In collaboration with
Capgemini and Cambridge
Industrial Innovation Policy,
University of Cambridge

WORLD ECONOMIC FORUM

The "No-Excuse" Opportunities to Tackle Scope 3 Emissions in Manufacturing and Value Chains

Industry Net Zero Accelerator Initiative

WHITE PAPER

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Images: Getty Images

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Foreword

To achieve net zero by 2050 or sooner, industries must tackle Scope 3 emissions at a much faster pace. This requires companies to take responsibility for emissions beyond their immediate operations and make profound changes throughout their products and business models, using emerging technologies and embracing new partnerships across value chains.

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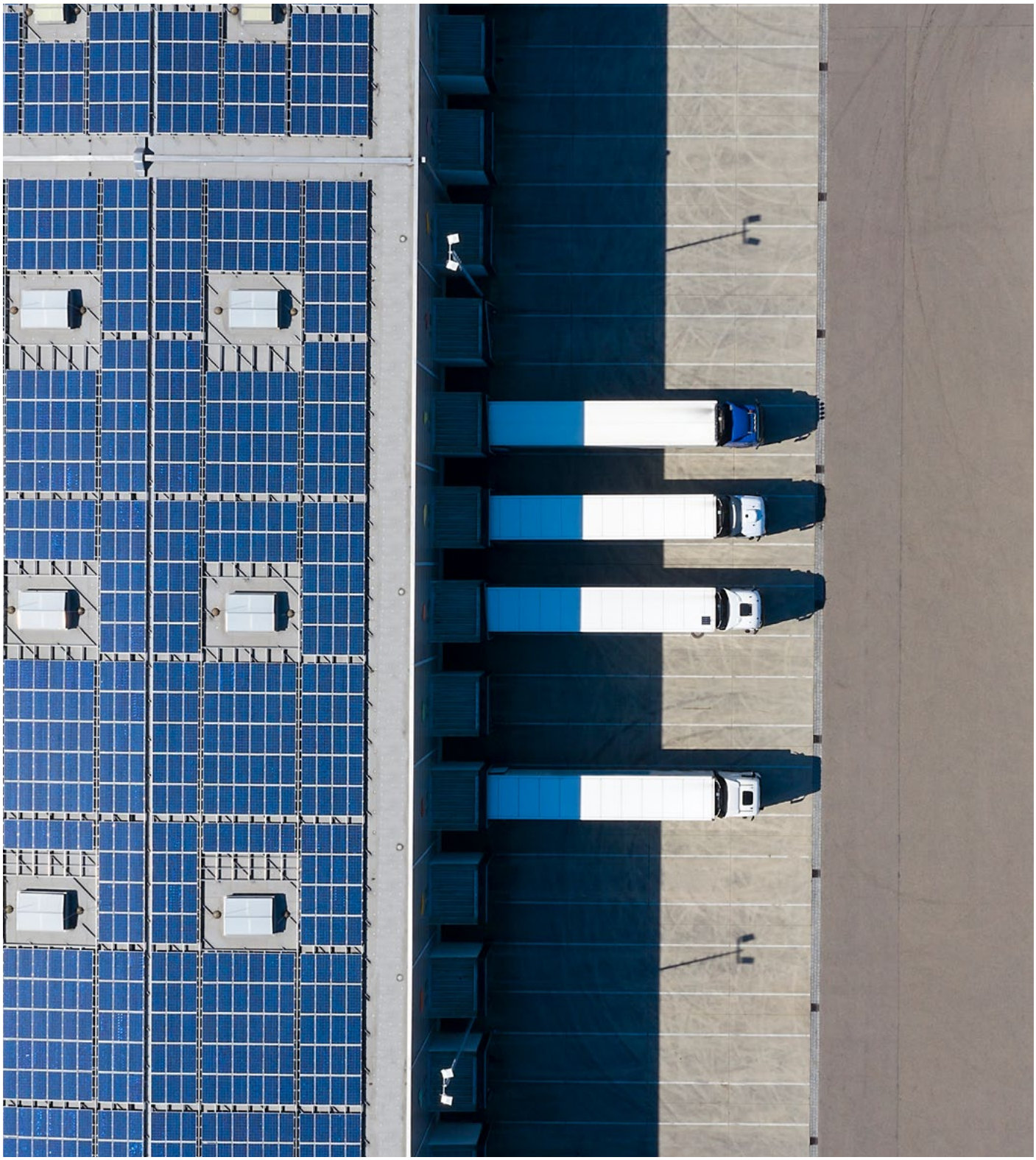
While many companies have set targets to reduce their direct emissions (Scope 1) and emissions from purchased energy (Scope 2), emissions within value chains (Scope 3) remain largely unaddressed. Scope 3 emissions, which account for more than 70% of industries' greenhouse gas (GHG) emissions,[1] represent a critical challenge. According to a February 2023 survey by the Science Based Targets initiative (SBTi), even among companies with Scope 3 targets, 50% are falling "off track" in achieving them, despite 40% of these companies holding their executives directly accountable for decarbonization efforts.[2]

In 2022 the World Economic Forum launched the Industry Net Zero Accelerator initiative in collaboration with Cambridge Industrial Innovation Policy (Institute for Manufacturing, University of Cambridge), Capgemini, Rockwell Automation and Siemens, as well as a community of more than 30 global manufacturing companies, to help accelerate the industry transition to net zero. Following the publication of *The "No-Excuse" Framework to Accelerate the Path to Net-Zero Manufacturing and Value Chains*,[3] the initiative has conducted consultations among leading business, academic and government experts to understand the main drivers, challenges and opportunities behind Scope 3 industrial emissions, uncovering valuable insights into the decarbonization status of industry's global value chain.

Addressing Scope 3 emissions requires a comprehensive re-evaluation of product portfolios and business models to unlock effective decarbonization strategies and pave the way to new business opportunities. This process involves embracing emerging technologies, fostering new value-chain relationship dynamics, and shifting towards a collaborative mindset.

While many manufacturers endorse this transformation, they encounter numerous challenges, such as the cost of decarbonization, data availability and quality, accounting standards interpretation, consumer education and co-innovation with suppliers in multi-tier supply chains. Firms need to be adaptive and innovative, employing a test-and-learn approach rather than waiting for perfect maturity in calculations and abatement technologies.

The World Economic Forum's Industry Net Zero Accelerator initiative published this paper to highlight emerging opportunities and best practices. It aims to inspire private- and public-sector leaders to take action and drive the net-zero transformation of global value chains with "no excuses".



Executive summary

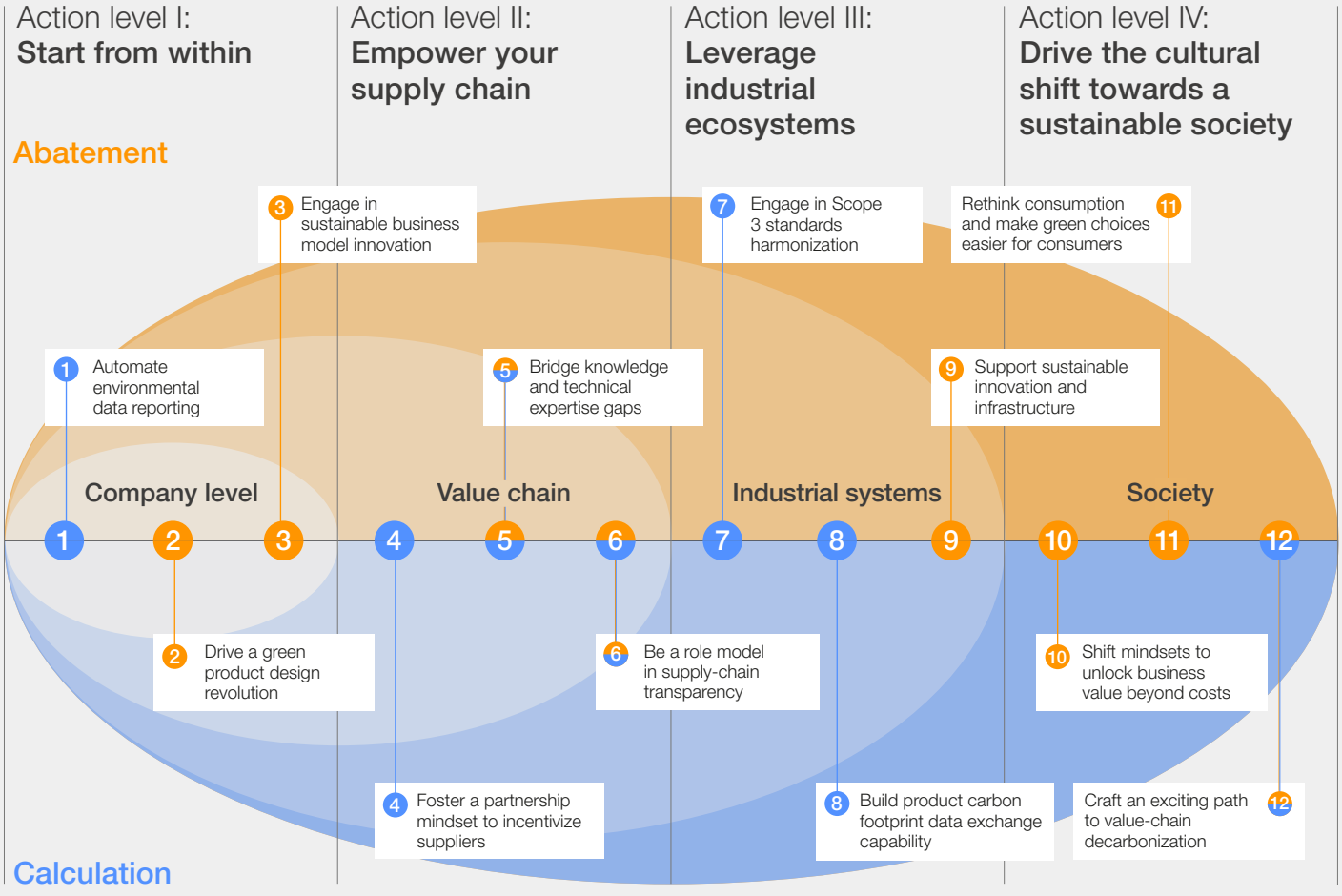
In the race to industry net-zero transformation, attention is finally being focused on Scope 3 emissions. The Science Based Target Initiative (SBTi) has been urging companies to establish reduction targets for their Scope 3 emissions – those embedded in the value chain. Organizations such as the International Organization for Standardization (ISO) and the International Sustainability Standards Board (ISSB) from the International Financial Reporting Standards (IFRS) Foundation are rolling out refined Scope 3 accounting standards, harmonizing calculation methods and encouraging their disclosure. Regulatory bodies, such as the European Union's Corporate Sustainability Reporting Directive (CSRD), are now underscoring the importance of addressing Scope 3 emissions, mandating companies to disclose them.

However, companies face complexities in addressing Scope 3 emissions and struggle to reduce them at the right pace and scale. Critical questions arise: How can companies influence emissions beyond their reach? Who bears the cost and benefits of low-carbon products and processes? How can progress be measured accurately? These highlight the need for a comprehensive approach to tackling Scope 3 emissions.

To mitigate Scope 3 emissions, a profound redesign of sustainable products and business models is crucial, along with a shift in the dynamics of value-chain relationships. This involves extending emissions reduction efforts to the entire product or service life cycle and swiftly adopting new technologies and digital innovations to scale the change across the organization. Central to this is forming beneficial collaborations with suppliers and customers and forging partnership across the industrial ecosystem.

In response to these challenges, the Industry Net Zero Accelerator initiative presents 12 "No Excuse" opportunities for businesses and governments to accelerate their Scope 3 decarbonization journey. These opportunities are grouped into four action levels:

The "no-excuse" opportunities to tackle Scope 3 emissions in manufacturing and value chains



Selected from consultations and reviews of key literature, these 12 opportunities address both the Scope 3 calculation and abatement aspects and are complemented by 18 real-world case studies from early movers. Although different contexts and drivers underlie the Scope 3 emissions of various industrial sectors, these opportunities are intended to be applicable across key industries and geographies.

They are considered as interlinked and mutually supporting themes that are likely to be deployed in combination as part of the net-zero journey.

This white paper serves as a practical roadmap for businesses navigating the intricate terrain of Scope 3 decarbonization and accelerating their contributions to global climate efforts.

1 Understanding industrial Scope 3 emissions: What, why, how

Although initially seen as secondary by most corporate-level standards, Scope 3 is now an important focus for corporations in the push to net zero, as new evidence points to its significance.

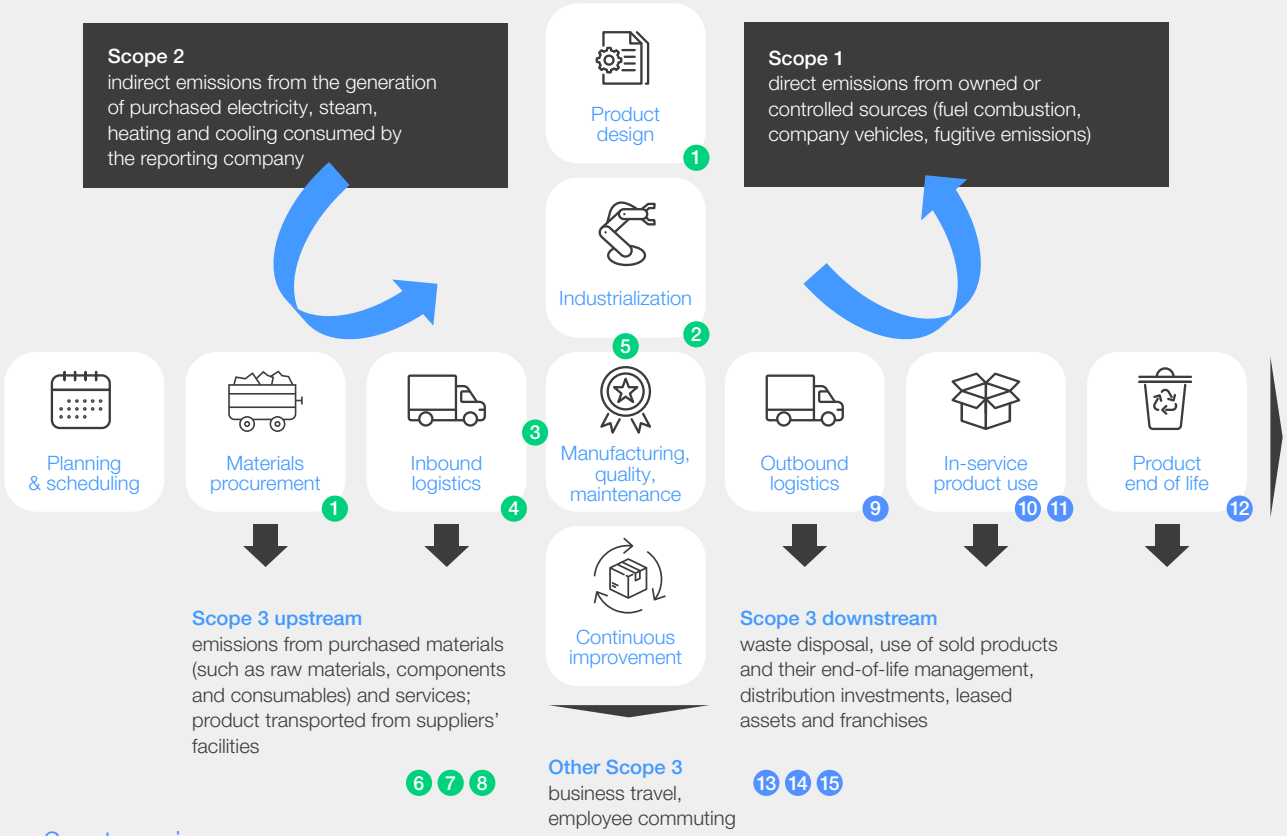
More than two decades ago, the Greenhouse Gas Protocol (GHG Protocol) defined emissions scopes as a way of classifying carbon sources. But what does Scope 3 mean exactly, why is it relevant and how are businesses approaching this conundrum?

According to the GHG Protocol, Scope 3 emissions encompass all indirect emissions not included in Scope 2, which occur throughout the value chain of the company reporting them, including those from upstream and downstream sources.[4]

In other words, most of a business's Scope 3 emissions are the Scope 1 and 2 emissions of another business/individuals. While these emissions are not fully under a firm's control, that firm may be able to affect the activities that result in them, influence its suppliers and/or choose which suppliers to engage with.[5]

The GHG Protocol corporate standard classifies Scope 3 emissions into 15 different categories, as shown in Figure 1. Although not all categories are relevant to every organization, these provide a structured framework to understand, measure, report and monitor Scope 3 sources of emissions across a value chain.

FIGURE 1 **Scope 3 categories**



Scope 3 categories

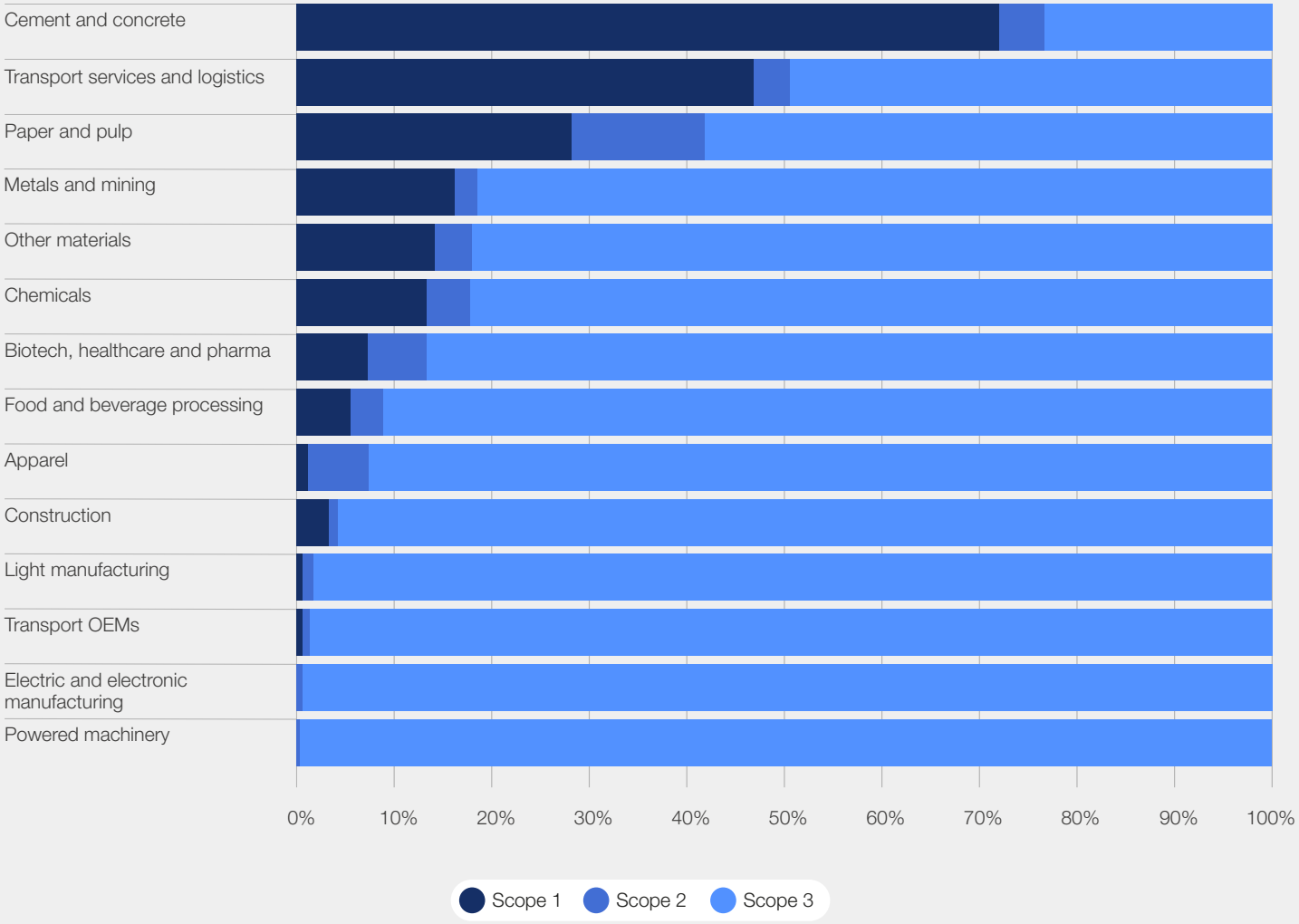
Upstream	Downstream
1 Purchased goods and services	9 Downstream transportation and distribution
2 Capital goods	10 Processing of sold products
3 Fuel- and energy-related activities	11 Use of sold products
4 Upstream transportation and distribution	12 End-of-life treatment of sold products
5 Waste generated in operations	13 Downstream leased assets
6 Business travel	14 Franchises
7 Employee commuting	15 Investments
8 Upstream leased assets	

Source: Extracted and modified from: World Economic Forum, The "No Excuse" Framework to Accelerate the Path to Net-Zero Manufacturing and Value Chains, January 2023; and The GHG Protocol, Corporate Value Chain (Scope 3) Accounting and Reporting Standard, 2011

1.1 Why does Scope 3 matter?

Scope 3 emissions usually account for more than 70% of a business's carbon footprint.[6] Figure 2 highlights that different industries face different challenges. While industries such as cement and concrete, and metals and mining have relatively lower Scope 3 emissions, this category becomes significant for other industries, including chemicals, electronics, automotive and food, and as a result any decarbonization efforts in those sectors are likely to require intense cooperation among original equipment manufacturers (OEMs), consumer brand companies and their suppliers.

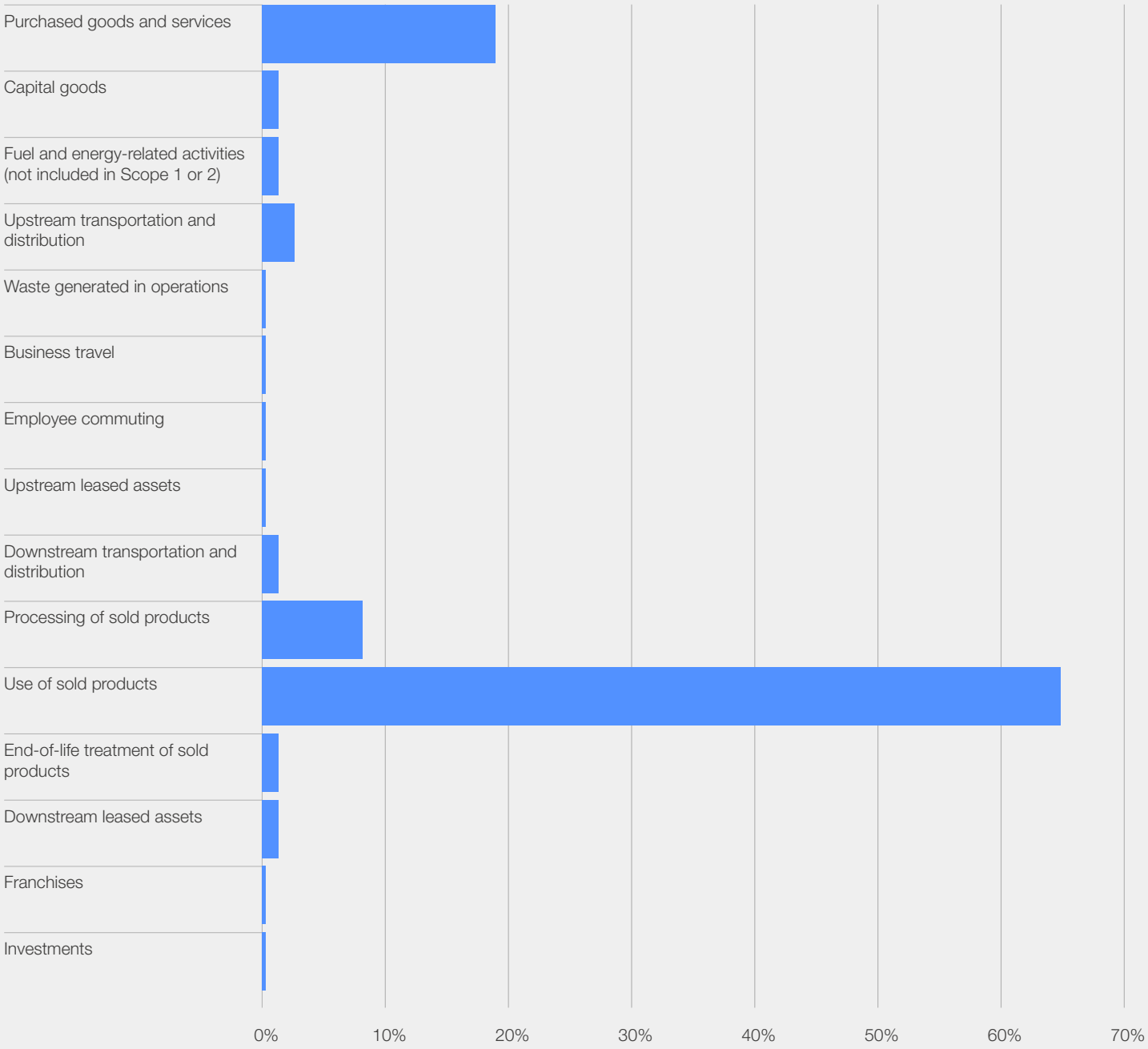
FIGURE 2 **Scope 3 emissions for selected industries from the CDP**



Source: Extracted from CDP and Capgemini Invent, From Stroll to Sprint: A Race Against for Corporate Decarbonization, July 2023; CDP, CDP Technical Note: Relevance of Scope 3 Categories by Sector, 2022

According to the CDP report, Scope 3 category 1 (purchased goods and services) and Scope 3 category 11 (use of sold products) combined represent 84% of reported Scope 3 emissions (see Figure 3). However, reporting is often incomplete, with many industries omitting several Scope 3 categories. Indeed, organizations disproportionately fail to disclose information about their value-chain actions.[7] Only 16% of organizations were able to share details of their supply-chain engagement strategy, while only 11% could do so for their portfolio of low-carbon products and services.[8]

FIGURE 3 | **CO_2e emissions split by Scope 3 categories for selected industries**



Source: Extracted from CDP and Capgemini Invent, From Stroll to Sprint: A Race Against for Corporate Decarbonization, July 2023; CDP, CDP Technical Note: Relevance of Scope 3 Categories by Sector, 2022

1.2 How is Scope 3 calculated and reported?

Carbon accounting standards underpin the measurement and reporting of carbon emissions as well as the tracking of organizational performance against abatement strategies and targets. Carbon accounting standards can be classified into two main categories:

- **Corporate carbon footprint (CCF):** CCF is the total sum of GHG emissions directly or indirectly generated by a company's activities during a specific period of time.[9]
- **Product carbon footprint (PCF) and life-cycle assessment (LCA):** PCF is the total GHG emissions generated by a product from the extraction of its necessary raw materials to its end of life.[10] LCA studies the environmental aspects and potential impacts throughout a product's life cycle, from raw materials acquisition through to production, use and disposal.[11]

The variety of standards available makes it a challenge for organizations to select the right one and ensure comparability of results across firms, as well as for sectoral, regional and national aggregation. Table 1 shows the most common standards used to evaluate CCF and PCF.

TABLE 1 **Principal carbon accounting standards**

Corporate carbon footprint standards	**GHG Protocol**	**Corporate Value Chain (Scope 3) Accounting And Reporting Standard:** First developed in 2001 by the World Resources Institute (WRI) and the World Business Council on Sustainable Development (WBCSD), published in 2011 as a supplement to the Corporate Accounting and Reporting Standard, this provides specific guidelines for the measurement of Scope 3 emissions and is unique of its type. The standard is focused on the six greenhouse gases covered by the Kyoto Protocol. Potentially the most widely used standard in the world, with 85% of companies reporting to the Carbon Disclosure Project (CDP) claiming to use it.
	ISO 14064	**Guidance at the Organization Level for Quantification and Reporting of GHG Emissions and Removals**: Multi-criteria measure of the environmental performance of an organization from a life- cycle perspective, created to harmonize European methodologies for environmental footprinting, this includes Organization Environmental Footprint Sector Rules (OEFSRs), aimed at helping specific sectors to identify the areas that are most relevant to them.
Product carbon footprint and life-cycle assessment standards	**GHG Protocol** (product standard)	**Product Life-Cycle Accounting and Reporting Standard:** Includes requirements and methods for PCF. It has been developed by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD) involving multiple stakeholders.
	ISO 14067	**Greenhouse Gases – Carbon Footprint of Products – Requirements and Guidelines for Quantification:** Provides requirements and guidelines, stemming from ISO 14040 and ISO 14044, to give details on how to quantify and report the carbon footprint of products. It includes product category rules (PCRs).
	ISO 14040/44 (LCA)	**Environmental Management – Life-Cycle Assessment – Principles and Framework:** Life-cycle assessment (LCA) guidance, with detailed LCA process steps, which include goal definition, scope of the LCA, inventory analysis (LCI) and impact assessment, making reporting easier.

Note: The standards in each section are listed in alphabetical order.

Source: High Value Manufacturing Catapult, Embodied Emissions and Net Zero, 2022

Other CCF standards include the EU Organisation Environmental Footprint (OEF) as well as the Global Reporting Initiative (GRI) and Department for Environment, Food & Rural Affairs (DEFRA) guidance (UK). Additional PCF standards include the EU Product Environmental Footprint (PEF), BP X30–323 in France, and Publicly Available Specification (PAS) 2050.

To estimate emissions, companies use formulas to multiply the volume of their activities (e.g. purchased materials, transport) with an emission factors (EF), which are representative values that attempt to relate the quantity of a pollutant released into the atmosphere with the activity releasing the pollutant. Finding the right EF is not an easy task, because it is necessary to ensure its geographic relevance, its scale of application (national/regional or site-specific) and that it is well documented. Several public and private EF databases exist and should be selected depending on their application, as they use either generic or geographic/sector-driven emissions estimates. Examples of recognized EF databases include:

- GHG Protocol emissions factors databases
- Intergovernmental Panel on Climate Change (IPCC) Emission Factor Database (EFDB)
- Institute for Global Environmental Strategies (IGES) List of Grid Emission Factors
- World Resources Institute (WRI) and World Business Council for Sustainable Development (WBCSD) Greenhouse Gas Protocol Calculation Tools
- US EPA Air Pollutant Emission Factors AP-42
- Life-cycle databases (e.g. ecoinvent)

1.3 Why must companies measure Scope 3 emissions?

Although current Scope 3 standards allow voluntary disclosure, this might change in the future as governments and organizations are increasingly pushing for mandatory disclosure as a basis for climate action planning. Scope 3 reporting has garnered increasing significance in light of new regulations such as:

- The **EU Corporate Sustainability Reporting Directive (CSRD)** is a pivotal European Union directive aiming to standardize sustainability reporting practices among large companies and listed small and medium enterprises (SMEs) operating within the EU. It significantly expands the scope of reporting by requiring companies to disclose detailed information on environmental and social matters, including Scope 3 emissions. This directive is expected to come into place on 1 January 2025.[12]
- The **International Sustainability Standards Board (ISSB)** is a standard-setting body under the International Financial Reporting Standards (IFRS) Foundation, whose mandate is the creation and development of sustainability-related financial reporting standards to meet investors' needs for sustainability reporting. The ISSB was established to develop sustainability disclosure standards, including on Scope 3 GHG emissions, backed by the G7, the G20, the International Organization of Securities Commissions (IOSCO), the Financial Stability Board (FSB), African Finance Ministers and Central Bank Governors from more than 40 jurisdictions.[13,14] Although not mandatory, the new ISSB standard aims to significantly improve carbon accounting harmonization – including sectoral specifics – to enable investors to make more informed green funding decisions.

Both of these initiatives underscore the growing importance of holistic, comparable and auditable reporting to drive sustainability efforts and meet the increasing demand for transparency in the business world

1.4 How are companies reducing Scope 3 emissions today?

Organizations around the world are implementing a range of approaches and actions to reduce their Scope 3 emissions. Table 2 shows selected examples of actions to reduce Scope 3 emissions, as suggested in the GHG Protocol Scope 3 Standard. The rest of this paper includes case studies of best practices from industrial companies that highlight additional examples.

TABLE 2 **Actions to reduce Scope 3 emissions from the GHG Protocol**

Scope 3 category	Examples of actions to reduce Scope 3 emissions
1. **Purchased goods and services**	– Replace high-GHG-emitting raw materials with low-GHG-emitting ones – Implement low-GHG procurement/purchasing policies, possibly using the total sustainable cost of ownership (TSCO) as a weighted objective – Encourage Tier 1 suppliers to engage the reporting company's Tier 2 suppliers, and disclose these Scope 3 emissions to the customer in order to propagate GHG reporting throughout the supply chain
2. **Capital goods**	– Replace high-GHG-emitting capital goods with low-GHG-emitting ones
3. **Fuel- and energy-related activities (not included in Scope 1 or Scope 2)**	– Reduce energy consumption – Shift towards lower-emitting fuel/energy sources – Generate energy onsite using renewable sources
4. **Upstream transportation and distribution**	– Reduce distance between supplier and customer – Source materials locally – Optimize efficiency of transportation and distribution – Replace higher-emitting transportation modes (e.g. air transport) with lower-emitting modes (e.g. marine transport) – Shift towards lower-emitting fuel sources
5. **Waste generated in operations**	– Reduce quantity of waste generated in operations – Implement recycling measures – Implement lower-emitting waste treatment methods
6. **Business travel**	– Reduce the amount of business travel and favour online meetings – Encourage more efficient and lower-emitting modes of travel
7. **Employee commuting**	– Create disincentives for commuting by car (e.g. parking policies) – Introduce incentives for use of public transport, cycling, car-pooling, etc. – Implement teleworking/telecommuting programmes – Reduce number of days worked per week
8. **Upstream leased assets**	– Increase energy efficiency of operations – Shift towards lower-emitting fuel sources
9. **Downstream transportation and distribution of sold products**	– Reduce distance between supplier and customer – Optimize efficiency of transportation and distribution – Replace higher-emitting transportation modes (e.g. air transport) with lower-emitting modes (e.g. marine transport) – Shift towards lower-emitting fuel sources

10. Processing of sold products	– Improve efficiency of processing – Redesign products to reduce processing required – Use lower-GHG energy sources
11. Use of sold products	– Develop new low- or zero-emitting products – Increase the energy efficiency of energy-consuming goods or eliminate the need for energy use – Shift away from products that contain or emit GHGs – Reduce the quantity of GHGs contained/released by products – Decrease the use-phase GHG intensity of the reporting company's entire product portfolio – Change user instructions to promote the efficient use of products
12. End-of-life treatment of sold products	– Make products recyclable and implement recycling measures that lead to net GHG reductions – Implement product packaging measures that generate net GHG reductions – Improve traceability of products to optimize their use and maximize recycling
13. Downstream leased assets	– Increase the energy efficiency of operations – Shift towards lower-emitting fuel sources
14. Franchises	– Increase the energy efficiency of operations – Shift towards lower-emitting fuel sources
15. Investments	– Invest in lower-emitting investments, technologies and projects

Source: World Economic Forum Industry Net Zero Accelerator initiative; The GHG Protocol, Corporate Value Chain (Scope 3) Accounting and Reporting Standard, 2011

2

Uncovering the main challenges to accelerate Scope 3 decarbonization

Tackling Scope 3 emissions is challenging and requires company commitment as well as collaboration across value chains and industrial ecosystems.

Achieving reductions in Scope 3 emissions involves both **improving emissions measurements and developing innovative abatement approaches.** However, these tasks are challenging due to the complexity of global supply chains, as well as the difficulty of establishing partnerships and scaling the technological shift required for decarbonization.

Understanding Scope 3 barriers is the first step towards designing effective strategies. The Industry Net Zero Accelerator initiative has used consultations and research to map important barriers across the supply chain and contextual system challenges that constrain Scope 3 measurement and abatement efforts (Figure 4).

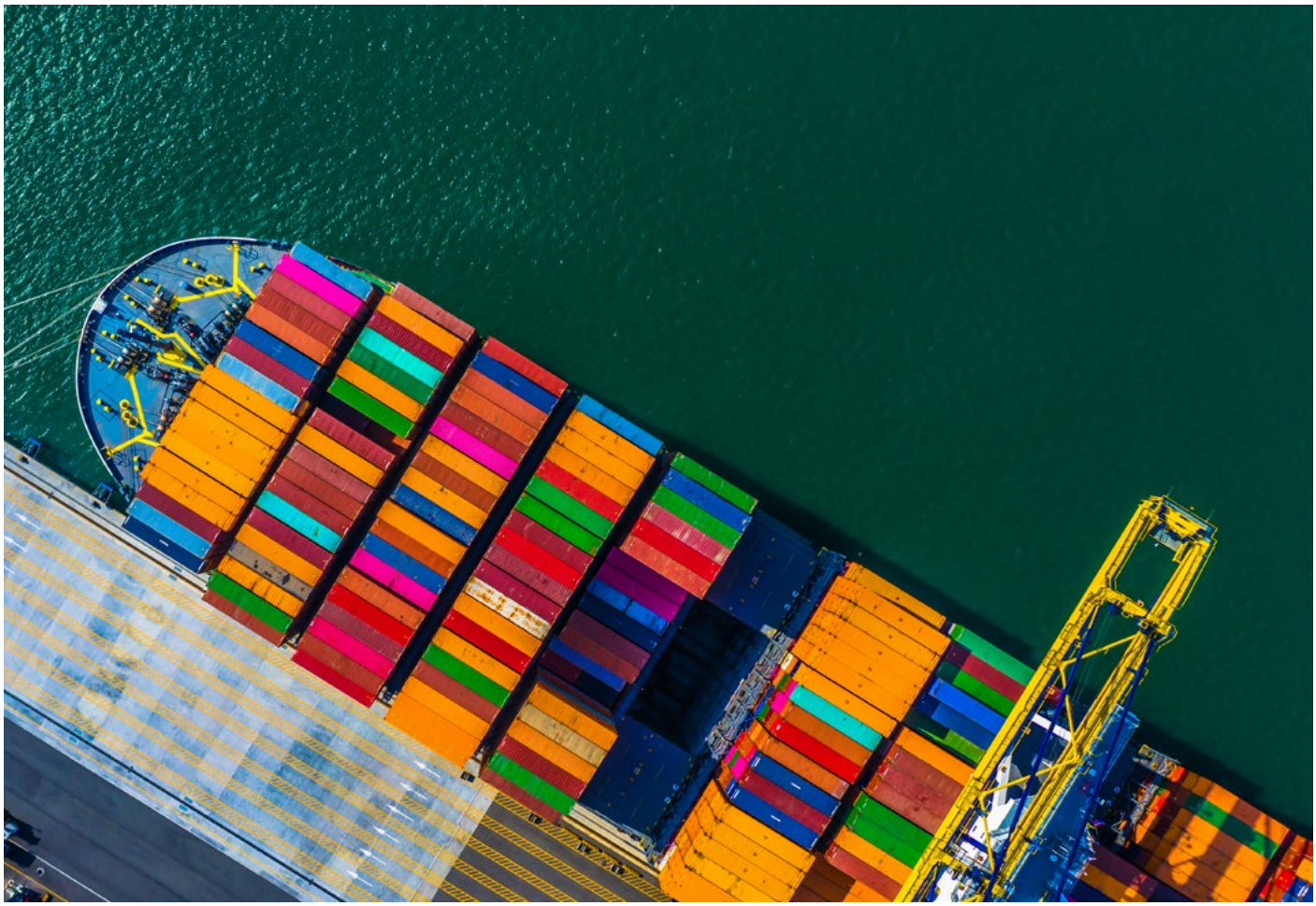
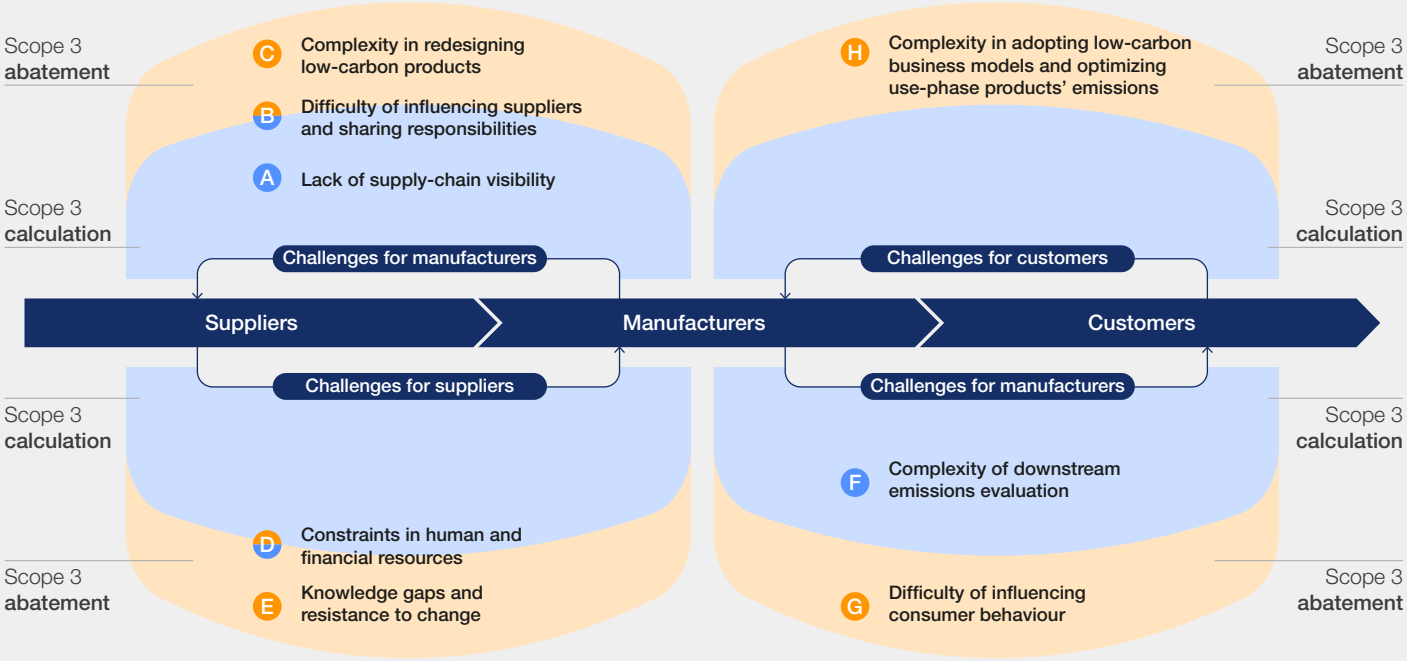
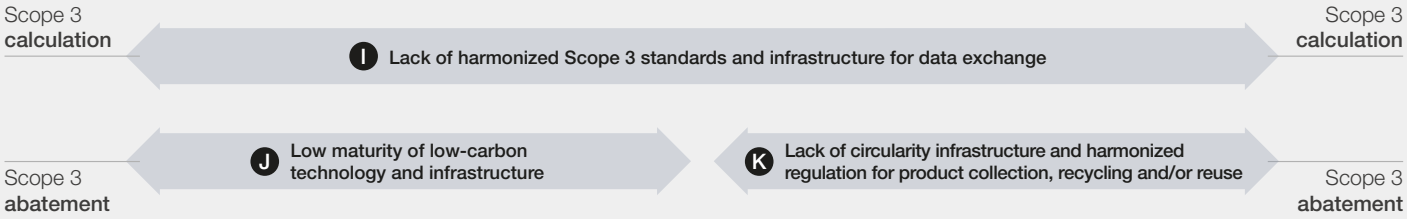


FIGURE 4 | **Selected barriers across supply chains and contextual system challenges in Scope 3 emissions measurement and abatement**

Barriers across supply chains



Contextual challenges



Calculation | Abatement

Challenges for manufacturers with their suppliers

A Lack of supply-chain visibility. Decarbonizing the supply chain demands robust visibility into GHG emissions and broader environmental impacts across the entire value chain, beyond direct suppliers (Tier 1) and their suppliers (Tier 2). Buying firms often struggle to improve visibility and verify information about product origins and energy intensity. The global reach and complex data integration due to legacy systems and departmental divisions prevent easy integration of data across the supply chain.[16]

B Difficulty of influencing suppliers and sharing responsibilities. In supply-chain dynamics, the ability to exert influence on another firm's behaviour is crucial. Yet, with limited visibility beyond Tier 1, and factors to contend with such as diversity, geography and culture, control wanes. Creating incentives for suppliers to decarbonize can be arduous, and suppliers may resist changes that raise costs or workload. Determining responsibilities in Scope 3 emissions is also complex as joint production blurs carbon footprint boundaries among companies.[17]

C Complexity in redesigning low-carbon products. Product design choices can significantly affect emissions.[18] Crafting low-emission products entails making choices to source sustainable materials, developing energy-efficient manufacturing processes and addressing upstream value-chain carbon intensity environmental life-cycle impacts. Achieving zero emissions necessitates considering how to facilitate end-of-life scenarios through improved design, such as recycling or safe disposal. Balancing products' eco-friendliness, cost-effectiveness and performance while keeping customer appeal requires innovative solutions and cooperation with regulatory bodies, which makes redesigning low-carbon products a complex task.

Calculation

Abatement

Challenges for suppliers with their manufacturers

D **Constraints in human and financial resources.** Supply-chain firms, especially small and medium enterprises (SMEs), grapple with resource constraints, hindering sustainable investments. Lean workforces struggle to allocate time for training amid the demands of daily operations.[19] Limited access to specialized training and public support adds complexity, while multinational companies can find it challenging to support suppliers, requiring significant time and resources with uncertain returns.[20]

E **Knowledge gaps and resistance to change.** Manufacturers often lack awareness of emissions reduction technologies and practices, their costs and benefits, and the necessary capabilities to implement them. Resource constraints in supply-chain firms, especially SMEs, create knowledge gaps, hindering adaptation to evolving trends.[21] Some suppliers may resist changes due to increased costs, disruption of their existing processes or inability to cope with requests from their multiple customers.

Challenges for manufacturers with their customers

F **Complexity of downstream emissions evaluation.** Reducing use-phase emissions demands comprehensive product usage data collection to understand consumer behaviour and optimize energy consumption. However, customer consent and data privacy compliance – e.g. the European Union General Data Protection Regulation (GDPR) and the California Consumer Privacy Act (CCPA) – pose challenges,[22] and data collection, storage and security require specific technologies and infrastructure. Data standardization is necessary for comparability and trust across industries.

G **Difficulty of influencing consumer behaviour.** Consumption is a social, cultural and economic process in which decisions are likely to be influenced by the values and beliefs of individuals and cultures.[23] Influencing sustainable consumption requires overcoming entrenched habits, perceptions and social norms to make green choices more appealing.[24] Challenges include price barriers, limited access to alternatives and convenience. A holistic approach combining psychology, communication, policy support and incentives is essential for shifting consumption patterns.[25]

Challenge for customers with manufacturers

H **Complexity in adopting low-carbon business models and optimizing use-phase products' emissions.** Circular business models are a powerful tool to reduce the use of virgin materials and address the sustainability impact of products,[26] but their adoption faces various challenges, including technical ones, to scale up remanufacturing, pricing strategy, branding to ensure customer appeal, feedstock availability, consumer acceptance and regulatory constraints for remanufactured goods trading.[27] Policy and regulatory hurdles may vary by product and country, adding another layer of complexity.

Challenges across the ecosystem

I **Lack of harmonized Scope 3 standards and infrastructure for data exchange.** Addressing Scope 3 emissions complexity demands product-level environmental data, as corporate emissions data often lacks the granularity needed to drive effective Scope 3 decarbonization. Life-cycle assessment (LCA) and product carbon footprint (PCF) metrics currently rely on estimations and industry averages, making them less reliable for supply chain-specific decision-making and progress monitoring.[28] Effective progress is hindered by the absence of unified and comparable methodologies to calculate Scope 3 emissions; insufficient infrastructure for secure LCA and PCF data exchange to ensure data transparency, interoperability and confidentiality; and limited supplier capabilities to be able to use such standards and infrastructure.

J **Low maturity in low-carbon technology and infrastructure.** Incremental innovations such as energy and material efficiency are crucial, but substantial technological advances are needed for value-chain decarbonization.[29] Technological shifts require long and risky development periods to establish new systemic structures such as infrastructure, regulatory frameworks, low-carbon materials and knowledge development,[30] making it crucial to collaborate across industries and with public-sector organizations.[31]

K **Lack of circularity infrastructure and harmonized regulation for product collection, recycling and/or reuse.** Transitioning to a circular economy requires substantial investment in products' collection and processing facilities.[32] Coordination among stakeholders is hindered by varying interests and regulations. Sectors such as automotive and aerospace are well suited for remanufacturing practices as their products have high end-of-use value and longer life cycles and are distributed through business-to-business channels. However, barriers to circularity persist, such as the lack of specialized skills, insufficient infrastructure to take back and recycle/remanufacture components, regulatory gaps and difficulties in influencing customers who might prefer new to remanufactured components.[33]

3

Looking ahead: The “No excuse” opportunities to tackle Scope 3 emissions

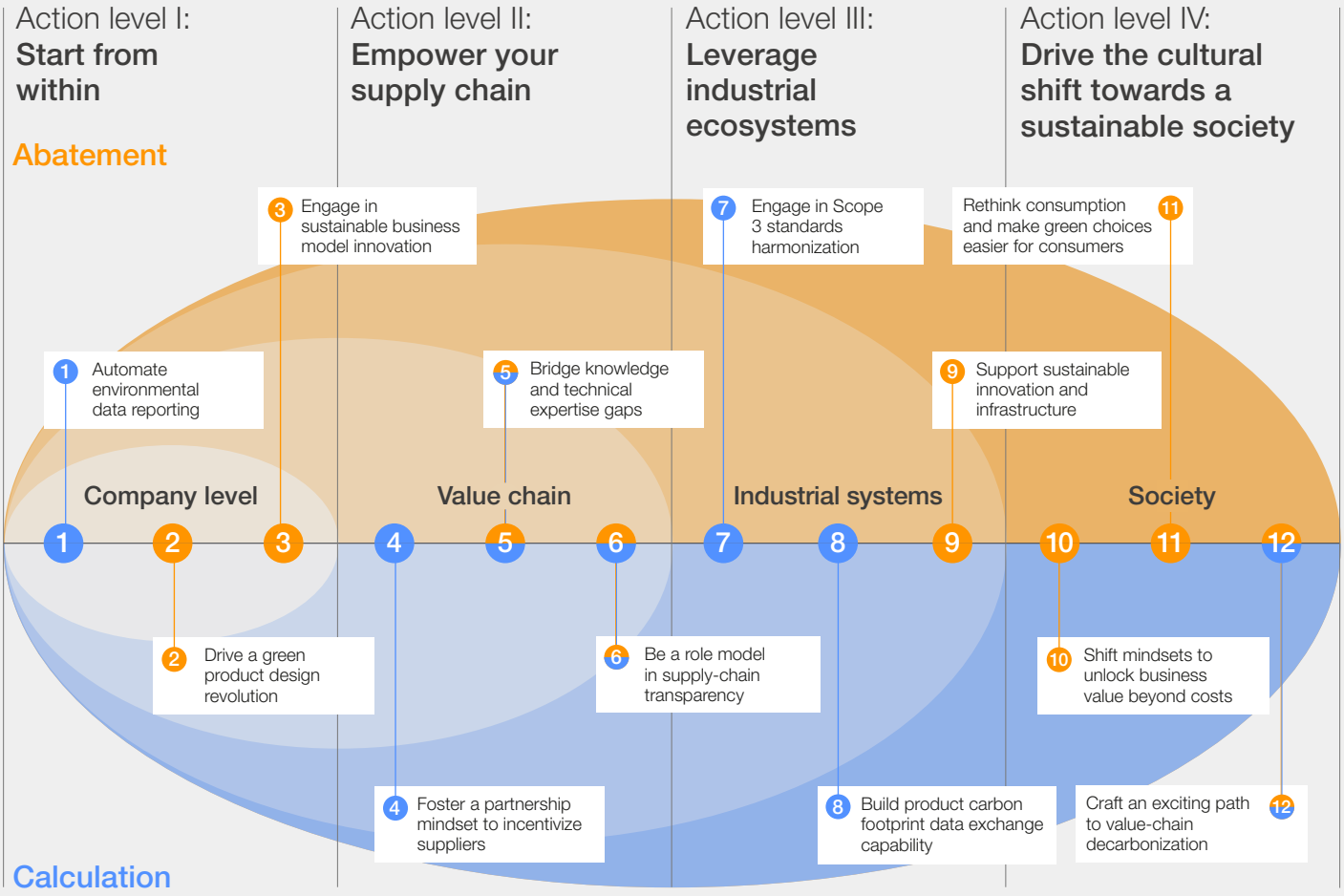
Reducing Scope 3 emissions presents many challenges. The Industry Net Zero Accelerator initiative has identified opportunities to accelerate progress through innovative solutions and industry-wide collaboration, enabling early movers to act as a catalyst for positive change, gain a competitive edge and strengthen their brand reputation, and access new markets.

There is no shortage of challenges to reducing Scope 3 emissions, as presented in section 2. Despite the existence of many publications on the subject, both SMEs and industry giants are struggling to navigate the complexities of Scope 3 emissions.

Through extensive research and consultations with industry leaders and academic experts, the Industry Net Zero Accelerator initiative identified 12 opportunity areas to assist companies in their decarbonization journey, and these, grouped into four action levels, serve as a guide to inform strategic decisions.

Case studies exemplify these opportunities, highlighting collaborative strategies and innovative solutions implemented by leading firms worldwide, demonstrating that Scope 3 decarbonization can yield positive results.

FIGURE 5 **The "no-excuse" opportunities to tackle Scope 3 emissions**



Source: World Economic Forum Industry Net Zero Accelerator initiative

3.1 Action level I: Start from within

Scope 3 emissions reduction literature often focuses on suppliers' engagement. However, the research and consultations conducted for this paper highlight significant opportunities under companies' direct control.

Manufacturers can initiate change by using emerging technologies to tackle upstream and downstream emissions evaluation, automating PCF and LCA across all products. This approach fosters alignment across internal functions and value-chain partners, expediting Scope 3 decarbonization efforts and data-driven action for maximum decarbonization results.

Furthermore, driving green product design and sustainable business model innovation through collaboration among innovation, engineering, operations and supply-chain teams can deliver breakthrough Scope 3 emissions reduction by reducing the use of virgin materials and downstream emissions during product use.

This section outlines the internal opportunities of Scope 3 decarbonization and the benefits achieved by early movers.

1 Opportunity area 1: Automate environmental data reporting

Scope 3 decarbonization requires calculating GHG emissions across the organization and product portfolio, but challenges such as limited supply-chain data, difficulty tracking product use emissions and time-consuming GHG calculations hinder progress.

Automation of environmental data reporting presents a promising solution. It streamlines data collection and analysis, improving transparency, collaboration and stakeholder trust, and identifying decarbonization priorities for faster decision-making and action planning. Additionally, it eases reporting and compliance with standards bodies and environmental regulations.

Case studies from Schaeffler and Dow illustrate the practical implementation and benefits of automated data reporting.

CASE STUDY 1

Schaeffler – collaborative decarbonization decision-making and management based on digital twin and analytical capabilities

Challenge

The Schaeffler Group is a global German motion technology company. Sustainability is an important goal: Schaeffler has set an ambitious target of becoming CO_2e neutral by 2040; by 2030, the company aims to reduce its Scope 1 and 2 emissions by 90% and upstream Scope 3 emissions by 25%.

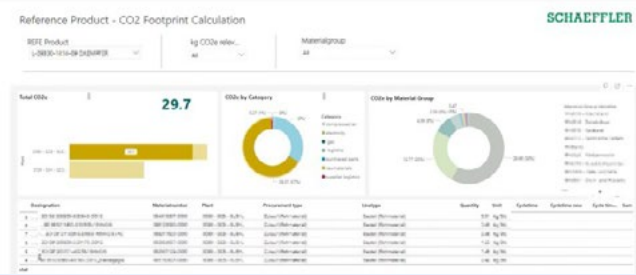
Schaeffler's CCF is dominated by steel and other metal-based materials, purchased from more than 8,000 suppliers. The organization has identified levers to decarbonize its entire 350,000-strong product portfolio, using different functions – purchasing, research and development (R&D), production and logistics – and covering 75 plants globally. Schaeffler needed a decarbonization management tool that integrates those constraints and interdependencies to derive balanced business decisions among decarbonization targets, investments and benefits.

Solution

In collaboration with Capgemini, the company developed a holistic decarbonization calculation, simulation and management solution covering the complete product portfolio. It consists of a digital twin backbone identifying decarbonization measures and their PCF impact. This enables different stakeholders to access and log emissions-related information as well as simulate PCF impact; for example, in order to derive management decisions. The principle features of the solution include:

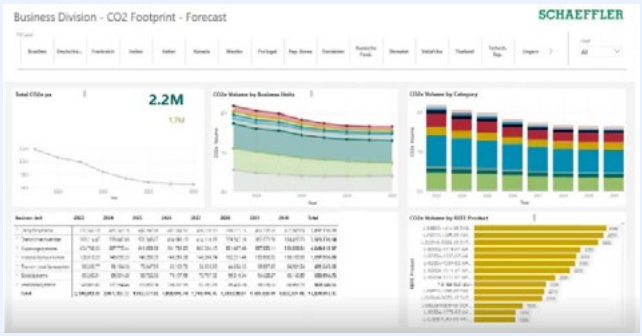
- **Carbon footprint insights:** detailed information such as emission categories and material group breakdown based on each product's bill of materials and routing information.

FIGURE 6
Carbon footprint insights



- **Raw material analysis:** can be used by engineering and purchasing teams to highlight the most carbon-intensive raw materials and simulate the impacts of replacing them with alternatives, with regards to carbon emissions (both at the product level and the company's overall emissions year by year) and costs.
- **Emissions reduction planning:** forecast of implementing measures in a PCF roadmap. By coupling emissions data and supply and demand data, Schaeffler can make strategic decisions to decarbonize the highest-emitting and best-selling products, channelling its efforts towards future emissions reductions.

FIGURE 7
Emissions reduction planning



Impact

In the future, Schaeffler will focus on improving data quality by obtaining more primary data from its suppliers. Continuous communication with product groups, further exploration of use cases (such as sharing primary data with external partners) and ongoing data model refinement will be essential to ensure the model's relevance and effectiveness in supporting sustainable business practices.

FIGURE 8
PCF estimator using decarbonization levers and projected products' sales

Source: Consultation with Capgemini and Schaeffler

CASE STUDY 2

Dow – digital dashboards and scorecards for Scope 3 emissions transparency

Challenge

Dow aims to become carbon neutral by 2050. The company's primary goal in improving Scope 3 emissions calculations was to establish a reliable accounting framework, ensuring accuracy and transparency. By better tracking Scope 3, Dow seeks to not only improve its environmental performance but also enhance its climate disclosures and enable it to track climate goals.

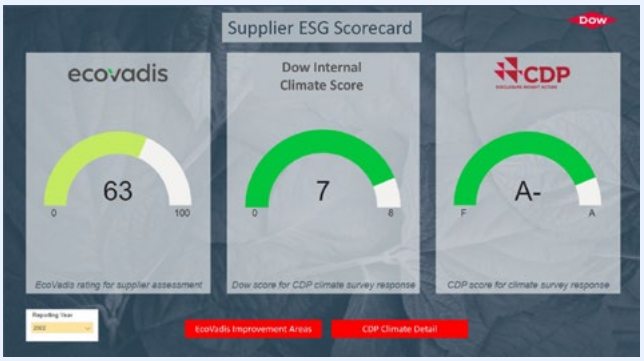
Solution

The company has implemented a data visualization dashboard for Scope 3 emissions, offering a comprehensive view of emissions data throughout Dow's value chain. This dashboard breaks down emissions by business group, region, supplier, material and more. It has proven to be a valuable tool for developing climate strategies, identifying priority areas for emissions reduction and validating data. It also contains a library of emissions factors used in Scope 3 calculations that can be leveraged for broader uses.

In addition, Dow has introduced a supplier scorecard accessible to all employees. This scorecard helps the company assess how well suppliers are performing in social and environmental aspects. It is used in regular meetings with suppliers to monitor progress towards their goals.

FIGURE 9

Example of a Dow supplier ESG scorecard



To calculate Scope 3 emissions, Dow primarily relies on internal data such as purchase and sales records, waste data and business travel records. It employs recognized methodologies by, for example, the Greenhouse Gas Protocol and the Global Logistics Emissions Council framework ensure accuracy and comparability and conducts systematic internal validation processes to enhance data accuracy and trustworthiness.

Dow also collaborates with around 500 suppliers to collect primary climate data. Standard platforms, such as EcoVadis and CDP disclosures, are used to streamline data requests to suppliers, including corporate and product carbon footprints, renewable energy usage and progress towards climate goals.

Impact

Through these initiatives, Dow can create and monitor roadmaps for reducing Scope 3 emissions. This trust in the data facilitates decision-making, such as when considering more expensive low-carbon alternatives. Dow believes that being a pioneer in this effort can not only lead to future market-share gains but also drive positive change in the industry.

Source: Consultation with Dow

2 Opportunity area 2: Drive a green product design revolution

Product design plays a pivotal role in emissions, affecting both upstream and downstream carbon footprint through material choices, sourcing, design processes and manufacturing.

However, reducing GHG emissions via product redesign presents challenges, requiring new capabilities and skills within internal teams. Balancing eco-friendliness with costs, performance and customer appeal is another hurdle. Manufacturers can employ several strategies and tools to address these challenges:

1. **Life-cycle thinking:** optimizes each product life stage for minimal environmental impact.
2. **Material efficiency:** advances resource efficiency and lower costs through product redesign for material savings and enhanced process yields.
3. **Low-carbon materials:** substituting materials with low-carbon, recyclable or biodegradable alternatives reduces product footprints.
4. **Energy efficiency:** designing products to consume less energy during manufacturing, use and end-of-life phases reduces carbon emissions.
5. **Durability and repairability:** long-lasting, easily repairable products reduce the need for replacement.
6. **Circular economy:** designing products for disassembly at end-of-life allows component reuse or recycling.
7. **Consumer education:** clear labelling and communication aid informed choices about the environmental benefits of green products.

By introducing innovations in these areas and expanding this approach across the product portfolio, companies can drive significant emissions reduction in their entire value chain.

Such an approach is illustrated by P&G's sustainable products strategy, aimed at cutting emissions by designing greener products and educating consumers.

CASE STUDY 3

P&G – designing products and educating consumers for low-carbon consumer use

Challenge

Procter & Gamble (P&G) is strategically focusing on changing consumers' habits to reduce Scope 3 emissions, advocating cold-water washing. While the company reduced its Scope 1 and 2 emissions by 57% from 2010 to 2022, it recognizes that more than two-thirds of laundry life-cycle GHG emissions stem from consumer use.

The challenge is that the way consumers use P&G's products can have a significant impact on their carbon footprint. For example, its Ariel brand team found that washing at 30°C instead of 40°C can reduce energy consumption by up to 57% per cycle. Additionally, only a small portion (10–15%) of consumers are currently willing to pay for sustainable products that do not offer performance or experience benefits.

Solution

P&G decided to push forward product design to be "irresistibly superior and sustainable", using two strategies:

- **Low-carbon product innovation:** P&G redesigned its Tide and Ariel brands for effective cold-water washing, incorporating cold-water enzymes for superior-quality cleaning at lower temperatures.
- **Consumer education:** the company launched a campaign in partnership with external organizations such as the World Wildlife Fund to promote cold-water washing. It emphasized that most of the energy consumed when doing laundry comes from heating water and highlighted the benefits of switching to 30°C. Collaborating with retailers, it also communicated the environmental benefits of this approach to develop consumer eco-awareness and highlighted the financial savings to increase consumer buy-in.

Impact

Since implementing these strategies in 2015, P&G's transition to low-energy laundry cycles has helped consumers avoid approximately 15 million metric tons of CO_2 emissions. This shift could also enable estimated annual energy bill savings of up to $150 for consumers. Looking ahead, P&G brands will continue to drive greater use of cold-water washing through new education campaigns to help avoid an additional 30 million tons of carbon emissions by 2030 – more than 10 times that of P&G's annual global operations.

Source: Procter & Gamble, "A Closer Look at P&G's Net Zero 2040 Ambition", 2021; Procter & Gamble, "Can Washing Your Clothes on Cold Do a World of Good?", 2021; Procter & Gamble, "Environmental Sustainability"; Capgemini Research Institute, "Discussion with Virginie Helias", 2023

3 Opportunity area 3: Engage in sustainable business model innovation

Developing sustainable business models goes beyond improving resource efficiency, which focuses on using fewer resources per product and relies on two pillars:[34]

1. Slowing resource loops: designing durable goods and extending product life through repair and remanufacturing

2. Closing resource loops: recycling to create a circular resource flow

Although sustainable business model innovation represents a significant decarbonization opportunity, various challenges slow down its scalability across products, processes and geographies. These include technical issues related to scaling remanufacturing, necessary infrastructure and logistics capabilities, pricing strategy, branding to ensure customer appeal, feedstock availability or consumer acceptance.

Case studies from Decathlon and Rockwell Automation illustrate how business-to-consumer (B2C) and business-to-business (B2B) companies can develop circular business models to enhance product life, enable circularity and guide customers towards sustainable choices.

CASE STUDY 4

Decathlon – from traditional product-selling to sustainable and profitable circular business models

Challenge

Decathlon, a French sports equipment manufacturer and distributor, has set a target of reducing its carbon intensity (tCO_2e/Eur value added) by 53% in Scopes 1, 2 and 3 by 2026 compared to 2016, and achieving carbon neutrality by 2050.[35] In pursuit of this objective, Decathlon is actively engaged in the development and testing of innovative sustainable business models, with the aim of optimizing the usage of its products throughout their entire lifespan.

Solution

Decathlon launched circularity initiatives in a test-and-learn approach. The company was supported by comprehensive data collection to gain an understanding of new consumption patterns and analyse their impacts. Initiatives included:

- **A buy-back system:** allowing customers to trade in used products for vouchers or bank transfers. Following inspection, the products could be resold under guarantee to new customers. This approach exists in 44 countries, both instore and, recently, online.

- **Product rental:**

  - Short-term hire allows customers to equip themselves for a few hours, days or seasonally for specific needs (e.g. winter sports, trekking)

  - Monthly product hire enables flexibility for products such as bicycles that children often outgrow fast

  - Long-term hire, via a "leasing"-style subscription programme with a one- to three-year commitment, provides access to higher-end adult sports equipment

- **Product repair:** a network of 1,636 workshops has been set up in stores and the supply of spare parts strengthened to encourage repairability. This initiative has been coupled with design teams emphasizing design of repairable products. Customer education is also a part of this approach, with websites explaining how to repair (through videos, phone guidance and online messaging services).

To complete Decathlon's sustainability strategy and enable more products to become more circular, it also put in place product lifespan extension design practices (e.g. a database to help designers choose the most durable component) and recyclability-enabling approaches (e.g. co-creation of a method and assessment tool for product recyclability).

Impact

In 2022, Decathlon increased its circular economy sales turnover by €100 million compared to 2021. More than 180,000 products were rented in 2022, doubling rental sales since 2021 and reaching €12 millions in sales revenue. Some 11% of products were considered repairable in 2022 (with a target of 30% in 2026). This circularity strategy allows Decathlon to reduce its year-on-year absolute Scope 3 emissions.

Source: Decathlon, "Going Circular - Transition towards a Circular Economy", 2022

CASE STUDY 5

Rockwell Automation – advance sustainable business models through technology and automation

Challenge

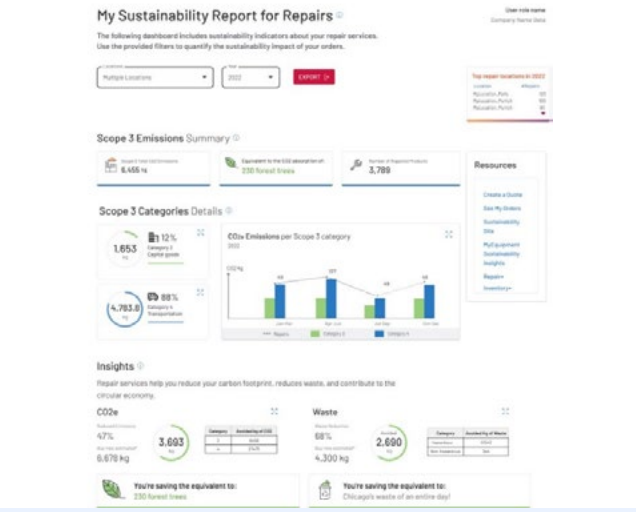
In 2019, nearly 53.6 MT of electronic waste (e-waste) was generated and more than 80% was thrown away, traded or recycled using non-environmentally friendly processes. As a provider of industrial automation and digital transformation technologies, Rockwell Automation is in a strategic position to participate in the circular economy with technologies that support and scale advanced process capabilities and infrastructure for recycling and remanufacturing.

Solution

To address this challenge, Rockwell relies on a double strategy: the introduction of a sustainability calculator, and repair and remanufacturing services that encourage customers to take a "fix-it-first" approach that reuses existing resources.

Sustainability calculator: the analytical dashboard quantifies waste and carbon emissions reduced by repairing automation assets rather than replacing them, providing insights customers can use to optimize maintenance, repair and operation costs.

FIGURE 10
Sustainability calculator



Repair and remanufacturing: throughout the world, Rockwell Automation manages and operates 14 repair centres and eight exchange hubs that remanufacture Allen-Bradley products to like-new or better condition and repair products from more than 7,000 manufacturers. Rockwell's proprietary remanufacturing process returns products to like-new condition through inspection, revisions and upgrades, and functional load testing that confirms operability and quality.

Impact

Rockwell Automation partnered with a global Consumer Packaged Goods (CPG) company to reduce and quantify the environmental impact of repairing industrial automation assets in one of its UK plants. As a result, the CPG company reduced its carbon footprint, mitigated e-waste and contributed to the circular economy by choosing to repair already owned assets rather than buy new. The CPG company was able to achieve an estimated 91% reduction in avoided CO_2eq Scope 3 emissions (vs. buying new) and avoid an estimated 8% hazardous waste to landfill — as calculated though Rockwell's sustainability calculator for repairs. For the first time, the company was able to quantify the environmental impact of its Scope 3 emissions, specifically category 1 and category 4.

Remanufacturing allows the preservation of 85% of energy expended and uses 90% fewer raw materials in production compared to the original product, which enables an extended equipment life.

Source: Consultation with Rockwell Automation; E-waste Monitor, "The Global E-waste Monitor 2020", 2020

3.2 Action level II: Empower your supply chain

Supporting supplier decarbonization is critical, as purchased goods and services emissions contribute to nearly 20% of reported Scope 3 emissions (see Figure 1). SBTi criteria reinforce this by mandating Scope 3 targets covering at least 67% of total Scope 3 emissions when Scope 3 accounts for more than 40% of total Scope 1, 2 and 3 emissions.[36]

However, supply-chain decarbonization faces significant challenges, including limited visibility, difficulties in influencing suppliers and resistance to change due to knowledge gaps and resource constraints driven by constant cost pressures.

The research and consultations conducted for this paper identify best practices to overcome these barriers: fostering a partnership mindset; closing knowledge and technical expertise gaps; and promoting supply-chain transparency. The next section details manufacturer opportunities for successful supply-chain empowerment and decarbonization.

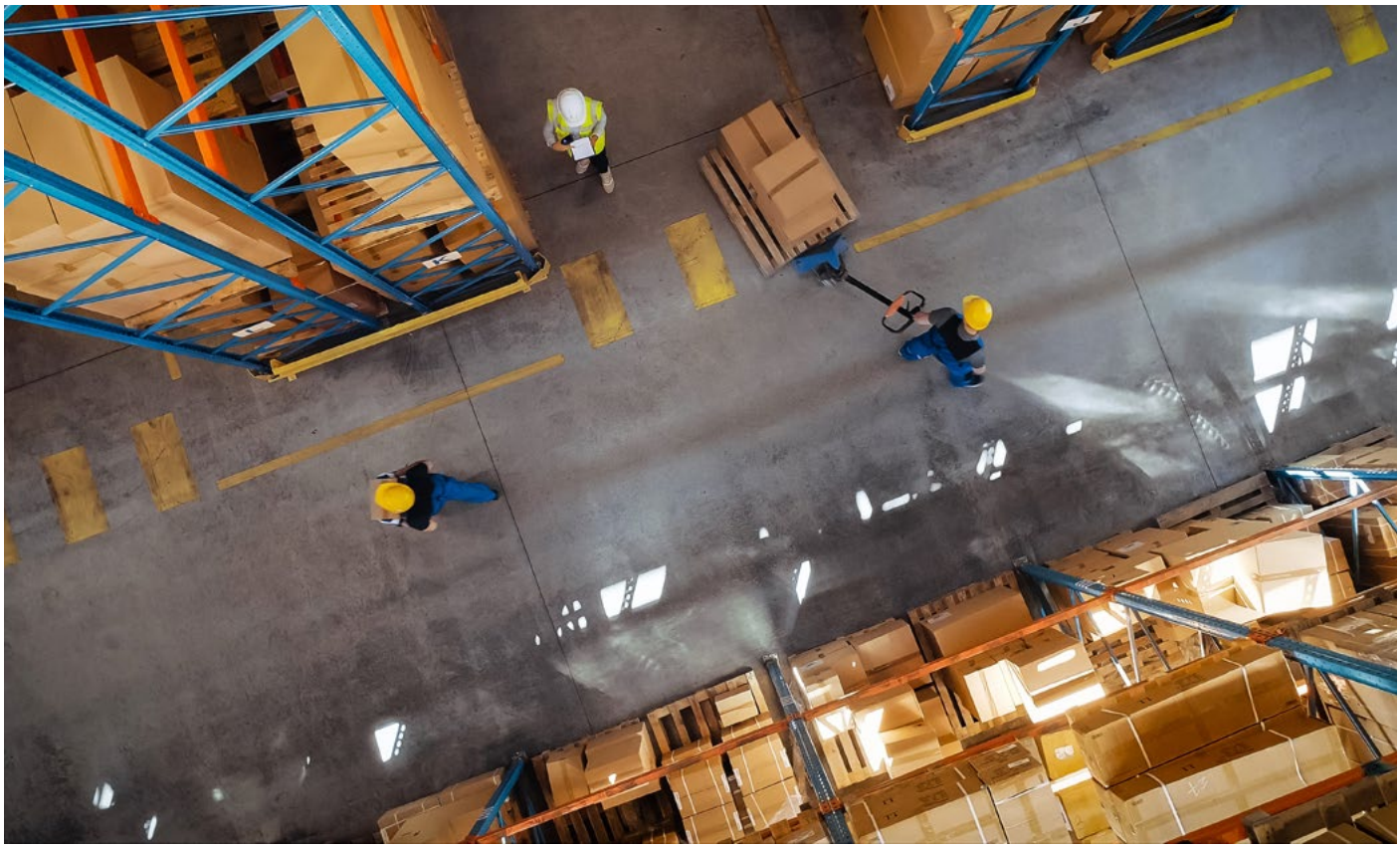
4 Opportunity area 4: Foster a partnership mindset to incentivize suppliers

Companies are increasingly looking to integrate key performance indicators (KPIs) on sustainability into procurement, with 36% planning to include them in supplier contracts within two years, as per the 2022 CDP Supply Chain Report.[37] However, only 11% have already implemented such contractual measures, and fewer than 3% formally demand climate-related data from suppliers.

Engaging suppliers and creating incentives for them to decarbonize is a complex task due to negotiation hurdles, performance metrics and compliance tracking. Scope 3 emissions responsibility can be convoluted due to shared production, blurring carbon footprint boundaries.

Successful decarbonization necessitates specific best practices for cultivating a strong partnership mindset and a win-win scenario in which the supplier can also benefit from the change. These include leading by example, supplier segmentation by maturity, transparent communication, simplified GHG data collection via digital tools, internal team alignment, collaborative sustainability initiatives and using purchasing power to create early markets for clean technologies.[38]

Bosch's Bursa case study showcases how adopting a partnership mindset drives decarbonization effectively in logistics and transport.



CASE STUDY 6

Bosch Bursa – collaborating for sustainable logistics

Challenge

The Bosch Bursa plant in Türkiye manufactures injectors for powertrain combustion engines destined mainly for the European market. The manufacturing site aims to reduce CO_2 emissions by at least 15% by 2025 for Scope 1 and 2 and logistics.

To address its packaging and transportation emissions, the plant needed to build collaborations with its most important partners: suppliers, customers and logistics service providers (LSPs).

Solution

Bosch Bursa engaged in several projects tackling aspects of its logistics operations that focused on creating synergies and collaboration with stakeholders in its supply chain:

- **Increasing filling rate in bulk packaging:** by taking a "go and see" approach in the warehouse, the site realized that raw material boxes were delivered with a filling rate as low as 35–50%. To increase the filling rate, Bosch's packaging team reviewed the needed quantities over time, the frequency of delivery and the handling. Since this would affect suppliers' ways of working, the team collaborated with suppliers to define the optimal filling rate while ensuring load security to avoid damaging the materials. By partnering together, Bosch and its suppliers reached an optimal filling rate to ensure the least number of deliveries with the best quality. As a result, the company reduced its emissions and its suppliers achieved less handling for its products, fewer printed documents and more efficient operations. The site was able to multiply the filling rate of the boxes by around two to three times, and the measure saved 300 $MtCO_2$/year by considerably reducing the number of boxes to be purchased, handled and cleaned.

- **Repairing reusable packaging:** Bosch Bursa switched to 100% returnable plastic packaging, with standardized boxes for inbound and outbound European deliveries. The site also partnered with a local service provider to repair (by rewelding) damaged packs that would previously have been scrapped. After implementing the repair of damaged boxes, the site saved 200 $MtCO_2$/year.

- **Switching air to sea:** using a logistics dashboard highlighting emissions data by type of transportation revealed that air freight generated 62 times more CO_2 than sea freight for the same load. Through proactive customer engagement and negotiation of alternate delivery timelines, the site successfully shifted to predominantly using sea freight, resulting in a reduction of 7,700 metric tons of CO_2 emissions over two years.

Impact

In just three years, the site has averted the emission of 30,000 metric tons of CO_2 through a series of innovative logistics decarbonization projects. This achievement is the result of effective communication and collaboration with both suppliers and customers, allowing for greater flexibility in prioritizing sustainability across network design, packaging and logistics operations. In recognition of these efforts, the site received the Bosch Corporate Sustainability Award in the Resource Efficiency category in 2022.

Source: Consultation with Bosch

5 Opportunity area 5: Bridge knowledge and technical expertise gaps

Scope 3 reduction entails encouraging suppliers to decarbonize their products and processes. However, suppliers, particularly SMEs, often face resource and knowledge constraints, hindering the development of low-carbon products and processes. As emphasized by SBTi, larger companies must actively support their supply chain through leading by example and openly sharing goals and strategies, sharing knowledge and providing field and technical support, and creating a collaborative learning community that facilitates structured knowledge exchange.[39]

Guiding, supporting and educating suppliers to align with sustainability goals is essential. Case studies from CATL and Schneider Electric demonstrate the advantages of a robust supplier support programme.

CASE STUDY 7

CATL – on-the-field sustainability partnership programme for suppliers

Challenge

Contemporary Amperex Technology (CATL) is a global leader in innovative energy technologies, committed to providing solutions and services for new energy applications worldwide. The company plans to achieve carbon neutrality in its core operations by 2025 and across the battery value chain by 2035. To achieve this goal, CATL needs to onboard its suppliers on a green and high-quality value chain.

Solution

CATL launched a partnership programme named "CREDIT" (Carbon footprint, Recycling, Energy, Due Diligence, Innovation and Transparency) focused on sustainable lithium-ion battery value supply chains. The programme covers 135 evaluation indicators for both direct and indirect suppliers of CATL that are compliant with the EU Batteries Regulation and other international standards. It includes an onsite evaluation and analysis of sustainability practices that results in a scoring against all indicators, priority areas of action and recommendations for suppliers to strengthen their sustainability performance. This programme is offered by CATL to its suppliers and the results can affect future purchases.

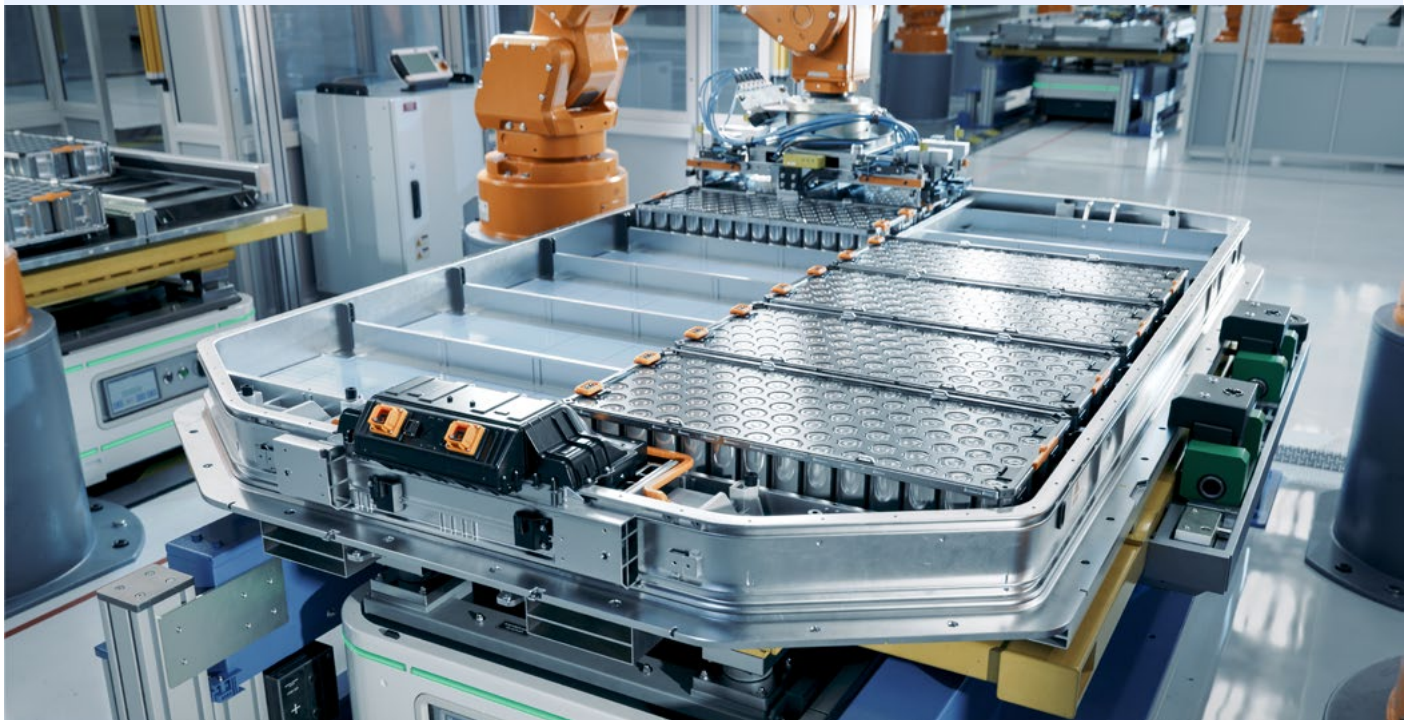
Additionally, CATL has established an incentive system to push forward sustainability, with awards for suppliers and joint research to cover new technologies around electric vehicle (EV) battery recycling industries.

Impact

Since the "CREDIT" programme launch in 2022, CATL has conducted onsite assessments of 35 core suppliers. Additionally, 51 training sessions on sustainable development have been provided to suppliers' employees. In 2023, CATL aims to provide onsite assessments for approximately 60 suppliers, including those with the highest carbon footprint.

CATL will continue to improve and broaden the "CREDIT" assessment coverage and indicators based on suppliers' specificities and has launched a post-assessment tracking and support process in 2023 to further enable the sustainability transformation of suppliers.

Source: Consultation with CATL



CASE STUDY 8

Schneider Electric – striving for a net-zero supply chain with the Zero Carbon project

Challenge

Schneider Electric (SE) aims to cut absolute GHG emissions across its entire value chain by 25% by 2030 from its 2021 baseline, on its way to achieve net-zero CO_2 emissions across its entire value chain by 2050. Having decreased its Scope 1 and Scope 2 emissions by 67% since 2017, SE acknowledged that it will not be able to achieve that ambitious goal without engaging its suppliers, an integral part of its ecosystem that accounts for 70% of SE's upstream carbon emissions.

This is why in 2021 SE launched "The Zero Carbon project", which aims to help its top suppliers reduce their operational emissions (Scope 1 and 2) by 50% by 2025.

Solution

The Zero Carbon Project provides capacity-building, thought leadership, resources, digital tools and practical assistance and guidance to programme participants, helping them set and achieve their carbon reduction targets. The initiative cultivates best practice exchange via regular live engagements and training sessions, with training materials available on the Schneider Supplier Portal.

The project has three fundamental tenets:

1. Analytics: help suppliers quantify their GHG emissions, establish a baseline and identify the main sources of emissions
2. Ambition: encourage suppliers to set ambitious emissions reduction targets
3. Action: support suppliers in deploying their action plans to achieve their targets

The Zero Carbon Project was launched globally via a live webcast with top executives from Schneider Electric's top suppliers. The event set the vision and expectations for the initiative, highlighting Schneider's unique position and experience in achieving a 60% CO_2 reduction in less than five years. The programme's flexibility was emphasized, catering to each supplier's unique situation in terms of industry, size, country, energy mix and CO_2 maturity.

Impact

More than 1,000 companies have joined Schneider's Zero Carbon Project, with 1,300 supplier participants trained, resulting in the company having already achieving a 24% emissions reduction by the end of Q3 2023. Interestingly, 70% of these suppliers had never assessed their carbon footprint before. Schneider provides support to the suppliers, engaging with them at various stages of decarbonization maturity, and helping them progress towards the 50% reduction target by 2025.

Sources: Consultation with Schneider Electric; Schneider Electric, "The Zero Carbon Project"

6 Opportunity area 6: Be a role model in supply-chain transparency

Supply-chain decarbonization requires improved visibility into GHG emissions across the value chain,[40] often hindered by supplier disincentives and complex data integration. To enhance transparency, opportunities include data platforms and internet of things (IoT) devices for sustainability data collection and sharing, data-sharing infrastructure, digital product passport applications for stock-keeping unit (SKU)-level sustainability information, and artificial intelligence (AI), including generative AI, to identify and suggest low-carbon alternatives.

Regulatory frameworks can increase transparency by mandating data collection and reporting, as in the case of the European Battery Passport regulation, which requires battery value-chain stakeholders to disclose sustainability data. A case study featuring Celonis and thyssenkrupp Rasselstein highlights the sustainability benefits of data platform technology in transport.

CASE STUDY 9

Battery passport - a sector-level policy to enhance transparency across the value chain

Challenge

Batteries are one of the most important components of tomorrow's green mobility. However, the manufacturing of batteries involves significant sustainability challenges linked to environmental, social and societal impacts. Manufacturing such components responsibly necessitates the ability to trace batteries across the entire supply chain, from raw material to final product.

Solution

In response to this challenge, in 2023 the EU approved the EU Batteries Regulation, mandating the creation of digital battery passports to document and exchange sustainability data throughout the value chain.

This passport will incorporate a wide range of information, including battery and manufacturer details, compliance and certifications, carbon footprint, supply-chain due diligence, battery materials, circularity, performance and durability. A specific methodology for calculating the product carbon footprint is provided by the 2023 EU Battery Regulation to align manufacturers and ensure comparability. The passport serves as an event tracker, to record when the product is sold, assembled, repaired, etc. This data can be accessible to the general public or specific battery industry stakeholders depending on its nature. Finally, the regulation requires the battery passport to provide dismantling information to push for easy repair and maintenance in a circular approach.

Deploying the battery passport will require automation of data collection from manufacturers but also exchange of data across different actors in the value chain. This implies collaborating across multiple stakeholders to define a common framework, standards and harmonized digital systems to ensure they are using a common language, comparable calculations and trustworthy infrastructure.

Impact

In the EU, the Battery Regulation has set a strong precedent, contributing to greater transparency and sustainability in the battery value chain. Traceability enables more responsible production, use and disposal of batteries and increased consumer knowledge. Industry groups such as the Global Battery Alliance and the Battery Pass consortium are working on global adoption, developing standards and showing how digital battery passports can work in practice. Beyond the EU, China and the US (with its Inflation Reduction Act) have also started to develop similar initiatives.

Source: World Economic Forum, Digital Battery Passports: An Enabler for Sustainable and Circular Battery Management, June 2023; The Battery Pass, Battery Passport Content Guidance: Executive Summary, April 2023

CASE STUDY 10

Celonis and thyssenkrupp Rasselstein – enhancing supply network transparency with process mining

Challenge

thyssenkrupp Rasselstein, one of Europe's largest manufacturers of packaging steel, serves clients in more than 80 countries globally. This leads to Scope 3 emissions associated with transport and distribution (categories 4 and 9). Wanting to efficiently drive emissions reduction initiatives, the company had to resolve the lack of real-time logistics GHG emissions data, which affected data quality and availability across fragmented systems.

Solution

thyssenkrupp co-innovated with Celonis, a digital technology pioneer in process mining, to develop a data-driven shipping emissions reduction application. The app analyses truck movements out of thyssenkrupp's sites and, coupled with contextual data, calculates the associated emissions. It is built on the Celonis Process Intelligence platform and leverages the carbon engine application programming interface (API) from Climatiq, a carbon calculation engine. It serves as an intermediary between customers' IT systems and various analytical dashboards, algorithms and automation processes that run on top of it.

To address the data quality challenge, Celonis and Climatiq aligned with domain experts to craft logic-based parameters to fill in any gaps in datasets and create a special module to validate existing data computed by the application.

The Climatiq calculation engine is accredited by and follows the Global Logistics Emissions Council (GLEC) framework to ensure comparability and standardization.

Impact

Over three months, the app analysed more than 49,000 outbound truck movements with activity data from enterprise resource planning (ERP) systems, resulting in a granular and automated calculation of total emissions of more than 58 million $kgCO_2e$. Through intelligent optimization of truck load factors, an emissions reduction potential of more than 4.5 million $kgCO_2e$ was identified. The app empowered thyssenkrupp to automatically compute emissions using input data from IT systems, incorporating them into transactional systems to guide processes and decision-making.

Several takeaways resulted from this collaboration: ERP data provides a strong basis for automated and granular measurement. Distance-based emissions measurement per shipment (rooted in ERP data) enables accurate emissions measurement, target-setting and performance improvement. Finally, shipment emissions data shared with customers can strengthen relationships and help with customers' own carbon accounting.

Source: Consultation with Celonis

3.3 Action level III: Leverage industrial ecosystems

Addressing Scope 3 emissions involves overcoming systemic challenges that extend beyond individual value chains. These challenges include the absence of standardized methods for calculating and sharing GHG emissions data, the nascent stage of low-carbon technology and infrastructure, and the lack of a unified regulatory framework for product collection, recycling and reuse.

The research and consultations conducted for this paper highlight that by collaborating with industrial ecosystems beyond their own value chains, companies can accelerate their decarbonization process and mitigate associated risks. This collaboration can lead to:

- The harmonization of sustainability standards and certifications across industries
- The development of data exchange infrastructure for sharing primary data among value-chain stakeholders
- Investment in infrastructure that promotes sustainable and circular operations
- Investment in research and development for carbon-neutral technologies, sustainable materials and circular economy solutions

The following section highlights opportunities for manufacturing companies to engage in collaboration with wider industrial ecosystems beyond their own value chains, to address the intricate challenges associated with Scope 3 measurement and reduction.

7 Opportunity area 7: Engage in Scope 3 standards harmonization

Addressing Scope 3 emissions requires a detailed understanding of product-level environmental impacts. However, manufacturers face challenges due to the multiplicity and complexity of existing Scope 3 standards and norms, lack of supplier engagement in data sharing and verification issues.[41]

Cross-industry initiatives such as the World Business Council for Sustainable Development (WBCSD) Partnership for Carbon Transparency (PACT) and sector-specific guidance from organizations such as the Rocky Mountain Institute, Catena-X, Together for Sustainability (TfS) and the Global Logistics Emissions Council (GLEC) are providing refined guidance for product carbon footprinting based on existing standards such as the ISO and GHG Protocol. Through industry-wide collaboration, companies can build trust in their carbon footprint calculations and facilitate practical data exchange with suppliers, leading to informed decisions for Scope 3 decarbonization.

This section highlights two examples: BASF's participation in PACT and TfS to refine Scope 3 standards for the chemicals sector, and EcoBeautyScore's consortium of 70+ members aiming to develop a global environmental impact assessment system for cosmetics products.

FIGURE 11 **Product carbon footprint rules from industry-wide to product-specific**

Cross-sectoral standards

Most-used guidelines in practice. Overarching rules provide requirements and some guidance on life-cycle assessments (LCAs) and reference materials. Such standards serve as the base for PCF calculation.

e.g. GHG product standard, ISO 14067, PEF, CSRD, ISSB

Sector-specific rules

Sector-specific guidelines. Built on recognized standards to cater to sectoral specificities. Rely on cross-sectoral standards while refining the approach to sectoral particularities.

e.g. Together for Sustainability (chemical sector), Catena-X (automotive sector) or the GLEC (logistics sector)

Product-specific rules

Most prescriptive, product-specific guidelines. Very detailed and tailored to a certain kind of product. Usually designed in accordance with ISO 14000 series or other cross-sectoral guidelines, with independent peer reviews; regularly updated and applicable where the product is marketed or produced.

e.g. PEFCRs

CASE STUDY 11

BASF – contributing to reporting standards using PACT and TfS

Challenge

BASF, the largest chemical producer in the world, is using PCF data exchange to reduce its Scope 3 emissions. This effort comes in parallel with halving its Scope 1 and Scope 2 GHG emissions between 1990 and 2018 and targeting an additional 25% reduction between 2018 and 2030, despite its targeted growth.[42]

Being a value-chain partner to almost all industries, BASF needed to address an important challenge to drive its Scope 3 emissions reduction: the lack of standard methodology and detailed guidelines to calculate and exchange PCF data at the most granular level consistently across different industry sectors, value chains and technology solutions.

Solution

This is why BASF decided to partner with the WBCSD and 60 other companies to develop the PACT Pathfinder Framework, which takes a cross-sectoral approach to helping organizations develop and exchange primary data-based PCFs to enhance data reliability and consistency across industries and value chains. Importantly, the Pathfinder Framework builds on existing standards such as the ISO, the GHG Protocol and sectoral guidelines such as Together for Sustainability (TfS) for the chemical industry.[43]

Impact

Since 2021, BASF has been onboarding suppliers in its Supplier CO_2 Management Program and requesting primary PCF data. By using the Pathfinder framework, as well as partnering with TfS, BASF has been able to calculate and exchange primary PCF data for thousands of products, with hundreds of suppliers and customers. By the end of 2024, all of the most important suppliers will have been onboarded to supply PCF data.

Building on the learnings from the pilot, BASF is working in close collaboration with PACT and TfS to scale this cross-industry programme. These activities will lower barriers to entry, upskill suppliers and improve the quality and consistency of the PCFs exchanged. As a result, improved PCF transparency will help to identify GHG reduction opportunities across the supply chain.

Source: Consultation with BASF; Thomas Nonnast, "BASF Presents Roadmap to Climate Neutrality", BASF, 2021

CASE STUDY 12

EcoBeautyScore – aligning an industry to define common environmental standards

Challenge

According to the Capgemini Research Institute, 42% of consumers are interested in buying brands that concentrate on circular and sustainable practices.[44] Instead of acting alone and competing on an important consumer concern, 71 small and large cosmetics and personal care companies, as well as professional associations from four continents, have joined forces to form the EcoBeautyScore Consortium, aiming to develop an industry-wide and global environmental impact assessment and scoring system for cosmetics products. The challenge is to propose, on each packaging, a score to inform consumers about the environmental footprint of the product.

Solution

To achieve this objective, the EBS Consortium created working groups with voluntary members to build on four pillars:

1. A shared, scientific method for measuring environmental impacts throughout the life-cycle assessment of products, backed by the principles of the EU Product Environmental Footprint (PEF)

2. A shared database of the environmental impact of standard ingredients and raw materials, built using existing databases (e.g. ecoinvent and Spice) and refined using members' data

3. A tool that enables assessment of the environmental impact of individual products, usable by non-experts. Members will be able to enter their product's raw materials in the tool to compute carbon footprint, with results on the 16 criteria of the PEF

4. A harmonized scoring system for consumers

EBS has created collaboration among members of the industry and scientific experts and used legal bodies to ensure respect for anti-trust laws, and is helped by Capgemini to orchestrate the consortium.

To facilitate decision-making, 18 full corporate members take part in bi-monthly technical working groups, while the whole consortium reunites every trimester for high-level follow-ups. However, each member of the consortium has the same voting weight, regardless of its size or level of involvement.

Impact

The focus in 2022 was on implementing governance and enabling members to collaboratively set the foundations of the methodologies developed by the consortium, while 2023 has been dedicated to testing those methodologies with actual data, at a large scale with a first tool prototype.

The methodology, database, tool and scoring system are being verified by independent parties and made available to the industry.

Source: Consultation with Capgemini and the EcoBeautyScore Consortium

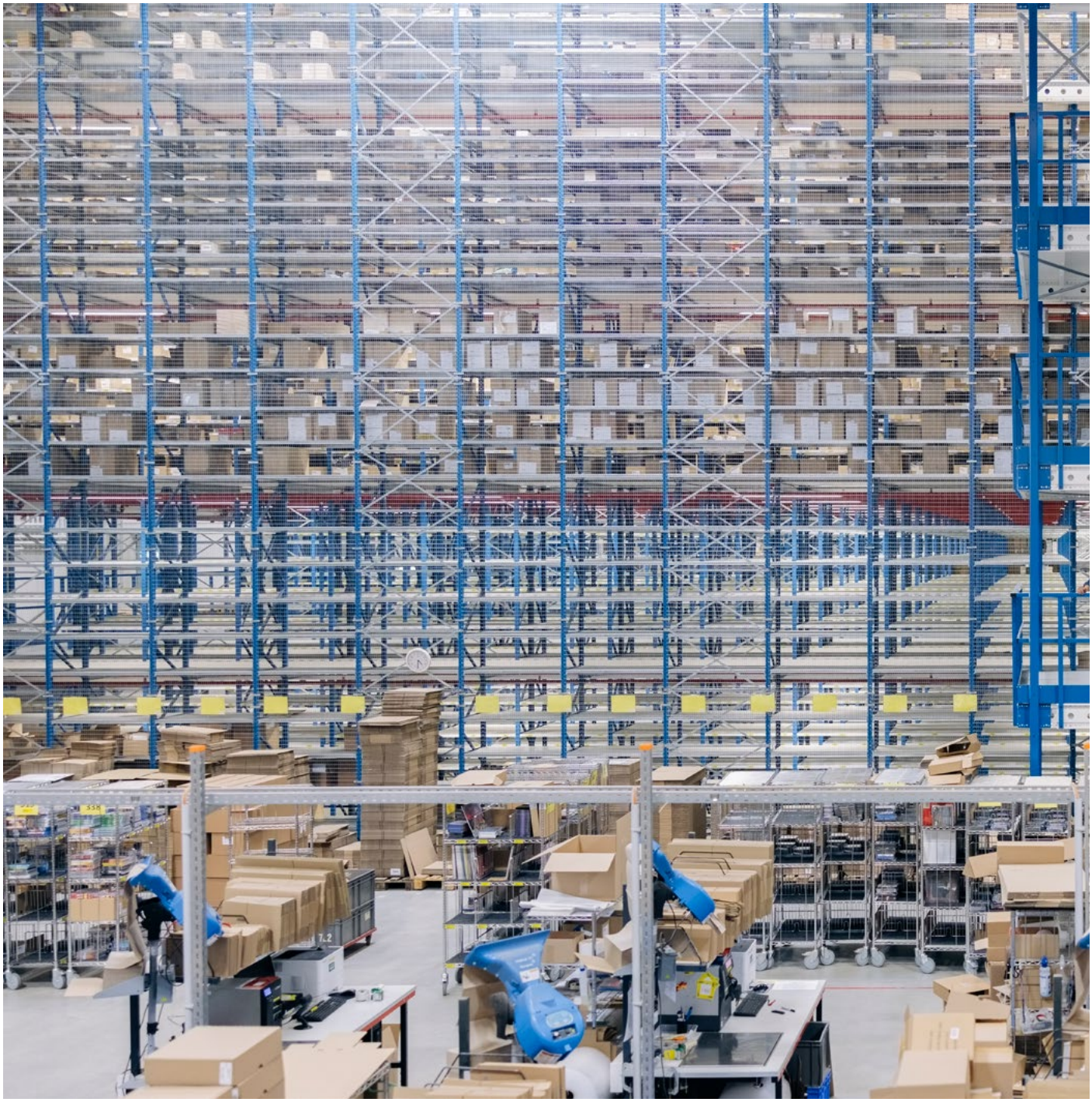
8 Opportunity area 8: Build product carbon footprint data exchange capability

Addressing Scope 3 emissions complexity requires detailed product-level emissions understanding. However, according to SBTi, companies face challenges in accessing supplier-specific emission factors (76%) and granular procurement data (64%), with less than 10% of emission factors based on supplier data.[45]

Currently, most companies manage Scope 3 data exchange manually, which becomes increasingly challenging as data requirements grow. Advanced software, using technologies such as blockchain, AI or machine learning, is needed for complex carbon calculations, cross-company data exchange and large-scale computations.[46]

The key lies in capturing product-level information based on suppliers' primary data, but this significant transformation faces hindrances due to a lack of standards and infrastructure for secure and confidential PCF data exchange across value-chain actors. Coalitions such as the PACT Network, Catena-X, Together for Sustainability, the ESTAINIUM Association and the Green X Digital Consortium are working to establish data-sharing standards and infrastructure capabilities.

A use case from Siemens' Chengdu factory showcases how an open decentralized network can facilitate data collection, identify hotspots and accelerate decarbonization.



CASE STUDY 13

Siemens and the ESTAINIUM Association: using verified and secured PCF data exchange to drive Scope 3 reduction

Challenge

Siemens' Electronics Works Chengdu (EWC), a World Economic Forum digital lighthouse, produces programmable logical controllers for the Chinese market. In parallel to its efforts to achieve carbon neutrality through a 93% reduction in its Scope 1 and 2 emissions, EWC has been seeking to drive Scope 3 reduction with suppliers through the exchange of PCF data. To this end, the factory needed to address an important challenge: identifying an approach that enables the exchange of PCF data in a trustworthy and confidential manner for all value-chain players.

Solution

EWC reached out to the ESTAINIUM non-profit association, of which Siemens is a founding member, to use its TSX (Trustworthy Supply Chain eXchange) connector and ensure transparency, verifiability and confidentiality in the exchange of PCF data with its suppliers.

Through a decentralized ecosystem, the ESTAINIUM network offers an open, cross-industry approach for the creation and exchange of verifiable credentials and shared information among manufacturers, suppliers, customers and partners – with each partner maintaining sovereignty over its own data.

Impact

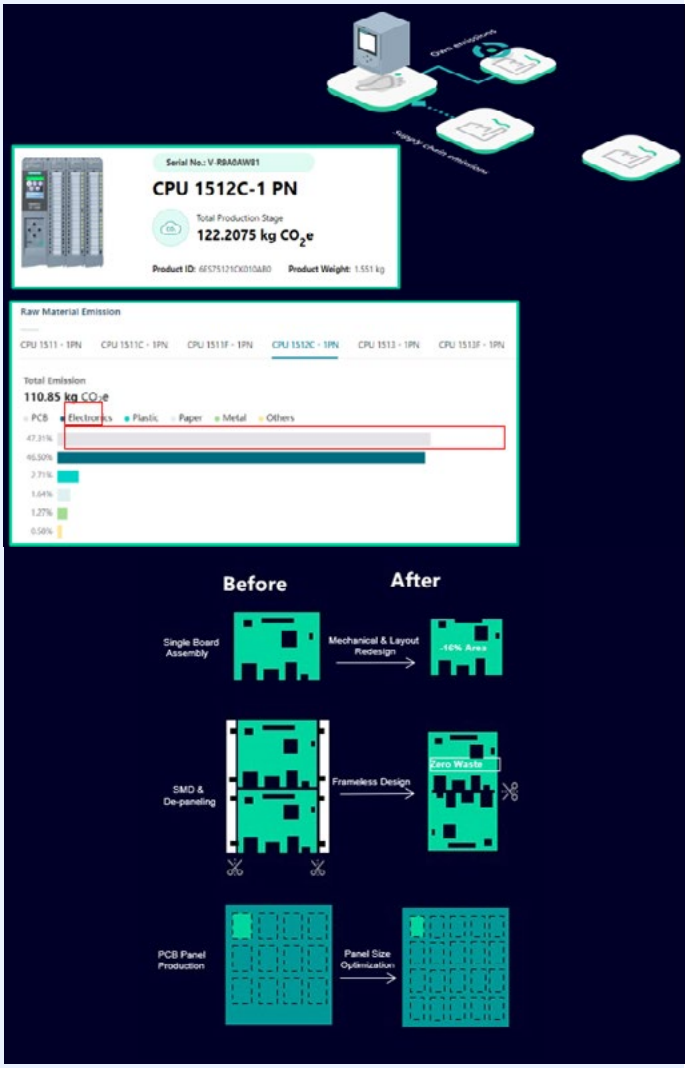
Using the ESTAINIUM network and Siemens' carbon emission management tool, EWC gained transparency into raw-material emissions from local suppliers. For example, it could verify that one product's total PCF was 122 kgCO_2e, with 91% coming from parts suppliers. This granular transparency enabled the identification of the main emission contributor: the printed circuit board (PCB), accounting for approximately 50% of total emissions.

The factory then undertook two actions to reduce those emissions: (1) drive joint initiatives with its suppliers to reduce the supply chain CO_2e impact; and (2) redesign the product to reduce CO_2e emissions, e.g. via raw material usage. Specifically for the PCB, these actions led to a 16% weight reduction and achieved 100% waste saving by removing disposable frames. The scaled impact resulted in a total CO_2e reduction of ~2,000 metric tons/year.

By using ESTAINIUM TSX technology, EWC was able to increase visibility within its value chain and uncover efficient decarbonization strategies, while ensuring verified accounting and secured sharing of PCF data.

FIGURE 12

ESTAINIUM network and Siemens' carbon emission management tool



Source: Consultation with Siemens

9 Opportunity area 9: Support sustainable innovation and infrastructure

Addressing Scope 3 emissions relies on technological advances such as the electrification of transport and use of renewable energy.[47] These shifts necessitate long development periods to establish new systemic structures, making collaboration across industries and with public-sector organizations crucial.

To address this challenge, companies often form coalitions to accelerate the development of infrastructure and innovation required for net zero. Opportunities include:

- Developing renewable energy grids for decarbonizing industrial assets
- Establishing circular systems for efficient logistics and waste recycling
- Creating joint digital platforms for sharing sustainability information
- Collaborative research on sustainable materials with specialized suppliers

The following case studies from Volvo Trucks and LifeCycle Optimization for Aerospace launched by a European aerospace consortium showcase how practical support can be provided to develop sustainable innovation and infrastructure.

CASE STUDY 14

Volvo Trucks – an OEM's support in green steel innovation to reduce automotive carbon footprint

Challenge

Steel demand is expected to reach 2.3 billion metric tons by 2030, with an annual growth rate of 3%. In the automotive industry, only about 55% of the steel purchased by car manufacturers makes it into cars.[48] Dual-mission sourcing (purchasing products that reduce both cost and carbon footprint) is becoming the new major challenge for procurement teams. However, the lack of availability of "green steel" – steel produced with low carbon emissions – can still hinder automotive OEMs in their sustainability strategies.

Solution

Volvo Trucks, in partnership with Swedish steel company SSAB, is developing vehicles built from fossil-free steel. The fossil-free steel is produced using neutral-carbon electricity (including biofuels) and hydrogen instead of by coking coal. Considering that, on average, 70% of a truck's weight comes from steel and cast iron, the Volvo initiative is an important step in cutting the automotive industry's emissions. In its car manufacturing, Volvo is also embedding circularity into its practices, using more recycled steel within SSAB's near-zero-emission steel. Another circularity approach uses green hydrogen surplus produced by Volvo's partner Ovako, an engineering steel manufacturer, to power the company's fuel cell vehicles.[49]

Impact

In June 2022, Volvo's A30G became the first construction equipment built using fossil-free steel, nine months after the first concept vehicle was showcased. By partnering with broader industrial systems, Volvo and SSAB are pushing the decarbonization of the automotive value chain.

Source: Volvo Group, "The Green Steel Collaboration – Volvo Group, SSAB and Ovako", 2021

CASE STUDY 15

Aerospace Consortium with Capgemini and AWS – a collaborative platform for the aerospace circular economy

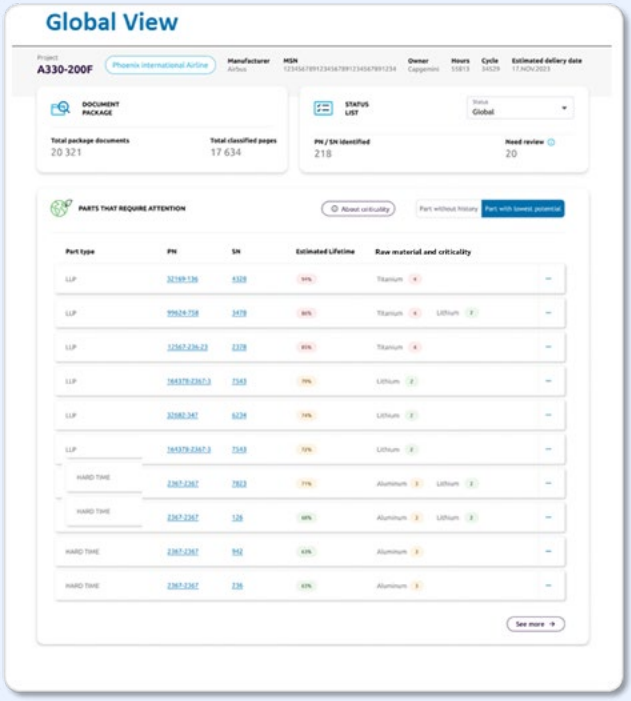
Challenge

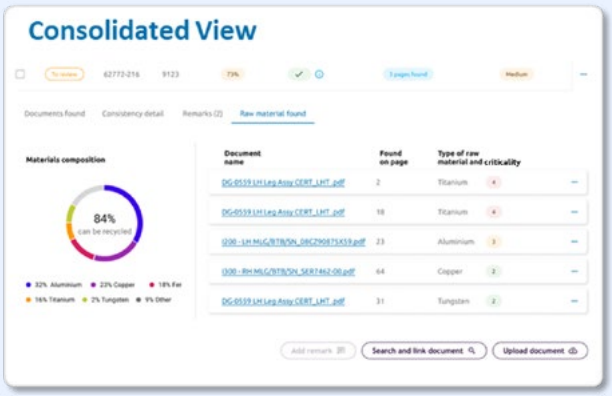
Adoption of circular economy practices in the aviation industry, which represents 3% of global emissions,[50] is one of the most important steps to reaching net-zero targets for aerospace manufacturers. However, documentation analysis and inspection processes for aeroplane parts are often complex and time-consuming. This is a clear hurdle for optimizing the life cycle of aircraft and enabling better reuse, resale and recycling services for parts.

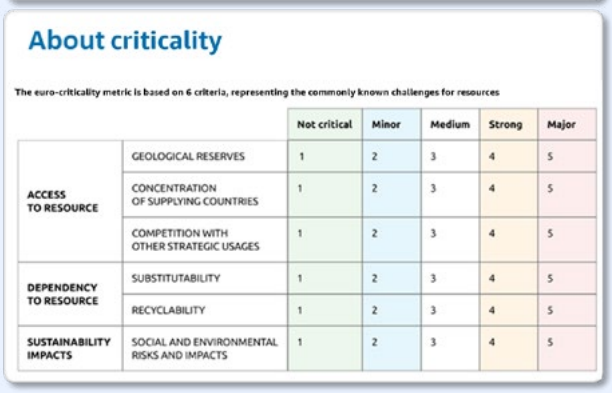
Solution

To meet this challenge, Capgemini and Amazon Web Services (AWS) partnered to develop LifeCycle Optimization for Aerospace with the support of the ADEME (French Agence de l'environnement et de la maîtrise de l'energie). The solution allows the processing of aircraft maintenance documentation to be automated using optical character recognition (OCR), natural language processing (NLP) and machine learning technologies. The tool digitizes all documents, even handwritten and non-structured ones. It then creates a database of parts' maintenance history and analyses it with AI engines. The data is automatically checked and structured (by serial and part number) for use. This was tested with real-life data provided by Safran Landing Systems and Air France.

FIGURE 13
Digitized data







		Not critical	Minor	Medium	Strong	Major
ACCESS TO RESOURCE	GEOLOGICAL RESERVES	1	2	3	4	5
	CONCENTRATION OF SUPPLYING COUNTRIES	1	2	3	4	5
	COMPETITION WITH OTHER STRATEGIC USAGES	1	2	3	4	5
DEPENDENCY TO RESOURCE	SUBSTITUTABILITY	1	2	3	4	5
	RECYCLABILITY	1	2	3	4	5
SUSTAINABILITY IMPACTS	SOCIAL AND ENVIRONMENTAL RISKS AND IMPACTS	1	2	3	4	5

Using this data enables operators to assess the repairability of a component, estimate its remaining lifetime in use and improve the part's reuse.

Upgrades of the platform will include materials identification and CO_2 trade-off, enabling decision-makers to take strategic action on the circularity of parts. The programme envisions integration with airlines and OEMs' information systems for decision support, emphasizing sustainability and efficiency. It could also be replicated in other sectors facing the same challenges.

Impact

The platform accelerates technical inspections at the end of an aircraft's life or leasing, reducing analysis time by between 30% and 50% compared to expert operators' manual analysis. A recent use of the platform enabled an airline to retrieve full traceability for 113 additional parts and increased the number of reusable parts by 15%.

Reducing inspection time and increasing parts traceability simplifies the implementation of circularity measures, important in handling the 20% of worldwide fleets soon to be retired.

Source: Consultation with Capgemini

3.4 Action level IV: Drive the cultural shift towards a sustainable society

As previously emphasized, addressing Scope 3 emissions necessitates profound transformations in operating and business models, involving systemic collaboration and the use of emerging technologies.

However, these transformations encounter challenges due to the perception that sustainability increases costs and requires consumer habit changes, and because of the complexity of multi-industry, global value chains, which often appear overwhelming.

To overcome these obstacles, cultural change is vital for driving sustainability initiatives that can lead to substantial cost benefits (e.g. reduction in consumed energy and waste, premium price for products). This cultural shift involves:

- Viewing sustainability as a business investment, not a cost, possibly through an internal carbon fee or by emphasizing the joint cost and sustainability benefits of greener consumption
- Encouraging green choices among consumers, promoting conscious consumerism by creating incentives for product reuse, remanufacturing and recycling
- Engaging stakeholders throughout the organization, value chain and society to create a shared journey for collective action

The following section outlines some practical opportunities for companies to change their mindsets, unlock business value beyond costs, simplify green choices for consumers and chart an inspiring path towards value-chain decarbonization.

10 Opportunity area 10: Shift mindsets to unlock business value beyond costs

Though often perceived as a cost-increasing measure, Scope 3 decarbonization can transform into a business value proposition by highlighting the principle opportunities, including:

- Developing resource-efficient products and processes for cost reduction through energy and material savings
- Innovating circular economy and sustainable products to create new business opportunities and supply chains
- Boosting talent attraction, retention and brand reputation through sustainability engagement
- Mitigating future risk-related costs, such as resource scarcity, climate change impacts or future regulations

Microsoft's internal carbon fee serves as an example of how sustainability can be viewed as a business investment, fostering awareness and informed decision-making among shareholders and employees.

CASE STUDY 16

Microsoft – an internal carbon tax to cut Scope 3 emissions

Challenge

In 2020, Microsoft set itself the goal of becoming carbon negative by 2030. As part of the solution to achieve this across 100 countries and 700 buildings, Microsoft decided to integrate sustainability as a business investment into the accounting of each business unit across Scopes 1, 2 and 3.

Solution

To accelerate the transition to net zero, Microsoft introduced an internal carbon tax model in 2012 that initially focused on Scope 1 and 2 emissions. Since 2020, the carbon tax has been expanded to include Scope 3 emissions, and in parallel Microsoft has worked with suppliers to help them understand and reduce their carbon footprints.

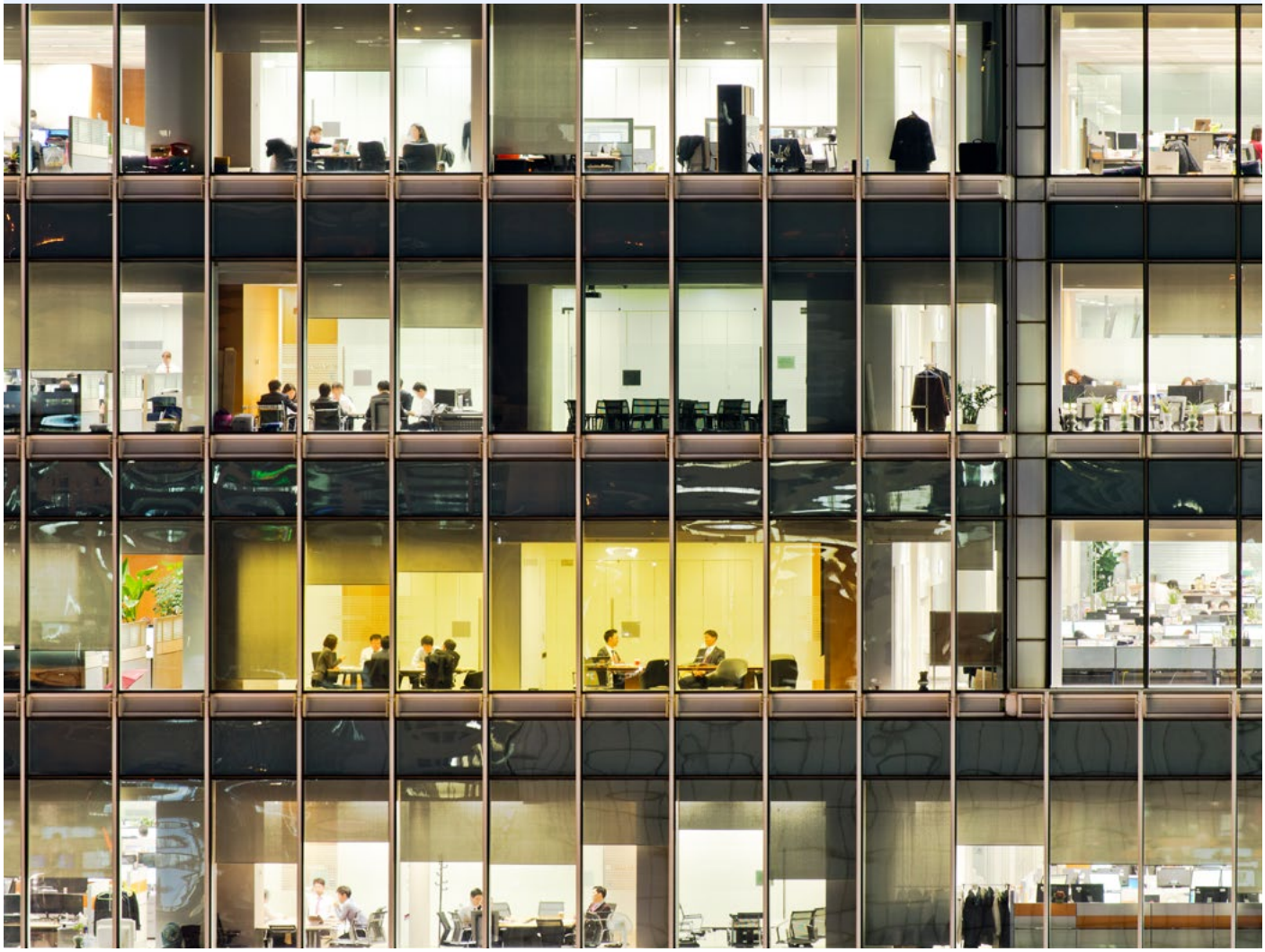
The carbon tax works by setting organizational carbon reduction targets for all business units. Carbon emissions are tracked and analysed across Microsoft's operations and supply chain. An internal price on carbon is set annually in line with the company's targets, and this is translated into a carbon fee that charges business units for their GHG emissions. All carbon taxes are collected into a fund that subsidizes investments in sustainable projects.

Impact

Through its internal carbon tax scheme, Microsoft has embedded a transformative approach to sustainability within its business units, leading to several important outcomes:

- Educated investment decisions: the carbon tax scheme has led to more informed and environmentally conscious decision-making
- Prioritization of low-carbon investments and operating practices: by attaching a tangible cost to carbon emissions, the scheme allows participants to highlight priority areas for decarbonization and create incentives for progress in them. For example, since 2022, Microsoft has hardened its stance on business air travel by increasing the associated fee from $15 to $100 per metric ton of CO_2 equivalent
- A shift in mindset across the organization to embrace sustainability as a strategic business investment

Source: Microsoft, "Making an Impact with Microsoft's Carbon Fee", 2015; Skift, "Microsoft Discourages Corporate Travel by Raising Own Carbon Fee 600 Percent", 2022



11 Opportunity area 11: Rethink consumption and make green choices easier for consumers

Designing sustainable products and business models necessitates changing consumer habits by promoting longer product use, recycling and reducing carbon-intensive services. Overcoming perceptions and societal norms is essential to make green choices more attractive, despite obstacles such as price barriers and limited access to alternatives.

Studies show that customers and employees are increasingly seeking ethical and sustainable choices, presenting an opportunity for businesses to enhance loyalty and gain a competitive edge. Several companies are already influencing consumer behaviour by providing information and services for product disassembly and repair, advocating energy efficiency and endorsing product reuse.

IKEA's business strategy serves as a practical example of how to influence sustainable consumption.

CASE STUDY 17

IKEA – Making green choices easier for consumers

Challenge

In its quest to minimize its environmental footprint, IKEA wanted to simplify sustainable choices for its customers, turning the complex concept of sustainability into an everyday habit.

Solution

IKEA is testing and developing new business models and circular services to enable its customers to extend the lifespan of their products through accessible solutions that motivate individuals to acquire, maintain and share them in sustainable, circular ways. The "Circular IKEA" initiative consists of several strands:

- **Reuse:** IKEA provides free spare parts so that its customers can easily replace a broken or lost part. A second-hand market allows customers to sell products they no longer need to IKEA, which will sell them to new customers.
- **Refurbish:** IKEA provides a restoration service for used and damaged products. The products are evaluated, cleaned, repaired, upgraded and recertified again, avoiding additional waste-to-landfill.
- **Design for disassembly:** IKEA is updating its products' design to facilitate disassembly and reassembly, enabling customers to easily modify part of their equipment or even to store them efficiently.

Ultimately, when the three circular strands are not possible, IKEA ensures recycling of its products – arranging transportation of waste in places where local infrastructure for recycling is not yet in place.

Impact

The circular initiative, augmented with effective communication, enabled IKEA to achieve substantial progress: the company offered more than 21 million assembly components to customers, allowing them to extend the life of 18 million IKEA items in 2021. Moreover, more than 9,500 products have been assessed for circularity and 17% of material was recycled in 2021. These initiatives helped to reduce emissions from product use at home by 45% and emissions from product end of life by 7% compared to 2016.

Source: IKEA, "Transforming into A Circular Business"; IKEA, "Sustainability Report 2022", 2023

Opportunity area 12: Craft an exciting path to value-chain decarbonization

Reducing Scope 3 emissions entails addressing decarbonization of the full value chain, which can seem daunting to manufacturers dealing with thousands of suppliers, partners and consumers. Yet several strategies simplify the challenge:

- Effective communication that embraces simplicity, inclusivity and enthusiasm can turn decarbonization into a shared venture, spurring collective action
- Leaders play a crucial role in demystifying Scope 3 decarbonization, setting an example, energizing teams, fostering innovation and a sustainability culture, and guiding the value chain towards decarbonization goals
- Uniting people, inspiring action and leading by example can drive change within and beyond industrial ecosystems

The Patagonia case study demonstrates how leading by example can transform sustainability and Scope 3 decarbonization into an opportunity for business innovation, employee engagement and customer loyalty.

CASE STUDY 18

Patagonia – sparking the sustainability cultural shift at every level

Challenge

The apparel industry is responsible for as much as 6.7% of the global GHG emitted in the world. Circularity is an important area of focus, as approximatively 85% of clothing ends up in landfills or incinerated each year. Patagonia, the outdoor clothing company, wanted not only to drastically reduce its emissions but also to shift the paradigm and change the mentality of its business, employees and customers towards more sustainable lifestyles.

Solution

Patagonia has engaged in several initiatives to put sustainability at the heart of its business.

First, in 2012, Patagonia became the first "benefit corporation", prioritizing environmental and social concerns over turnover. In 2022, the company announced "going purpose" instead of "going public". By transferring all assets to two legal entities, the owners ensured that every earning not reinvested into Patagonia would be paid as a dividend to a fund dedicated to financing environmental projects.

Patagonia also fosters a sustainability mindset within its people. Its Environmental Internship Program enables employees to take up to two months off work to engage in a fully paid internship for an environmental organization.

Finally, the company focuses on changing consumers' mindset. Its "Worn Wear" programme acts as an incentive to share responsibility by extending the lifespan of clothes. This initiative offers awareness and support for conscientious product maintenance, repair, reuse, resale and responsible end of life disposal.

Impact

Patagonia's cultural shift strategy is already reaping rewards. Through its "going purpose" approach, it expects to pay out around $100 million of annual dividend to sustainable projects.

Its employee turnover is less than 4%, much lower than the industry average, and more than 1,000 employees have taken part in the Environmental Internship Program. This enabled the company to gain valuable sustainability insights, change internal mindsets and develop stronger relationships with sustainable organizations.

Finally, Patagonia's circularity and consumer awareness strategy allowed it to extend the life of clothing by nine months. This reduced carbon, waste and water footprints by approximately 20–30% each. The company also resold more than 120,000 repurposed items, significantly cutting down on waste and emissions.

Sources: Patagonia, "Worn Wear"; Patagonia Works, "Patagonia's Next Chapter: Earth Is Now Our Only Shareholder", 2022; Quantis, "Measuring Fashion", 2018; United States Environmental Protection Agency, "Facts and Figures about Materials, Waste and Recycling", 2022

4 Industry Net Zero Accelerator Initiative: Next steps

Taking responsibility, scaling sustainable products and business models, and embracing partnerships across value chains are vital to accelerating Scope 3 emissions reductions.

Despite the importance of Scope 3 mitigation, understanding and progress are lagging due to challenges in emissions measurements and abatement. These challenges stem from the complexity of global supply chains, evolving standards and regulations, and the need for significant technological and consumption habit changes.

To address these challenges, the initiative identified 12 “no-excuse” opportunities to accelerate Scope 3 decarbonization. These opportunities, supported by 18 case studies from early movers, are grouped into four action levels: (I) Start from within; (II) Empower your supply chain; (III) Leverage industrial ecosystems; (IV) Drive the cultural shift to a sustainable society.

These opportunities provide a path for companies to take responsibility, foster collaboration across value chains, redesign operating and business models, and adopt emerging technologies for rapid decarbonization. The case studies highlight that embracing the cultural shift to sustainability can increase business resilience and unlock new opportunities, while garnering support from consumers, employees and shareholders.

The World Economic Forum’s Industry Net Zero Accelerator initiative is committed to engaging leaders across industry sectors, governments, academia and civil society to accelerate the net-zero journey.

Future work includes: using this paper and the “no-excuse” framework to inform decisions; promoting learning through the Forum’s digital repository of sustainable manufacturing and supply-chain case studies, launched in May 2023; and celebrating industrial leaders’ achievements in decarbonization.

Given the complexity of Scope 3 challenges, the goal of the initiative is to assist businesses and governments in enhancing their decarbonization strategies and driving change in industrial policies. The hope is that this white paper will encourage more organizations to embrace these “no-excuse” opportunities for Scope 3 mitigation, join the community and contribute to the collaborative effort of exchanging knowledge and best practices. The urgency and opportunities to make a difference have never been greater – organizations need to act now, testing and learning as they go rather than waiting for calculations and abatement technologies to reach full maturity.

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