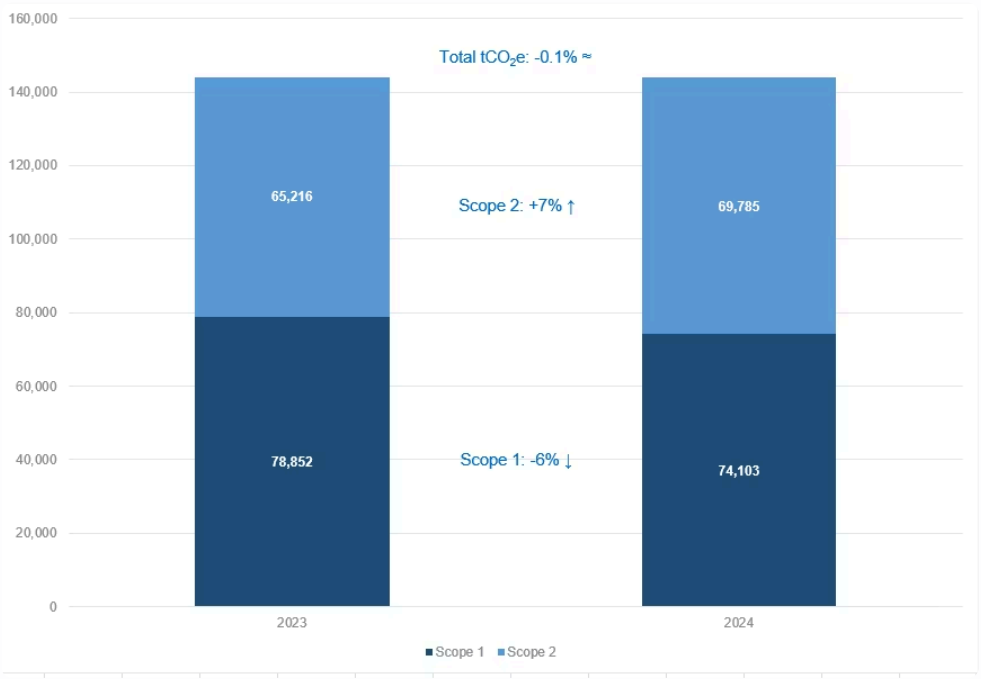


Chart 1: tCO_2e and Year-on-Year Change

While the aggregate result appears neutral with total CO2e of 146,091 tCO2e and 145,912 tCO2e in 2023 and 2024 respectively, it masks significant internal variation across members. Several companies experienced material movements in either direction, with some reporting changes in the range of ±20–35%. The Group's stability therefore reflects offsetting dynamics rather than uniform performance..

In both years, Scope 1 emissions remained slightly higher than Scope 2 emissions, although the gap narrowed significantly between 2023 and 2024. The increasing share of Scope 2 emissions highlights the importance of electricity sourcing and efficiency as priority areas for emissions reduction.

Electrification as decarbonisation pathway: Shift highlights importance of analysing Scope 1 & 2 emissions jointly, as reductions in one scope may be offset by increases in another.

"This pattern suggests **structural transition rather than stagnation**."

Scope 1: Tangible Operational Efficiency Gains

The 6% reduction in Scope 1 emissions demonstrates measurable progress in managing direct fuel consumption and process-related emissions.

Survey responses confirm that the main drivers of Scope 1 reductions were:

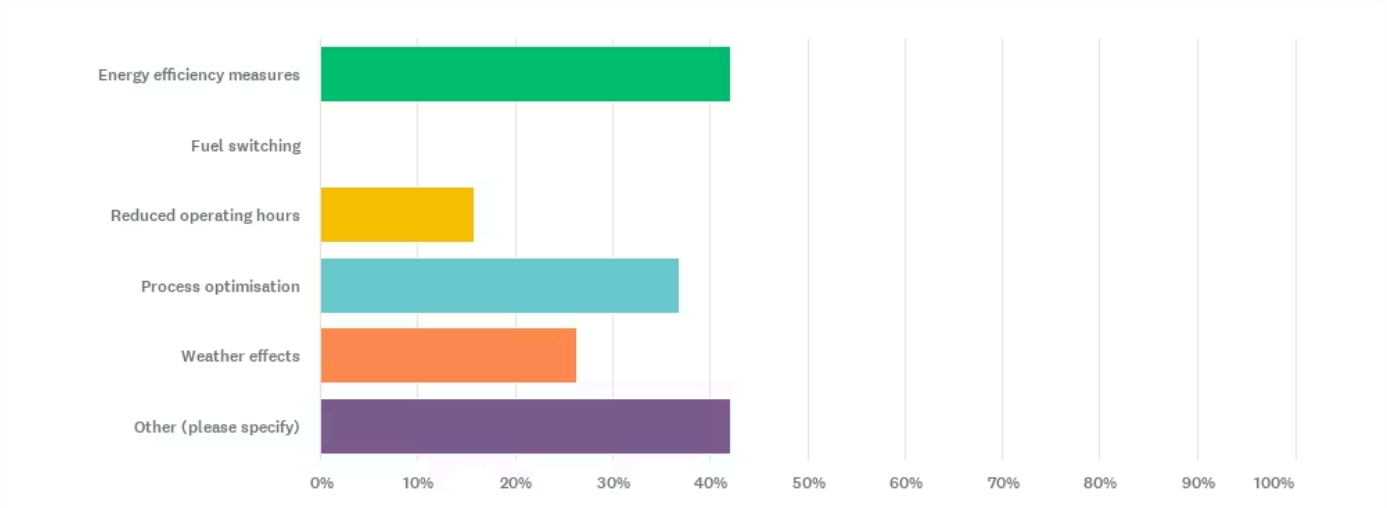


Chart 2: Scope 1 Emissions Drivers

Notably, **26.32% of respondents** implemented capital investments or pilot projects affecting fuel use or thermal processes, indicating that reductions were not solely due to temporary fluctuations but reflect structural operational improvements.

Qualitative responses further highlighted:

- Electrification of vehicles
- Conversion of building heating systems
- Improved cooling system integration
- Process optimisation and production planning adjustments

Fuel switching was **not identified as a material driver (0%)**, suggesting that while efficiency measures are advancing, transformation of thermal fuel systems remains limited.

Overall, Scope 1 performance reflects steady incremental improvement through optimisation and electrification.

Scope 2: Increasing Electricity Dependence

Scope 2 emissions **increased by 7%** at Group level, driven primarily by changes in electricity consumption rather than worsening grid carbon intensity. The increase reflects increasing electrification of processes and equipment, which may represent a structural shift rather than deteriorating environmental performance. Electricity consumption trends were distributed as follows:

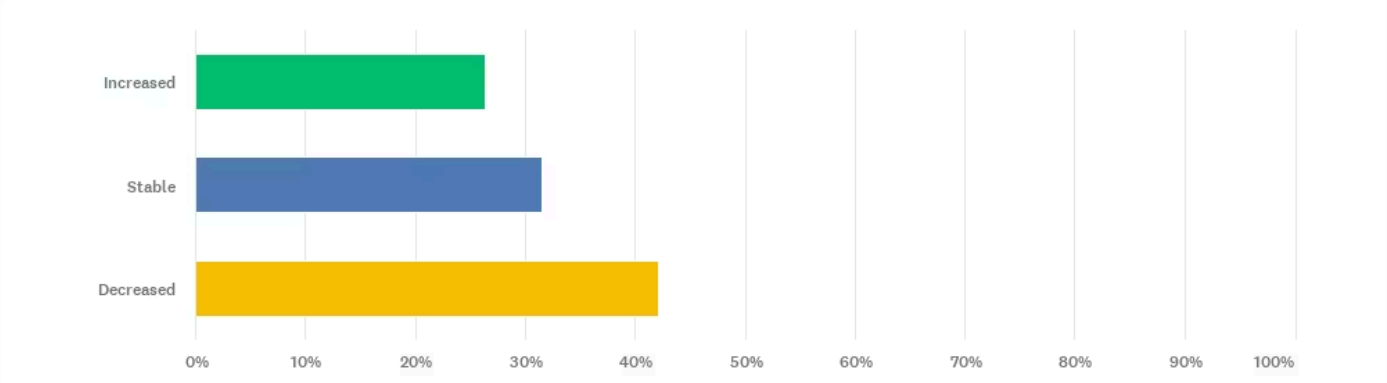


Chart 3: Electricity Consumption in 2024 compared to 2023

The fact that over 40% of respondents reduced electricity consumption indicates active demand-side management and operational efficiency efforts across the sector.

Despite more than **50% of SEAM members reporting no change in electricity**, the survey shows gradual development progress with **1/3 of SEAM Members** reporting the introduction of partial renewable energy in 2024 and **5.56% transitioning to full renewable sourcing**.

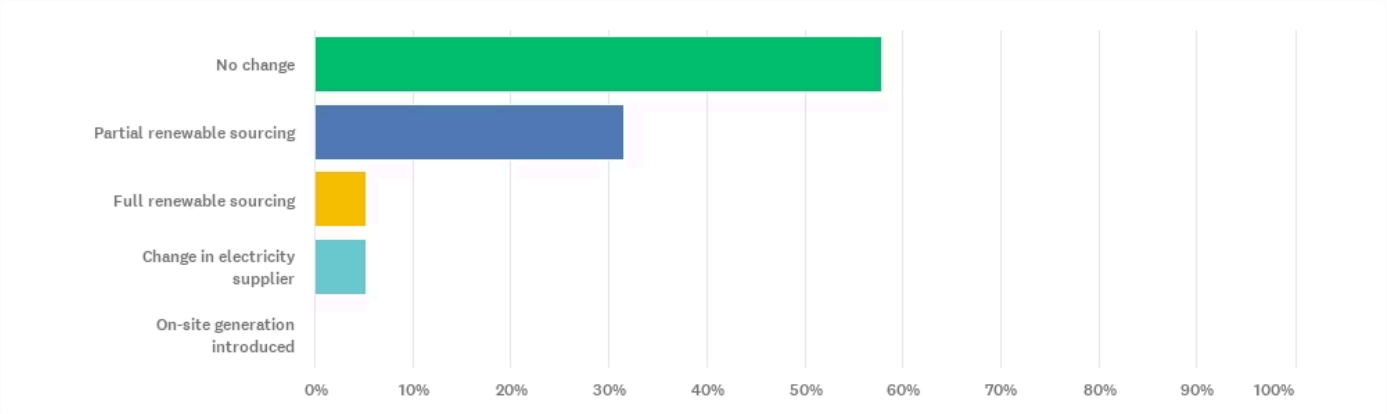
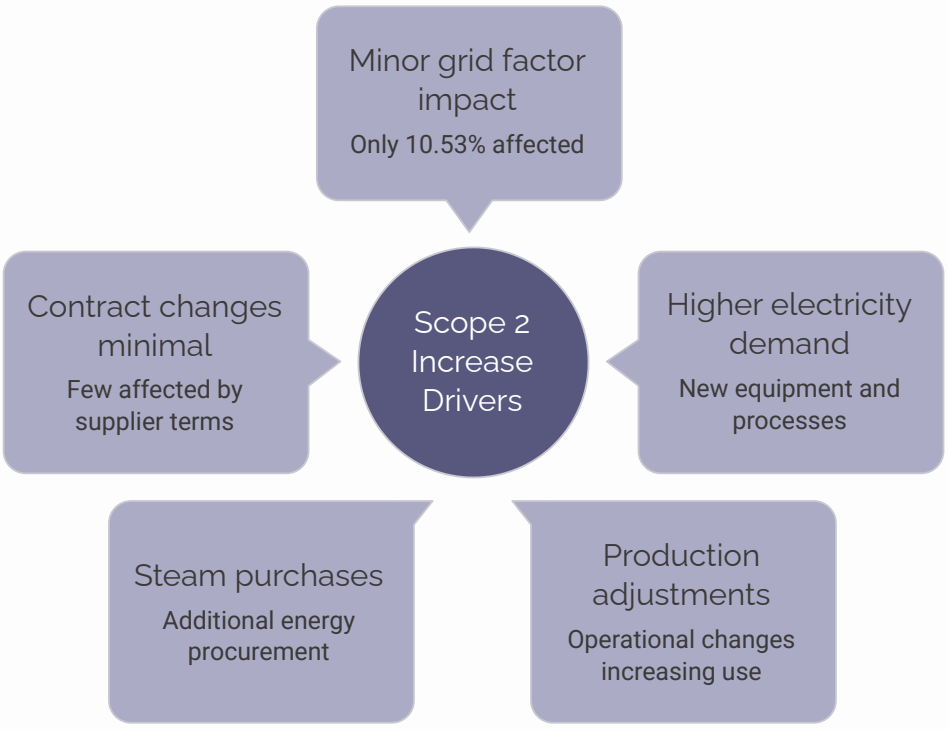


Chart 4: Electricity Sourcing Change in 2024

Only **10.53% of respondents** reported that Scope 2 emissions were materially affected by grid emission factors or electricity contract changes. This confirms that the increase in Scope 2 emissions is largely attributable to electricity demand (e.g., new equipment, production adjustments, steam purchases) rather than deterioration in electricity carbon intensity.



As electrification increases through process changes, steam system adjustments, and equipment upgrades, Scope 2 exposure grows. The sector is therefore entering a **structural transition phase**: reducing fuel combustion while increasing reliance on electricity.

Production Trends and Structural Stability

Production trends were evenly distributed across members. This balanced distribution confirms that emissions changes cannot be attributed solely to production fluctuations.

Structural and methodological changes were limited with 10.53% of the SEAM Members reporting major operational changes, perimeter changes and methodological adjustments affecting emissions.

Year-on-year comparability therefore remains robust at Group level.

5. A Sector in Transition

The results reveal a clear structural evolution:

Trend #1

Direct emissions (Scope 1) are declining through efficiency and electrification.

Trend #2

Electricity-related emissions (Scope 2) are increasing due to greater electrification.

Trend #3

Total emissions stability masks internal volatility.

Trend #4

Emissions are progressively shifting between scopes.

Several respondents highlighted future scope rebalancing (e.g., steam supply changes leading to higher Scope 1 and lower Scope 2 in subsequent years). These shifts underline the importance of assessing Scope 1 and Scope 2 collectively.

As electrification deepens, decarbonisation performance will increasingly depend on:

- Access to renewable electricity
- Procurement strategies
- National grid carbon intensity
- Long-term electricity system transformation

In other words, future decarbonisation success will rely not only on internal efficiency but also on external electricity systems.

These dynamics also underline an important analytical point: changes in scope distribution do not necessarily reflect changes in total emissions. Future reporting should continue to assess Scope 1 and Scope 2 collectively to avoid misinterpretation.

Decarbonisation Priorities Identified by Members

Respondents identified the following as key reduction levers:

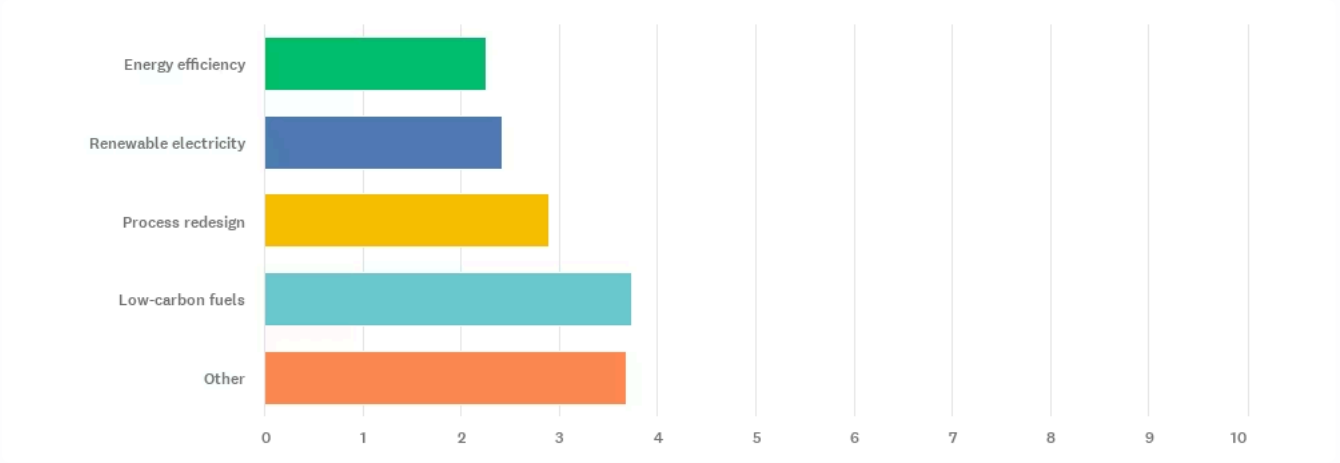


Chart 5: Levers to Decarbonisation According to SEAM Members

Energy efficiency remains the primary short-term lever, but renewable electricity procurement is emerging as a strategic priority.

- Electrification of processes
- Heat pump installations
- Alternative steam technologies
- Process emission management

This indicates growing recognition that incremental efficiency gains alone will not deliver long-term decarbonisation and that members recognise the need for deeper technological transformation.

Strategic Implications for SEAM

To navigate the accelerating transition toward industrial electrification, SEAM must adopt a cohesive approach that integrates technological innovation with robust reporting frameworks. The following priorities serve as the architectural foundation for building long-term resilience and competitive advantage in a decarbonising economy.

Electricity Strategy Coordination

As electrification increases, coordinated renewable procurement could materially accelerate Scope 2 reductions.

Thermal Innovation

Limited fuel switching indicates potential for exploring low-carbon thermal solutions.

Scope Transparency

Clear communication of Scope 1–Scope 2 transfers will improve interpretability.

Intensity Metrics

Emissions intensity indicators would strengthen analysis of structural progress.

Methodological Alignment

Continued harmonisation of emission factors and recalculation practices will enhance consistency.

These strategic priorities collectively position SEAM to move beyond incremental progress toward a structured, sector-wide decarbonisation pathway aligned with European climate ambitions. By prioritising cross-sector cooperation and technological investment, the organisation can effectively hedge against energy volatility. This transition ensures that SEAM remains at the forefront of the industry's shift toward a net-zero future.

6. Scope 3 Emissions – Current Status and Outlook

SEAM members were invited to report selected Scope 3 emissions categories as part of the FY2023–FY2024 reporting cycle, recognising that these figures would necessarily rely on estimation methodologies.

The categories requested were limited to key value-chain sources considered most relevant and measurable for the sector:

- 3.1 Purchased Goods and Services
- 3.4 Upstream Transportation and Distribution
- 3.6 Business Travel
- 3.7 Employee Commuting
- 3.9 Downstream Transportation and Distribution

- Among the companies that did submit Scope 3 data, reported emissions were on average approximately thirteen times higher than their combined Scope 1 and Scope 2 emissions, even though several respondents were unable to provide estimates for up to five Scope 3 categories.

- One company reported that estimating its full Scope 3 footprint required more than six months of internal work, highlighting the complexity and resource intensity associated with comprehensive value-chain emissions reporting.

Reporting Challenges

Despite this targeted approach, the number of responses received remained statistically limited and was largely confined to larger companies. Smaller businesses reported difficulties interpreting the Scope 3 categories, determining the appropriate allocation of data between sections, and understanding the units and methodologies required for estimation. These challenges led SEAM to develop a dedicated FAQ guidance document to clarify reporting expectations and improve consistency in future reporting cycles.

Looking Ahead

These findings reinforced SEAM's decision to adopt a progressive and pragmatic reporting approach, initially focusing on a limited number of Scope 3 categories and gradually expanding coverage over time.

> SEAM will invite all members to estimate their Scope 3 emissions again for 2025, with an initial reporting participation target of 50% of member companies. To support this objective, SEAM will organise a training session dedicated to Scope 3 reporting, aimed at improving members' understanding of category definitions, data allocation, and estimation methodologies.

This step-by-step approach is intended to strengthen reporting quality while enabling companies, particularly smaller enterprises, to progressively build the internal capacity required to assess and manage value-chain emissions.

7. Overall Assessment

The SEAM Group is **not stagnant; it is structurally evolving**. The sector is currently in a transitional phase in which direct emissions are declining through operational efficiency and targeted investments, while increasing electrification is progressively shifting the emissions profile toward Scope 2.

Group-level emissions stability therefore reflects **structural rebalancing rather than stagnation**. Beneath the stable aggregate result lies significant company-level volatility and offsetting internal dynamics, illustrating that the sector is actively transforming rather than remaining static.

The industry is progressively reducing fuel combustion while expanding reliance on electricity-driven processes. As this transition continues, sustained decarbonisation progress will increasingly depend on:

Low-Carbon Electricity

Access to low-carbon electricity systems

Strategic Procurement

Strategic procurement decisions

Thermal Modernisation

Deeper technological modernisation of thermal and process-intensive operations

Accelerating renewable electricity integration, modernising heat and steam systems, and embedding structural decarbonisation strategies across member operations will be essential to converting this transitional momentum into **sustained long-term emissions reductions**.

Conclusion at a Glance

- Framework is methodologically robust and broadly aligned with established standards (particularly for Scope 1 & 2)
- Limitations remain regarding comparability (e.g. absence of dual Scope 2 reporting)
- Exclusive use of absolute emissions limits the ability to assess efficiency improvements and performance relative to output
- Overall emissions stability at group level masks internal variations across companies
- High level of structural clarity and transparency is achieved through defined boundaries
- Partial reliance on different calculation tools introduces potential inconsistencies
- Results indicate clear structural transition, with decreasing Scope 1 and increasing Scope 2 emissions
- Improvements could be: enhancing methodological harmonisation, improve Scope 2 transparency, integrating intensity-based performance indicators

Annex I – European Reporting Boundary

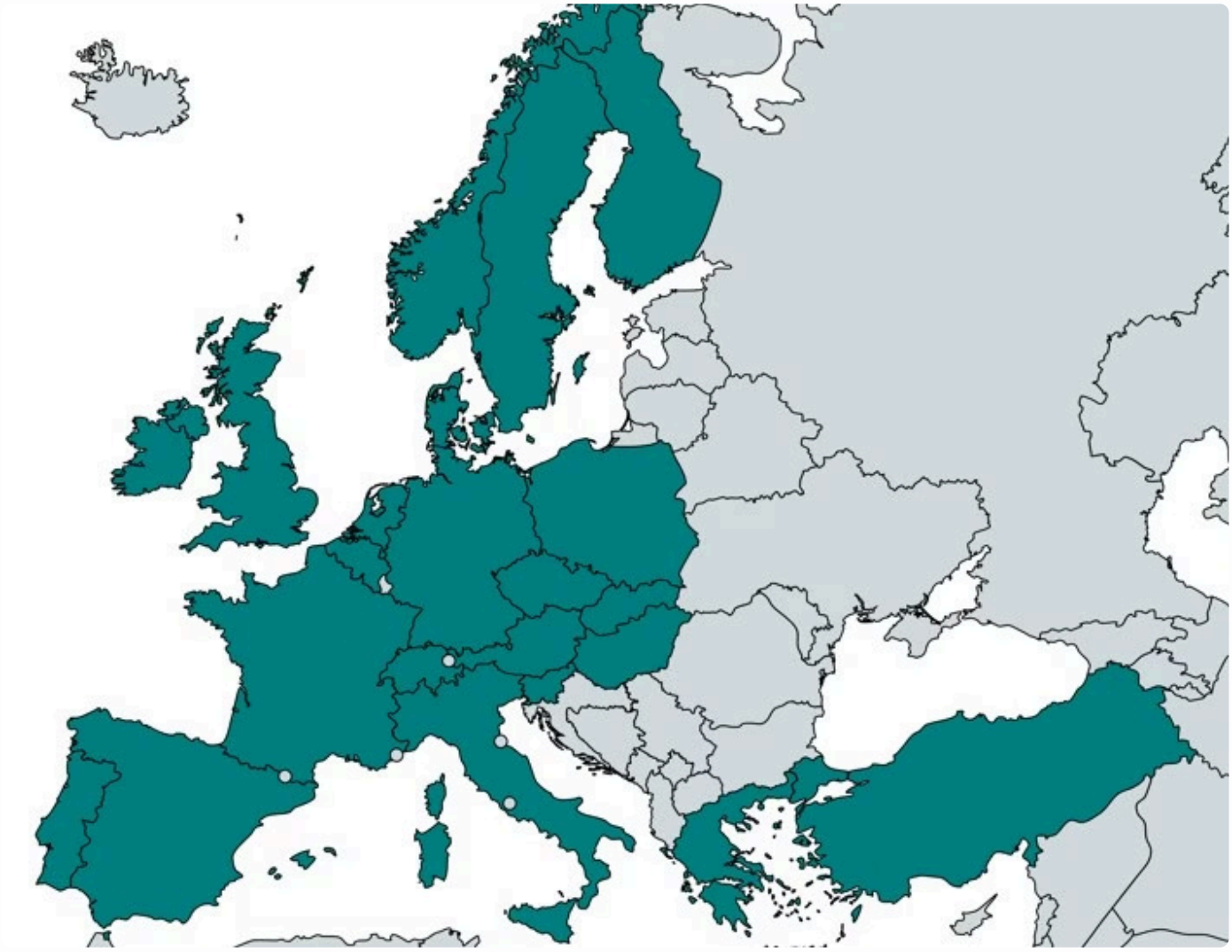
This list shows the operational boundaries of the SEAM Carbon Footprint Programme, reflecting its broad operational footprint across the continent.

Northern Europe
Denmark, Finland, Ireland, Norway, Sweden, United Kingdom

Western Europe
Belgium, France, Germany, Netherlands, Switzerland

Central & Eastern Europe
Austria, Czech Republic, Hungary, Poland, Slovakia, Slovenia

Southern Europe
Greece, Italy, Portugal, Spain, Turkey



SEAM

Sustainable European Abrasive Manufacturers

A FEPA Programme

Together, building a more sustainable abrasives industry.

2026