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Decarbonising global supply chains: building a sustainable future

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Abstract

Modern supply chains are vital to global commerce, but they are also major contributors to greenhouse gas (GHG) emissions. As climate change intensifies, achieving carbon neutrality – particularly through supply chain decarbonisation – has become a global imperative. While organisations have made strides in reducing direct emissions, addressing indirect supply chain emissions presents greater complexity and urgency. We invite academic contributions that examine the challenges, enablers, potential risks, strategic approaches and innovative practices related to decarbonisation across a wide range of sectors, including manufacturing, service industries and humanitarian logistics. Emphasis is placed on holistic, multi-stakeholder approaches aligned with the GHG Protocol. The issue welcomes interdisciplinary research employing varied methodologies – ranging from empirical studies to conceptual frameworks – to inform practice, policy and sustainability transitions. By showcasing sector-specific insights and cross-cutting solutions, this issue aims to advance knowledge and action in building low-carbon, resilient supply chains.

Impact statement

The decarbonisation of supply chains is not just a technology challenge but also a strategic urgency in attaining global carbon neutrality and addressing the consequences of climate change. Since supply chains generate even more emissions than direct operations, partnering across different industries is critical in catalysing systemic transformation towards low-carbon economies. Decarbonisation innovations in various sectors – from manufacturing to digital commerce – represent the potential that could unlock scalable and sustainable solutions for global supply chain networks. This special issue aims to highlight actionable insights, sector-specific innovations and collaborative frameworks that empower organisations to decarbonise their supply chains and build a resilient future that is climate-aware.

Supply chains are integral to a global society. Modern organisations depend on efficient and global supply chains for success. However, production and logistics activities within these networks significantly contribute to greenhouse gas (GHG) emissions. Tackling global challenges – particularly climate change and global warming – requires a critical assessment of supply chain operations.

The United Nations has identified achieving carbon neutrality by 2050 as one of the most urgent global priorities. Given the pivotal role of supply chains, collaboration across the entire network is essential in addressing climate change. The GHG Protocol, developed by the World Resources Institute, underscores the need for a comprehensive, multi-stakeholder strategy to reduce carbon emissions (World Resources Institute, 2004). The Protocol categorises emissions into three scopes: Scope 1 and Scope 2 cover direct and indirect emissions, whereas Scope 3 includes indirect emissions occurring across supply chains (Zhang et al., 2022).

Many manufacturing firms prioritise financial performance, often limiting their commitment to low-carbon initiatives due to resource constraints. However, governments worldwide are increasingly pushing organisations to adopt sustainable strategies (Khaiyum et al., 2023). Decarbonisation – the process of reducing or eliminating carbon dioxide (CO_2) emissions from operations – is a key step towards achieving carbon neutrality. Decarbonisation has become a global imperative and a top priority for governments and businesses in the fight against climate change (Khorasani et al., 2022). Efforts to reduce emissions in the energy sector include transitioning away from fossil fuels in favour of carbon-free renewable energy and low-carbon fuel technologies, such as nuclear energy (Alamoush et al., 2023). These solutions address Scope 1 and Scope 2 emissions, but not Scope 3 emissions.

Organisations are realising that decarbonising their supply chains presents even greater challenges than optimising their internal processes. In fact, supply chain emissions often surpass those generated directly by companies themselves (Eckerman et al., 2023). Therefore, effective decarbonisation must be a collective effort across the entire supply chain. It is important to clarify that the term *supply chain*, as used in this context, refers to the full spectrum of supply chain activities. This encompasses procurement, operational processes and logistics – all of which are integral to the effective functioning and sustainability of supply chain systems (Khaiyum et al., 2023).

This pressing need for action sets the theme for the inaugural issue of the *Energy Transition Journal*, focused on "Decarbonising Supply Chains – Building a Sustainable Future" within the broader context of Energy Transmission and Distribution. We invite submissions showcasing diverse decarbonisation initiatives across various industries, including automotive, oil and gas, construction, retail, healthcare, food and beverage, fast-moving consumer goods, apparel and humanitarian supply chains. In addition, we encourage authors to highlight decarbonisation initiatives within service-based supply chains – including but not limited to sectors such as aviation, tourism, financial services (e.g., banking) and digital commerce (e.g., online retailing). Showcasing strategies and practices from these industries can provide valuable insights into how service-oriented organisations are addressing carbon reduction across their supply networks. Exploring different supply chains is essential, as decarbonisation strategies vary significantly across sectors.

This issue aims to cover the multifaceted aspects of supply chain decarbonisation, including, but not limited to:

Barriers and Drivers of Decarbonisation: Identifying the obstacles that hinder decarbonisation efforts and the factors that encourage and facilitate the shift towards lower-carbon operations.

Opportunities and Risks in Decarbonisation: Examining the potential benefits, such as improved efficiency and market expansion, alongside risks (e.g., rising costs and technological limitations).

Strategies for Decarbonising Supply Chains: Investigating effective frameworks and approaches, including supplier engagement and low-carbon procurement projects for significantly reducing carbon emissions throughout supply chains.

Innovative Solutions for Supply Chain Decarbonisation: Showcasing novel technologies, methodologies and best practices that advance decarbonisation efforts.

Cost–Benefit Analysis of Decarbonisation Initiatives: Evaluating the financial implications of decarbonisation, including initial investment, incentives, long-term cost savings and overall return on investment.

Broader Implications of Supply Chain Decarbonisation: Analysing the impact of decarbonisation on stakeholders, market dynamics, regulatory compliance and environmental sustainability.

We encourage a comprehensive exploration of supply chain decarbonisation, addressing both opportunities and challenges. Contributions from researchers with diverse backgrounds, perspectives and expertise are highly valued. Interdisciplinary studies are particularly welcome, as they offer valuable insights into emerging challenges and innovative solutions.

We invite literature reviews, research papers, conceptual papers and case studies using a range of methodologies, including qualitative, quantitative, experimental or mixed-methods approaches. We look forward to showcasing groundbreaking research from scholars around the world.

Open peer review. To view the open peer review materials for this article, please visit https://doi.org/10.1017/etr.2025.10003.

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