Aligning supply chain management for efficiency and sustainability challenges – Take aways from the ADMIRAL project

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Highlights

- EU sustainability regulation is pushing logistics companies toward robust, auditable CO_2e data requiring closer supply-chain collaboration
- Harmonizing regulatory frameworks and implementation flexibility foster companies' adoption of sustainability measures
- ADMIRAL demonstrates how a neutrally operated digital multimodal marketplace can foster stakeholder collaboration and enable emission-aware purchasing
- Integrating sustainability reporting functionalities on top of forthcoming eFTI platforms reduces compliance costs for logistics companies and enhances operational efficiency
- Further support for logistics companies is required regarding easy access to accredited emissions data and harmonized CO2e calculation tools.

Rethinking global challenges - Sustainability & Efficiency

EU regulation is gradually obliging companies to adopt sustainability monitoring and promoting emission calculation standards as part of a growing emphasis on sustainability goals.

Most recent regulation includes the EU Corporate Sustainability Reporting Directive (CSRD) requiring companies to include Scope 3 emissions occurring along the supply chain into their reporting which calls for closer collaboration between supply chain actors. Other EU regulation such as CountEmissionsEU push for a standardized approach to GHG emission calculation for transport services.

The logistics sector is a cornerstone of Europe's economy, but it faces growing pressure to reduce its environmental footprint. Establishing stronger collaboration with supply chain actors and an efficient emissions monitoring approach have thus become both a regulatory obligation, but also an opportunity to stay ahead in the competition, and re-shape internal and external processes for more efficiency and sustainability.

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Sustainability Reporting under CSRD – a phased-in obligation for companies

The European Corporate Sustainability Reporting Directive (CSRD) and more specifically its 'rulebook' of European Sustainability Reporting Standards (ESRS) have recently established a unified framework for sustainability reporting across the EU. Effective from January 2023, requirements will be phased in through 2029, targeting mainly large companies, but also affecting SMEs. **Compliance to CSRD and ESRS demands robust, auditable CO_2e emissions data covering Scope 1, 2, and—for the first time—Scope 3 emissions throughout the supply chain**. Company level sustainability data must be included in management reports in the agreed ESEF/ iXBRL digital format in addition to traditional financial data. Even if only requiring reporting of aggregate data, this will require rigorous data collection, governance and cross-departmental collaboration within companies.

Standards for CO_2e emissions reporting & frameworks for data sharing are available

To help companies in voluntarily creating and disclosing comparable data on CO_2e emissions from transport services, the European Parliament and the Council have recently agreed on the **CountEmissionsEU** regulation. It will provide **standardized GHG accounting** via the EN ISO 14083:2023 standard including access to default values via emissions data bases for transport services. Although the CSRD/ESRS framework requires only aggregate corporate-level reporting and CountEmissionsEU sets comparability standards at the transport service level, it is expected that companies will adopt CountEmissionsEU as the recognized EU standard. These regulations are complemented by the EU **Data Act (2024) and Data Governance Act (2022)** which have created **frameworks for safe sharing of such emission data between companies and individuals and support data accuracy**, e.g. in terms of emissions reporting.

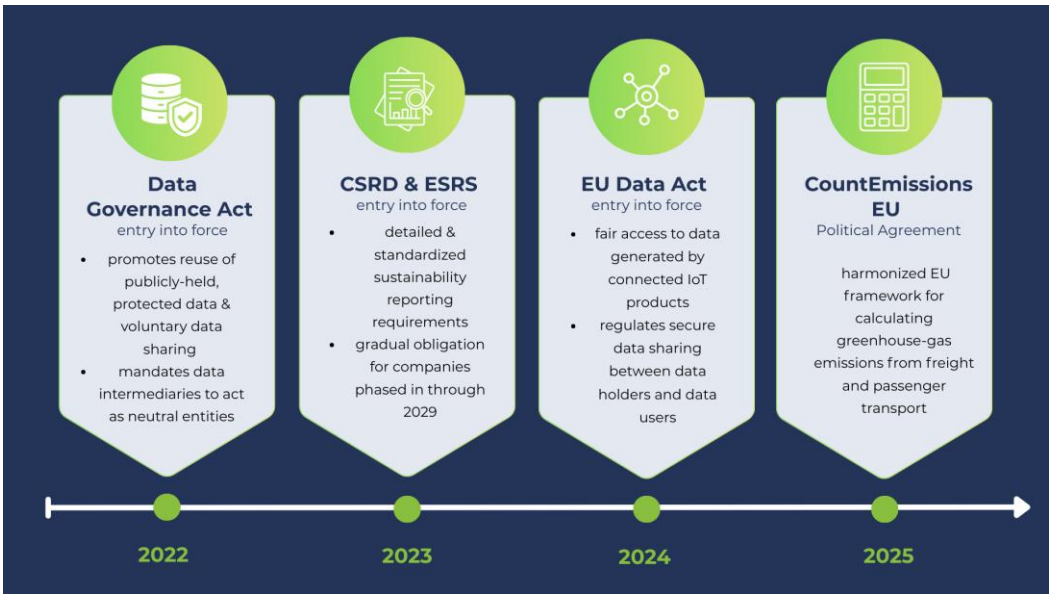

Figure 1 Regulation Timeline

While this regulation 'puzzle' supports EU-wide transparency in emissions from transport and logistics, offers a standardized calculation approach to ensure comparability and data quality for transport services, and pushes for a safe sharing of emissions data, **the current challenges persist:**

- How to ensure easy and cost-efficient access to accredited emissions data for companies
- Companies face unknown costs when applying tools for CO_2e emissions calculation and reporting
- The use of these tools is voluntary for most EU companies, making software developers struggle to convince customers of their services' merits
- The certification methods and processes for solution developers remain unagreed

From Obligation to Competitive Advantage – Opportunities for Companies

To encourage more widespread CO_2e emission reporting in logistics supply chains, **companies need easy ways to share and access clear data on multimodal emissions and costs**. That entails:

- comparability of logistics services in terms of pricing as well as emissions along the supply chain, thereby promoting services with lower total emissions
- collecting reliable data for emissions reporting
- trusted data exchange between sellers and buyers of logistics services and other involved stakeholders

The ADMIRAL project answers these needs by building a digital multimodal marketplace connecting sellers and buyers of logistics services as well as developers and integrators of service solutions on a joint, trusted platform. The marketplace thereby simplifies stakeholder collaboration along the logistics supply chain, and enables the purchase of services based on price as well as emissions information. Thus, the marketplace opens up a trusted ecosystem where logistics services are exchanged and low-emission services are promoted.

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2 Best Practices from ADMIRAL – Driving green logistics through stakeholder cooperation and alignment with market needs

ADMIRAL marketplace –A digital marketplace simplifying collaboration and comparability of logistics services in terms of emissions and costs

Digital marketplaces can accelerate the transition to low-emission logistics by enabling connectivity, transparency with respect to stakeholders, connected data as well as physical and digital networks, and coordination across supply chain actors. The **ADMIRAL marketplace** (Advanced multimodal marketplace for low emissions and energy transportation) illustrates this potential by **connecting logistics actors at multiple levels –both vertically,** i.e. stakeholders representing different tiers of the supply chain such as shippers and carriers; **and horizontally**, referring to stakeholders collaborating at the same operational level, for instance carriers sharing resources to reduce empty runs.

A key innovation of the ADMIRAL marketplace is its ability to **compile Scope 3 emissions data across multimodal logistics chains**. By offering buyers, i.e. cargo owners' **information on pricing and Scope 1-3 emissions associated with a specific logistics service**, the marketplace empowers them to make emission-aware decisions and gather data for emissions reporting conveniently. The marketplace thus serves as a management tool for the entire supply chain and its related emissions, driving the transition toward carbon-neutral freight.

The ADMIRAL marketplace is more than a platform—it's a collaborative ecosystem for a carbon-neutral future.

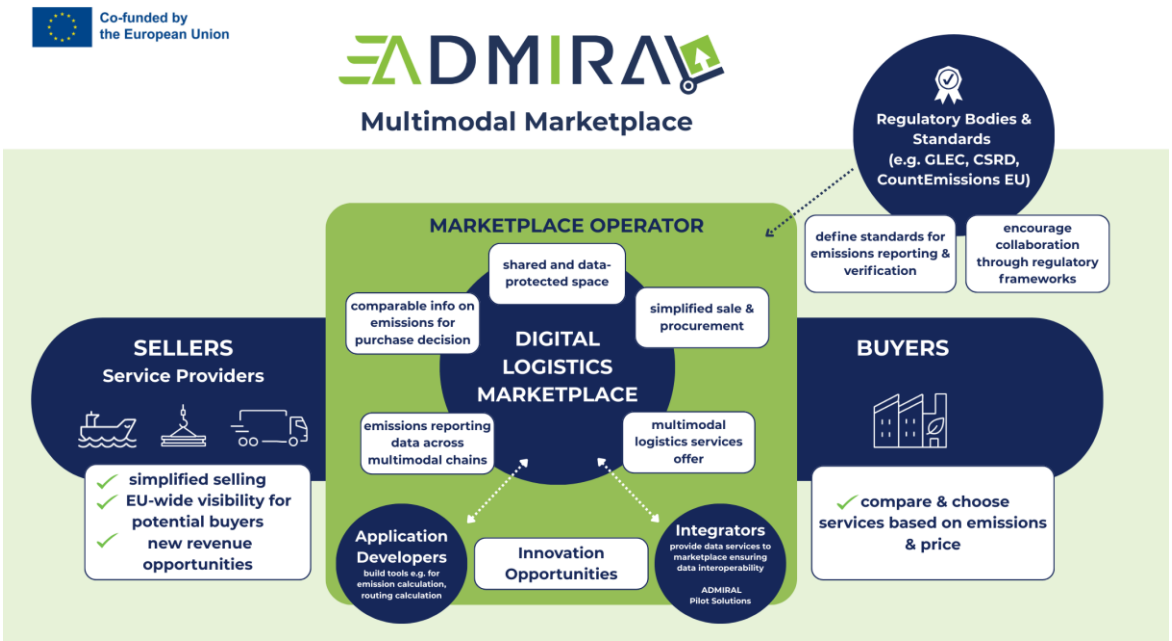

Figure 2 ADMIRAL Multimodal Marketplace

Overcoming barriers to digital collaboration: Lessons from ADMIRAL

Digital logistics marketplaces such as the one developed within the ADMIRAL project hold strong potential to enhance collaboration among logistics stakeholders. However, realizing this potential requires explicitly addressing persistent barriers that limit participation and coordinated action. The ADMIRAL project has identified these barriers across economic, governance, market, and information-sharing dimensions and responds to them through targeted design and governance mechanisms embedded in the marketplace architecture.

Key Barrier	Solution proposed by ADMIRAL marketplace
Fragmented governance and regulation challenges	Regulatory and legislative compliance: • marketplace embeds the GLEC Framework through an API for harmonized Scope 1-3 emissions calculations and aligns with emerging CountEmissionsEU guidance to ensure consistency across transport modes and EU reporting obligations • offers marketplace participants a single, trusted methodology for transparent and comparable emissions data.
Economic and efficiency constraints e.g. in terms of cost structures & transaction fees	Operational efficiency and productivity: By providing integrated emissions tracking, ADMIRAL reduces manual effort and reporting costs, leading to tangible business performance gains.
Information-sharing resistance: Data power imbalances and lack of transparency limit effective decision-making.	Platform-enabled trust and interoperability: Embedded emissions transparency and modular participation foster robust, scalable collaboration.
Market and business model limitations: Concerns about reputational risk and resistance to collaboration hinder active engagement.	Innovation diffusion and market integration: Facilitates distribution of sustainable solutions and strengthens visibility and network effects across Europe.

Table 1 Key barriers & ADMIRAL marketplace structural solutions

As shown in Table 2, the **ADMIRAL marketplace** directly links key collaboration barriers to platform-level solutions. It **embeds mechanisms for transparency and modular participation**, reducing interdependence while supporting coordinated action. Its digital architecture mitigates challenges common in analogue collaborations, such as fragmented governance, inconsistent performance measurement, and limited innovation diffusion.

The ADMIRAL marketplace represents a promising architectural response for digitally-enabled, collaborative logistics ecosystems. Its capacity to embed trust, transparency, and interoperability positions it as a viable enabler of supply chain transformation, supporting the EU's decarbonization and competitiveness goals.

A streamlined set of KPIs for the logistics sector aligned with EU regulation

Achieving green and sustainable freight transport requires coordinated action among governments, regulators, industry players, consumers, and civil society. By **adopting KPIs aligned with EU policy directions on digitalization and sustainability** early on, **companies can** put themselves at the forefront of societal and policy developments, **enhance operational efficiency, and contribute to sector-wide sustainability goals.**

Within the ADMIRAL project, over 400 logistics industry KPIs have been consolidated into a **streamlined set of 22 KPIs linking to EU policy priorities and covering key drivers including digitalization, sustainability, and regulatory compliance**. Linking selected KPIs to EU policy priorities provides guidelines for sustainable growth, digital technology adoption, and emissions reduction.

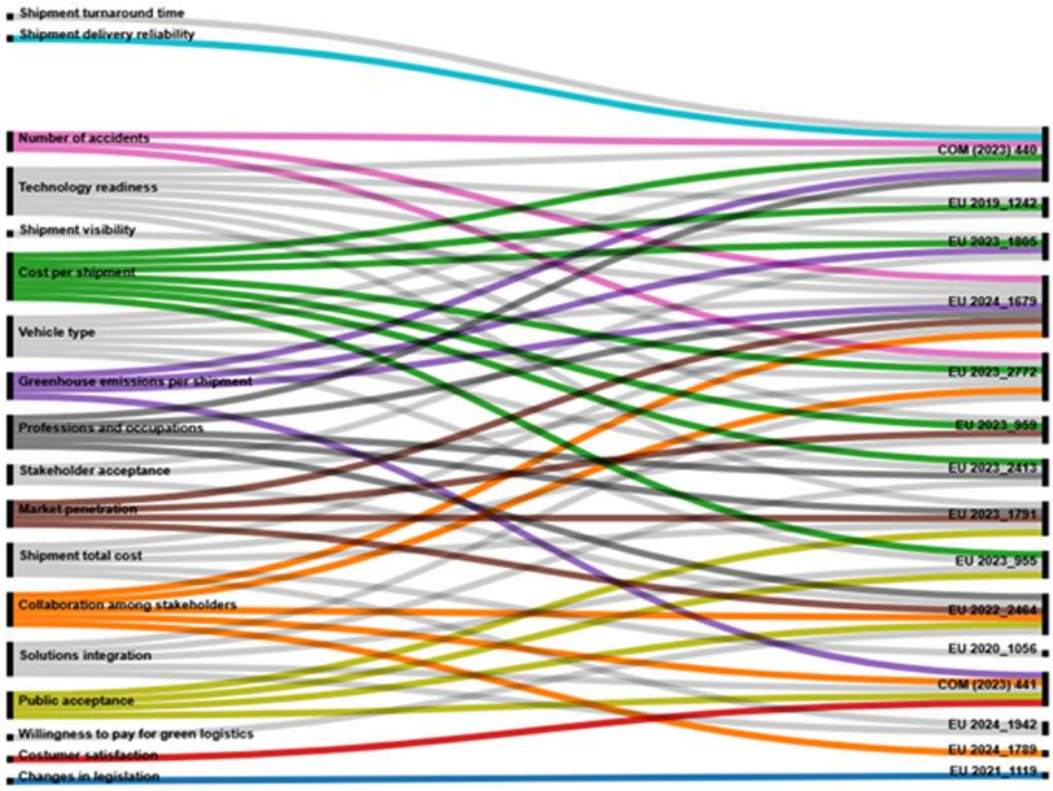

Figure 3 Interconnection between ADMIRAL KPIs and EU Regulations

Aligning Stakeholder Priorities Across Europe

While EU regulations set the framework, sustainability priorities differ across stakeholders and regions, creating challenges for harmonized implementation.

To reflect major sustainability priorities across EU companies in a core set of KPIs, an **ADMIRAL survey** (Sobrino et al. 2025) among diverse European stakeholders has been conducted including feedback from cargo owners, logistics operators, infrastructure managers, policymakers, researchers and associations. The survey asked participants to indicate their respective sustainability priorities across stakeholder roles and examined the perceived importance and progress of technological, non-technological, and regulatory drivers of green logistics.

Evidence from the survey analysis showed that **sustainability priorities in European logistics vary more by stakeholder role** than by region. Infrastructure managers, academia, and ancillary services strongly prioritised environmental goals. Cargo owners and logistics operators balanced economic, environmental and social objectives. Public authorities emphasised governance (see Figure 4).

Across **EU regions, priorities are largely aligned, reflecting the harmonising effect** of shared policies, regulations, and institutional frameworks. This regional convergence provides a **strong foundation for coordinated EU-level interventions**, enabling consistent advancement of green logistics across national borders while still accommodating role-specific needs and responsibilities.

Technological solutions –digitalisation, energy-efficient technologies, and alternative fuels- are seen as the **most promising drivers**, though adoption remains moderate. Collaborative approaches and multi-actor coordination lag, highlighting the need for mechanisms that facilitate trust, transparency, and data sharing.

Figure 4 AHP-weighted importance of sustainability goals by stakeholder group (Daniela et al. 2026)

ADMIRAL demonstrates how EU-aligned KPIs can serve as a practical tool for driving performance, fostering collaboration, and supporting the green transition in logistics.

3 Policy Recommendations

From the project experiences of developing and testing the ADMIRAL multimodal marketplace for low-emission services including pilot services, adapting the marketplace design to reflect identified success factors and lowering barriers faced by potential marketplace participants, and from in-depth analysis conducted on the alignment of sustainability KPIs with EU regulation on the one hand, and industry priorities on the other hand, the following policy recommendations offer a path towards greening logistics through:

1 – Lay the regulatory foundation for encouraging bottom-up low emission efforts in line with industry priorities and needs

Actions proposed

- Stimulate broader adoption of sustainable practices in the logistics sector by offering regulatory certainty on support measures to aid companies, especially small and medium-sized enterprises, in implementing emissions reporting. In this regard, accelerating the **CountEmissionsEU framework** will provide clear and actionable guidelines for emission calculation and data publishing which support the use of data deriving from services such as the ADMIRAL marketplace.
- Align prioritized industry KPIs related to sustainability with KPIs set by EU regulations ensuring that companies can remain competitive while fulfilling sustainability policy mandates. Ensure implementation flexibility to accommodate sustainability priorities of different stakeholder groups in the logistics sector.

Evidence from ADMIRAL

During the ADMIRAL timespan, regulations concerning emissions developed significantly (e.g. CSRD, ISO14083:2023, CountEmissionsEU introduced), which has enabled a common reference framework for companies to move forward with emissions management and offered ADMIRAL project partners the necessary frameworks to build new solutions for emissions reduction on. This highlights the impact of clear regulatory frameworks and support mechanisms.

While studies conducted in ADMIRAL confirm that logistics companies' attention to GHG emission reduction is growing, findings also emphasize the benefits of implementation flexibility in order to align EU regulation and logistics industry sustainability priorities (KPIs). Analysis of feedback from logistics stakeholders likewise points to the harmonizing impact of EU policies on sustainability priorities across EU regions, highlighting EU regulation as a driving force for a shared vision on green logistics by industry stakeholders across European regions (Castaño-Herrera et al.).

However, logistics companies (especially SMEs) continue to struggle with implementation of EU emission regulation, and further support is still required, concerning e.g. easy and cost-efficient access to accredited emissions data and harmonized CO_2 calculation tools as default emissions data for different modes of transportation and emissions factors for different energy types remain

scattered in different databases. This challenge has been repeatedly raised by logistics companies across several industry events and workshops[1].

Expected Impact

Approaching industry and EU regulation KPIs on sustainability is likely to motivate logistics companies to reduce GHG emissions in their business operations and strengthen the argument of becoming a forerunner through early adoption of sustainability KPIs and anticipating upcoming regulatory obligations rather than losing competitiveness. Providing support and regulatory certainty to companies strengthens this tendency, while role-sensitive policies can address the distinct incentives of infrastructure managers, logistics operators, cargo owners, and public authorities, reinforcing sustainability efforts while accounting for heterogeneous capacities and constraints across the EU.

2 –Support forerunner digital collaboration platforms that embed trust and transparency to foster CO_2e emission reduction and operational efficiency along the entire supply chain

Actions proposed

Support forerunner, scalable innovations such as digital collaboration platforms promoting collaboration between logistics stakeholders which are operated by a neutral 3rd party and have a special emphasis on engaging SMEs, to

- enable an effective approach to emission reduction along the entire supply chain fulfilling both efficiency and sustainability goals
- ease information exchange on Scope 1-3 emissions
- establish a neutral basis for collaboration between logistics stakeholders

In that regard, digital collaborative platforms such as the ADMIRAL marketplace have the potential to connect stakeholders both vertically and horizontally in a trusted space, structured by transparent and fair data governance in line with data intermediation services as set by the Digital Services Act, backed by certification, allowing for modular participation, and ensuring data interoperability.

For digital collaboration platforms, regular assessment of platform performance should be ensured to stimulate continuous improvement and integration of most recent emission reporting and (regulatory) data sharing standards.

Evidence from ADMIRAL

Findings from ADMIRAL surveys (Castaño-Herrera et al.) highlight that technological innovations—such as digital logistics marketplaces, real-time monitoring tools, energy-efficient technologies, alternative fuels, and decision-support systems—are perceived as the most promising drivers of green logistics, yet adoption remains moderate. Collaborative mechanisms requiring multi-actor coordination show slower progress, underscoring the need for trust-building, transparency, and governance frameworks. ADMIRAL demonstrates that an integrated digital strategy can align

[1] Many of these events/workshops were organized by LOGY, the Finnish logistics association.

stakeholder actions, optimise operations, and facilitate measurable CO_2 reductions across supply chains.

Expected Impact

Fostering collaborative digital platforms, e.g. in the frame of research projects allows for operational efficiency, emission reduction and enhanced energy performance in the logistics sector –specifically with regard to Scope 3 emissions –by triggering stakeholder collaboration through incentives in the form of data (e.g. CO_2e emissions reporting data) and cost transparency. At the same time, common barriers to platform collaboration can be addressed through a balanced and transparent governance structure and by ensuring a trusted data sharing space. Over time, such integrated approaches are expected to support a coherent, system-wide green logistics transition, strengthening the EU's ability to meet climate targets and advance sustainable transport networks.

3– Integrate future sustainability reporting functionalities at the top of forthcoming eFTI platforms

Actions proposed

Enable logistics companies to address emissions within the entire supply chain effectively by adding sustainability reporting functionalities to the eFTI data model and on top of forthcoming eFTI platforms.

Evidence from ADMIRAL

While the ADMIRAL project has not directly focused on eFTI platforms, project findings from bottom-up collaboration with logistics companies indicate that companies are inclined to develop solutions that extend or enhance their existing digital systems rather than adopting new ones if these require further investment. In addition, findings from semi-structured interviews with companies reveal that collaborative logistics is key. As eFTI is expected to become a foundational and widely adopted system for freight data management in the EU, establishing interfaces with emissions calculation tools, would significantly improve operational efficiency, streamline monitoring processes and reduce compliance costs by avoiding the need to invest in parallel or overlapping digital solutions. Including sustainability metrics within eFTI data model and platforms therefore emerges as a promising avenue for future development.

Expected Impact

While the eFTI Regulation is focused on digitalizing and thereby facilitating the exchange of regulatory transport information, its technical framework offers an opportunity to include sustainability performance indicators and standards into eFTI platform functionalities. This would contribute to data transparency, facilitate CO2e data exchange and data-based monitoring of logistics companies' sustainability performance. The extension towards sustainability reporting functionalities thus has the potential to reinforce the push towards sustainability monitoring, stakeholder exchange, and reducing emissions along the supply chain with the added benefit of enhancing operational efficiency. Developing such sustainability dimensions of eFTI might also lead to similar evolutions in the underlying Multimodal Transport Reference Data Model (MMT RDM) of the UN/CEFACT.

This policy brief puts forward findings and recommendations based on insights gathered in the EU project ADMIRAL (Advanced multimodal marketplace for low emission and energy transportation) among others based on surveys, semi-structured interviews, and workshops with logistics companies as well as detailed analysis of EU sustainability regulation and logistics company sustainability reports.

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