CITP
CENTRE FOR INCLUSIVE TRADE POLICY

UKTPO
UK TRADE POLICY OBSERVATORY

Organizational standards, Trade and the Net Zero Transition

An independent report prepared for BSI (the British Standards Institution)

Professor Emily Lydgate

Dr Xinyan Zhao

February 2025

The authors are grateful for peer review and advice from Frank Faraday, Michael Gasiorek, Peter Holmes, Charlotte Humma, Andrew Lang, Greg Messenger, Fiona Smith, Sunayana Sasmal, Mattia di Ubaldo and the rest of the UKTPO/CITP team at Sussex. We are also grateful for the ongoing guidance and insight of Ritwika Sengupta and Joel Chapman from BSI. A note on references: we have hyperlinked references to policy literature and websites in the text of the Report, but not peer reviewed academic articles. References are also listed in the Bibliography.

Contents

Glossary

Accreditation: A formal third-party attestation of a conformity assessment body, of its competence to conduct specific conformity assessment tasks (ISO/IEC 17011:2004)

Conformity Assessment Procedure: Any procedure used, directly or indirectly, to determine that relevant requirements in technical regulations or standards are fulfilled. Conformity assessment procedures include, inter alia, procedures for sampling, testing and inspection; evaluation, verification and assurance of conformity; registration, accreditation and approval as well as their combinations. (Annex 1.3, Agreement on Technical Barriers to Trade [TBT Agreement], WTO)

Emissions scopes: SCOPE 1: Direct GHG emission from sources owned or directly controlled by the organization ; **SCOPE 2**: Indirect GHG emission from the generation of purchased electricity, heat, cooling or steam consumed by the organization; **SCOPE 3**. Indirect GHG emission that is a consequence of the organization's activities but arises from sources that are not owned or directly controlled by the organization. (Adapted from ISO Net Zero Guidelines)

International standards: A document that has been developed through the consensus of experts from many countries, is approved and published by a globally recognized body, and operates on a national delegation principle. It comprises rules, guidelines, processes, or characteristics that allow users to achieve the same outcome time and time again. The International Standards Organization (ISO) and International Electrotechnical Association (IEC) are widely recognized international standardizing bodies (Adapted from IEC).

Non-Product-related Process and Production Method (NPR-PPMs): A production method that does not leave a trace in the final product, i.e. the physical characteristics of the final product remain identical (adapted from WTO)
Organisational standards: Although no universally accepted definition exists, the academic community identifies several cross-cutting features: focused on the behaviour of firms or other entities, principle-oriented, voluntary, diverse, interconnected and asymmetrically distributed. They apply to production and management (Examples: ISO 9000, ISO 14000).

Private standards: Standards designed by non-governmental entities, which include those developed by a sector-specific consortium (e.g., Greenhouse Gas Protocol); civil society standards - established as an initiative by an non-profit organization usually as a response to concerns over social and environmental conditions (e.g., B Corp) and company-specific standards - which are developed internally and apply to

the whole supply chain of a company (i.e., codes of conduct) (Adapted from United Nations Industrial Development Organization [UNIDO])

Public standards: Defined in contrast to private standards, as a standard developed by government-recognized national or international- standardizing body.

Standards: A document, established by consensus and approved by a recognized body, that provides, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context, and with which compliance is voluntary. (ISO/IEC Guide 2:2004:2).

Quality Infrastructure: The system comprising the organizations (public and private) together with the policies, relevant legal and regulatory framework, and practices needed to support and enhance the quality, safety and environmental soundness of goods, services and processes (World Bank, 2013).

Technical regulation: A document which lays down product characteristics or their related processes and production methods, including the applicable administrative provisions, with which compliance is mandatory. It may also include or deal exclusively with terminology, symbols, packaging, marking or labelling requirements as they apply to a product, process or production method. (Annex 1.1, WTO TBT Agreement).

WTO TBT Committee: Affords WTO Members (country representatives) the opportunity to discuss specific trade concerns (STCs) related to specific laws, regulations or procedures that affect their trade. Usually in response to notifications, members raise STCs to find out more about the scope and implementation of each other's regulations in light of TBT obligations. Members also exchange experiences on the implementation of the Agreement to make its implementation more effective and efficient. This discussion revolves around generic, cross-cutting themes, including transparency, standards, conformity assessment and good regulatory practice.. (Adapted from WTO).

Executive summary

A number of standards respond to the need to support organizations, including firms, public institutions and the voluntary sector, in achieving net zero. Key features of such organizational standards include an objective of transforming behaviour and emphasis on principles. It is important to assess how organizational standards support the net zero transition and, in so doing, shape trade practices and patterns. To do so, this Report undertakes an interdisciplinary literature review and qualitative case studies of organizational standards supporting net zero, focusing primarily on the EU and UK context.

The interaction of standards and regulation

Organizational standards and EU regulation contribute to a trend towards requirements being applied to firms and their supply chains, rather than products (cf UNIDO, 2024; Pauwelyn, 2024). The net zero transition is one area such requirements address.

Interaction with mandatory regulation shapes the relevance of voluntary organizational standards. In some cases, this relationship is mutually reinforcing. For example, adoption of ISO 14064-1 or Greenhouse Gas Protocol accounting standards supports compliance with EU regulatory requirements. In other cases, organizational standards duplicate these requirements and cannot contribute to regulatory compliance. Duplication risks sunk costs for firms, and proliferation of requirements complicates market access. It can also catalyse reform in organizational standards that ultimately strengthens them.

Recommendations

- Countries or regions establishing new regulatory requirements to support the net zero transition, such as the EU, can recognize that relevant organizational standards align with their requirements in order to streamline conformity assessment processes.
- In this recognition process, regulating countries can also address concerns about the governance and effectiveness of organizational standards, including by requiring reforms.
- Organizational standards can maintain relevance by continuing to exceed regulatory requirements, encouraging adoption by firms who want to position themselves as market leaders.

Value-chain (Scope 3) emissions reporting

Requirements for value chain emissions reporting are now included in EU regulation and elsewhere (for example, by the State of California). They often rely on organizational standards, primarily the Greenhouse Gas Protocol. This trend seems set to influence global supply chains.

There are methodological difficulties for firms in reporting their value chain emissions: multiple and diverse sources, with uncertain or unavailable data, over which reporting firms do not have direct control.

Recommendations

- As it is a key question at the net zero and trade intersection, academic research should pursue greater understanding of how firms respond to emerging value chain (Scope 3) reporting requirements, and how these responses influence global supply chains.

- Firms can address some of the methodological difficulties of value chain emissions reporting by bringing reporting in-house and embedding it in firm culture, digitizing processes, and developing strong relationships with suppliers.

The role of the WTO

The TBT Agreement encourages countries to base technical regulation on international standards where relevant. There is controversy regarding what constitutes an international standard, and private standards have been viewed with more scepticism. The focus of organizational standards on changing behaviour has the potential to place significant demands on firms, exacerbating concerns regarding private standards' contribution to inequalities and market access challenges.

Some scholars have identified missed opportunities for the WTO, including the TBT Agreement and Committee, to play a more active role in governance of standards, including their formulation and dissemination (Delimatsis, 2013; Du, 2020). The TBT Agreement includes obligations on conformity assessment and principles on the development and application of standards.

Recommendations

- Countries can follow recently concluded TBT Committee Guidelines on Conformity Assessment Procedures (WTO, 2024) to help support effective implementation of organizational standards.

- Countries can continue to advocate for more transparency regarding private standards, through for example producing TBT Committee guidelines.
- Countries can use existing WTO fora, including the TBT Committee and the Committee on Trade and Environment, to discuss trade impacts of organizational standards, their interaction with regulation, and their interoperability.

The contribution of the forthcoming ISO net zero standard

The ISO net zero standard can contribute to the existing standards landscape through its comprehensive codification of best practice, and broader acceptance among WTO members when compared to private standards or unilateral regulation. Accredited conformity assessment, at its best, can help provide strategic direction by supporting firms to think beyond day-to-day operational necessities, which is at the core of successful implementation of organizational standards. Assurance processes for assessing compliance with organizational standards can provide a deeper reach into organizational strategy than other types of standards and regulations.

However, the case studies in this Report both demonstrate how the orientation of organizational standards toward principles (rather than precise and quantifiable outcomes) risks weakening these outcomes. A similar risk exists for the ISO net zero standard, particularly given the complexity of the net zero transition and its requirements. The complex and rapidly evolving nature of net zero strategy makes it challenging to draw the line between requirements that are too specific and those that are too general.

Recommendation

- The ISO net zero standard can make a strong contribution to the net zero landscape by codifying existing best practice and requiring firms to think through their strategy and adopt clear targets for progress, underpinned by a strong quality assurance process.

The contribution of National Standards Bodies (NSBs)

Organizational standards must adapt to a swiftly evolving regulatory environment. Key challenges include ensuring that they remain relevant and addressing concerns about proliferation of standards.

Recommendation

- To support the net zero transition, NSBs can help to ensure that organizational standards continue to identify gaps, and review and update standards to prevent replication.

- NSBs can help to ensure more effective collaboration between public and private actors in standard-setting processes. In so doing, NSBs can support the development of complementary rather than competing standards.
- NSBs can help to ensure that organizational standards align with regulatory requirements to support conformity assessment processes.

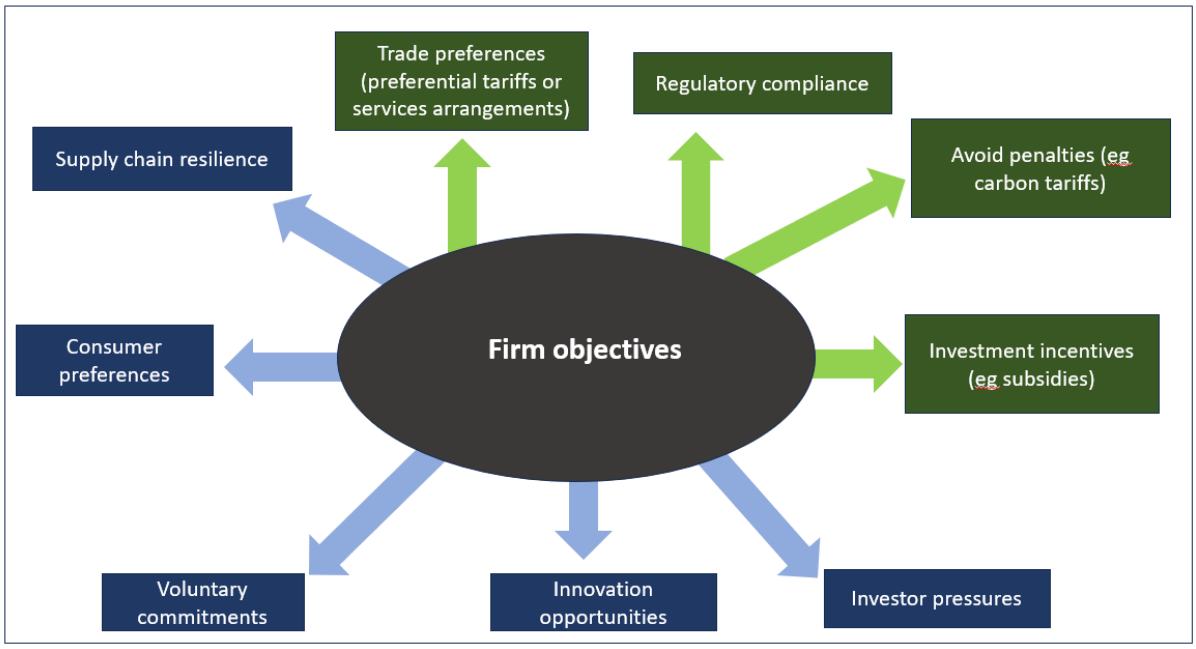
1. Introduction

Progress towards net zero is a multifaceted process. On the firm level, it requires phasing out directly generated emissions, but also addressing inputs and value chains, which could consist of everything from raw materials to transport, to digital carbon footprint. It also requires consideration of investment strategy and sources. All this necessitates long-term planning and commitment. To respond to this need, a host of standards have emerged which focus on helping organizations, including firms, public sector institutions and the voluntary sector, decarbonize their value chains across a wide array of indicators.

The most tailored of these come from the International Organization for Standardization (ISO), which has committed to developing a net zero standard, to 'guide organizations as they embark on their net zero transitions' (ISO, 2024). Other, existing standards, both public and private, set out requirements for organizations to prove that their activities align with the net zero transition. These standards, which we describe as 'organizational', sit among better-established standards for organizational environmental management.

For firms, trade is implicated in various elements of net zero strategy. These include ensuring supply chain resilience, greening supply chains, responding to international consumer and investor preferences, compliance with regulatory requirements and incentives, internal reputational imperatives and desire to maintain international competitiveness through embracing innovation. In the figure below, objectives in green represent public incentives driven by treaties or regulation; those in blue represent private incentives.

Fig. 1. The importance of trade to the low-carbon transition: a firm-level perspective *(Key: Green represents public incentives driven through regulation or treaties; blue represents private incentives)*



Source: Authors

At the same time, some countries are making elements of net zero transition planning mandatory through introducing regulation such as reporting, due diligence and sectoral emissions performance requirements. Such regulations, which also focus on firm-level (rather than product-level) requirements, replicate some of the requirements of voluntary standards. Recent requirements in legislation such as the EU Corporate Sustainability Reporting Directive (CSRD), Corporate Sustainability Due Diligence Directive (CSDDD) and Carbon Border Adjustment Mechanism (CBAM), are not limited to territorial emissions but include emissions generated in other countries through international supply chains, and thus impact upon trade. These regulations suggest a broader shift away from technical regulation imposing specific product requirements, and toward requirements being applied and enforced at the firm (rather than border) level (Pauwelyn, 2024).

As compared to technical product standards, the relationship between organizational standards, net zero and trade is more difficult to pin down. Organizational standards are voluntary, and focus on firm behaviour, while technical regulation is mandatory, and focuses on products. There is no multilateral organization that clearly addresses the relationship between organizational standards and trade.

Questions arise regarding how such standards influence trade, how they interact, and should interact, with emerging mandatory regulation that supports net zero, and whether this relationship supports the net zero transition by facilitating trade in low-carbon products and services. To address these questions, this Report

undertakes theoretical analysis with case studies at the intersection of organizational standards and trade, covering the following:

- Facilitating mutual understanding between academics and practitioners working at the intersection of net zero organizational standards and trade by setting out how they classify and analyse the relevance of such standards.
- Examining why firms choose to adopt organizational standards, whether they help or hinder trade flows, whether there is scope to use them to meet requirements of technical regulation, which different standards and regulations are operational, whether they overlap in their thematic coverage and how firms navigate this challenge.
- Examining whether organizational standards are viewed as supporting international trade, using the lens of the law and politics of the Agreement on Technical Barriers to Trade ('TBT Agreement') at the World Trade Organization.

Focusing primarily on the EU/UK, a region rapidly developing new net zero requirements, it first undertakes an interdisciplinary literature review, synthesizing management studies, economic, legal, academic and grey literature. It next undertakes qualitative case studies of two organizational standards: ISO Greenhouse Gas Accounting Standards and B Corp certification. The former provides an example of how organizational standards interact with technical regulation in measuring and reporting on emissions. The latter is a non-profit-led certification which has been widely adopted and used to certify compliance with net zero principles at the firm level. Both offer different modes of governance and are used in different ways. Finally, it provides recommendations on how to integrate organizational standards and technical regulation more effectively to support the net zero transition, including the potential contribution of emerging standards such as ISO's forthcoming net zero standard.

2. Literature Review

A. Definitions

There is no single accepted definition of organizational standards. As set out in more detail below, our definition draws from an academic literature review, and identifies key features including emphasis on firm behaviour, orientation toward principles, voluntary nature, diverse and asymmetric sources, and interconnection. Of these, the most unique and prevalent features are their focus on organizational behaviour and principles, rather than specific product or even process-based requirements.

The difficulties with defining organizational standards are not unusual; many stakeholders in differ in the terms used to describe and define standards. These terminological differences can be confusing. They can also have important legal and practical implications for how particular standards are discussed. As stakeholders discussing standards are sometimes separated by their language, it is useful to set out some key differences and debates regarding definitions. This will provide a basis for the rest of the report, with the broader aim of addressing the divide between different stakeholders discussing standards, trade and the net zero transition.

i. Organizational standards vs Non-Product Related-Process and Production Methods (NPR-PPM)

The term organizational standards is utilized in academic literature and by some standards-setting bodies, but is not evident in the World Trade Organization. The most analogous term, dated to negotiations of the WTO-precursor General Agreement on Tariffs and Trade (GATT) in the 1970s (Vranes, 2009), is process and production methods (PPMs), which is used to describe a type of product regulation. PPMs are often split into the categories of product-related and non-product-related ('NPR'). The former, while physically invisible, have to do with a product's quality or functionality, while the latter have to do with the ways in which it was produced, and are invisible in the final product. Consequently, these measures cannot usually be enforced through physical inspection of products.

NPR-PPMs differ from organizational standards in two important ways. First, debate about NPR-PPMs in the WTO has focused on regulation rather than standards. Second, products remain the reference point for debate or, in some cases, dispute in the WTO – in contrast to organizational practices. These distinctions go beyond the merely technical, as they shape the way that regulation is discussed. Sections 2(F)ii and 5(F) reflect further on the policy implications of these distinctions.

ii. Voluntary versus mandatory

While for some stakeholders, voluntary standards and mandatory technical regulation are understood to be very different, these categories are conflated, or used with less precision, by others.

Within academic disciplines, terminology varies. Management studies on standards, and standard-setting organizations themselves, tend to identify 'voluntary' as a key characteristic of standards. In contrast, economics literature often conflates both mandatory regulation and voluntary standards, describing both as 'standards'. In an economics literature review on standards and international trade, for example, Shepherd explains: "Whereas the distinction between a 'standard' and a 'technical regulation' is important in the standards space, as well as for international trade

lawyers, economists often group the two types of measure together under the single heading of 'standards'. The reason is that from an economic point of view, the question of primary interest is whether the measure in question alters costs for producers…." (Shepherd, 2020, p. 3). Illustrating the importance of this distinction, under the TBT Agreement, different obligations pertain.

In civil society and Government, the term 'standards' is sometimes used with less precision, to refer to mandatory regulation rather than voluntary standards. For example, during the UK's Brexit process, MPs and civil society debated whether the UK's new Free Trade Agreements would threaten the UK's high standards (see, e.g., Sustain). In its scoping exercise for its FTA negotiation with the US, the UK Government verified that 'Any [FTA] will … not compromise on our high environmental protection, animal welfare and food standards' (HM Government, 2020, p. 5). The desire to ensure that standards were upheld led the UK to create review processes to evaluate whether Free Trade Agreements uphold UK statutory protections; in other words, regulation rather than voluntary standards (Agriculture Act, 2020, Section 42).

In sum, while economic analysis tends to identify standards and regulation in terms of their market impact, and reflect the fact that both are influential, they are treated differently in the context of the WTO, and public scrutiny of 'standards' sometimes focuses on Government regulation. In this Report, maintaining a distinction between standards (voluntary) and regulation (mandatory) is important to the analysis.

iii. Standard vs Certification

Definitions of standards vary even between standard-setting bodies and private entities. Identifying a risk of greenwashing, an RSE report states:

> The word 'standard' is used very widely, and this can be confusing. In some industries, proprietary certification schemes (where one organisation develops a private standard and offers to certify organisations against it) are described as standards. This type of standard will have a very different governance to the standards of the [Quality Infrastructure] QI, which are based on stakeholder representation, combined in national delegations in the case of international standards (ISO1, IEC2). (RSE, 2024, p.8).

QI is the system of standards, conformity assessment, accreditation and measurement that ensures that supports and enhances the quality, safety and environmental soundness of goods, services and processes.

B Corp provides an example of such terminological differences. According to the website, 'Certified B Corporations, or B Corps, are companies verified by B Lab to meet high standards of social and environmental performance, transparency and

accountability.' (B Corp, 2024) B Labs also produces a set of requirements for certification which it describes as standards.

ISO/IEC define a standard as 'a document, established by consensus and approved by a recognized body, that provides, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context.' Based on this definition, some might argue that requirements for B Corp certification do not constitute standards at all.

B. The emergence of 'organizational standards'

A broad characterization of the historical context of standard-setting itself reveals that it has progressed from an emphasis on physical characterization of products to developing a greater focus on organizational practices reflected on the quality of products and services. Brunsson et al. highlight the importance of the founding of the British Standards Institution and the American National Standards Institute in the early 20th century '…to create sets of rules for the design of industrial products so that firms could produce goods that were comparable in their key aspects.' (Brunsson et al., 2012, p. 614). They date scholarly interest in how standards affect organizations to the 1980s and 90s (Brunsson et al., 2012).

A UNIDO (2024) report characterizes the trend away from a focus on products and toward a focus on organizations in terms of the widening of the scope and metrics for evaluating quality, noting '…a shift in recent years by more progressive organizations from a traditional ("narrow") approach to quality (focused almost exclusively on the quality of the products and services they provide) to a more holistic "broad" quality philosophy that extends along the value chain and addresses the many different dimensions of quality that are important for today's consumers and society.' (UNIDO, 2024, p. 26) This "broad quality" approach includes organizational efficiency, environmental considerations, social issues and governance. This shift also implies an increased interest not only in the governance of organizations, but also Quality Infrastructure– in other words, the system that helps verify and validate the integrity of the measurements and metrics by which organizations provide their data and demonstrate compliance to requirements.

C. Core characteristics of organizational standards

While there is no single definition, academic literature suggests the existence of cross-cutting features: organizational standards focus on firm behaviour, and are principle-oriented, voluntary, diverse, interconnected and asymmetrically distributed. We set out these features below.

i. Focused on firm behaviour

Despite the variety of organizational standards, a unifying feature is their focus on shaping the day-to-day operations of an organisation. This influence manifests in the organisation's decision-making processes, business model, corporate culture, employee habits, and many other aspects. Organizational standards can penetrate layers of managerial decision-making, thereby influencing the personal habits of employees (Fritz, 1999). Ideally, these personal habits, shaped by specific organizational standards, will cultivate a corporate culture, making the standards an intrinsic part of the organization's norms. However, in practice, such far-reaching effects do not always materialise; Section E identifies some causal factors that shape the effectiveness of environmental organizational standards.

ii. Principle-oriented

Academic literature on standards has traditionally drawn a distinction between process and product standards (see, e.g., Werner and Katz, 1976, Brunsson et al. 2012; Banta, 1992). While organizational standards as a whole focus on processes, they often incorporate, or support, outcome-based benchmarks, targets or objectives.

In the context of the ISO 14001 on Environmental Management Systems (EMS), Wirth (2013) explains that 'although EMS is a process-oriented approach…an ISO-conforming EMS ought to assist a firm in meeting performance-based standards such as emissions limitations promulgated under the major environmental regulatory statutes.'

A focus on principles cuts across organizational standards that are both broadly and narrowly focused. As an example of the latter, the assurance of ISO's Greenhouse Gas Accounting standards by a Conformity Assessment Body results in a verified assessment of firm-level emissions. However, the standard itself, rather than establishing an energy-use limit for a specific product (a technical product standard) it focuses on principles and operational procedures necessary for measuring an organisation's GHG emissions (see Section 3). Other organizational standards include a much broader set of objectives for firms. In the climate space, such standards might require, for example, that firms set a decarbonization strategy that conforms with the net zero transition, as aligned to a globally agreed goal such as the Paris Agreement.

iii. Voluntary

As discussed above, their voluntary nature is an essential feature of organizational standards, as well as standards more generally (see, e.g., Tarí et al., 2012; Bowler et al., 2017). Although these standards can set high practice benchmarks, they cannot

compel action (Hale, 2021). Consequently, organisations typically have the freedom to decide whether to implement them.

In some instances, national laws rely upon specific organizational standards as part of legally enforceable regulations (Lin, 2021). Consequently, the use of these standards may no longer be considered voluntary. With respect to organizational standards supporting the net zero transition, this is a nascent trend which we explore further in the rest of the Report.

iv. Diverse

Organizational standards are characterised by a diversity of sources and content. There are numerous private standards that meet the criteria identified here. NGOs and civil society organisations are responsible for well-known organizational standards such as Fairtrade International and the Forest Stewardship Council.

There are also international standards. For example, ISO has developed a series of well-known international standards such as the ISO 9000 family (quality management), ISO 14000 family (environmental management systems), and ISO 26000 family (social responsibility). These are among the most recognised organizational standards, with extensive research on their social, economic, and environmental benefits since 2000 (e.g. Salim et al., 2018; Hillary, 2000; Christopher, 1998).

v. Asymmetric

Organizational standards reflect their adopters' geographical distribution. Guler et al. reveal that organizational standards are more likely to flourish in regions where policies and regulations support them; a major mechanism for such support is the embedding of organizational standards into regulatory conformity assessment requirements (Guler et al., 2002). Additionally, local firms can play a significant role in their development. For instance, an organizational standard originating in Europe will likely reflect the value preferences of European firms. The founders have to maintain this preference throughout the standard's development to preserve local business support. This preference naturally leads to more significant support for the organizational standard in its place of origin.

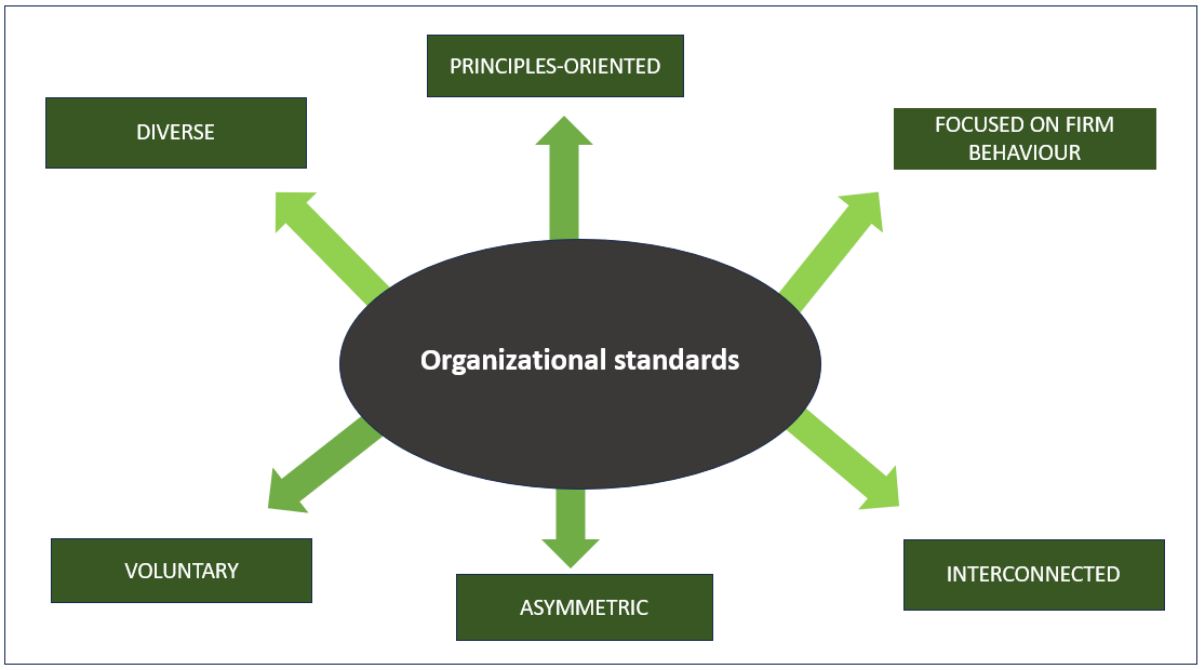
vi. Interconnected

The existence of multiple organizational standards, from various sources, can be competitive or mutually beneficial. Competitive relationships arise when the implementation of certain organizational standards discourages firms from adopting others. Factors underlying dominance of a particular standard include regional preference (described above as 'asymmetry') and market power or recognition.

Competing standards serve similar functions and can act as substitutes for each other. For example, Forest Stewardship Council (FSC) certification competes with the Programme for the Endorsement of Forest Certification (PEFC), the Sustainable Farming Incentive (SFI), and to an extent with ISO 14001 on Environmental Management Systems (Lang and Messenger, 2024, 105-6; Schepers, 2010; Bowler et al., 2017).

Organizational standards can also be mutually reinforcing. For example, the relationship between the adoption of Greenhouse Gas Protocol (GGP) emissions accounting standards and B Corp certification is a benign facilitation: adopting GGP standards can assist in obtaining B Corp certification. Another example is that FSC-certified firms often build their FSC-compliant management systems based on what they have learned from ISO certification (Bowler et al., 2017).

Fig. 2. Key characteristics of organizational standards



D. Motivations to adopt organizational standards

i. Regulatory compliance

Compliance with national regulations is a primary motivation for many companies to embrace organizational standards (Hickmann, 2017; Hoffman, 2005; Hoffman, 2011; Pinkse and Kolk, 2009). Organizational standards play a complementary role to national regulation when enforcement of regulations depends on them. As organizational standards are operationally-focused (on firm's behaviour), they play a role in the certification of quality in organizational systems, which can be tied to

regulatory requirements (UNIDO, 2024). One example takes place in the context of the EU Emissions Trading System (EU ETS). European Accreditation worked with DG CLIMA to implement accreditation according to ISO 14065, which sets out general principles and requirements for bodies validating and verifying environmental information (ISO 14065; UNIDO, 2024, p. 37). This accreditation allows for verification of emissions for the purpose of the EU ETS. In this way, international organizational standards assist national governments in providing trustworthy accreditation that supports robust environmental verification of regulation.

Another prominent example is the ISO 9000 family of standards. First published in 1987, these focus on the quality of processes within organizations, and thus can be seen as an early example of an organizational standard. Compliant companies receive a certificate when they have fulfilled specific requirements on quality management. ISO 9000 is a family of organizational standards that have become integral to quality assurance processes in the European Union. Guler et al. argue that not only countries, but also multinational corporations influence the embedding of organizational standards into regulation (Guler et al., 2002).

They argue that multinational corporations play a similar role to that of countries. Parent companies used their influence over subsidiaries to spread ISO 9000 globally, encouraging manufacturers and retailers in their supply chains to implement the standard (Guler et al., 2002). These examples demonstrate how national regulations and multinational corporations, working together, drive the global adoption of organizational standards.

ii. Gap-filling

Organizational standards can play a complementary role by addressing areas not covered by national regulations (Hickmann, 2017). While they don't form a formal part of regulatory compliance processes, regulators sometimes acknowledge these standards explicitly or implicitly as guidance for enterprises.

The development of organizational standards reflects the support of enterprises and civil society organisations for corporate social responsibility (CSR), including environmental and labour protection (Lash and Wellington, 2007; Jones and Phillips, 2016; Lee et al., 2015). Further, where there are existing gaps, compliance with organizational standards may take place in anticipation of future regulation (Hale, 2021) enabling large multinational companies to gain a competitive edge in the market.

For example, the World Business Council for Sustainable Development (WBCSD) and the World Resources Institute (WRI) are NGOs who jointly launched the Greenhouse Gas Protocol (GGP) in 1998. Green depicts the GGP as a success story

of 'NGOs in creating standards for greenhouse gas (GHG) emissions at the level of the entire company', arguing that 'private authority' rather than state delegation occurred due to weak international governance provided by the United Nations Framework Convention on Climate Change (UNFCCC) (Green, 2010, p. 2). Hickman (2017, p. 94) agrees that the GGP filled a regulatory gap by 'providing the means for the corporate sector to comprehensively account and report their GHGs.' Green argues that a major incentive for reporting GHG emissions is the reputational benefits to firms who can position themselves as environmental leaders (Green, 2010).

iii. International obligations

While Green points to the weakness of the UNFCCC, Hickman also argues that it has helped to further the uptake of the GGP, by providing an institutional forum to assist in dissemination, and anticipation of increased regulation (Hickman, 2017). In the first case, WBCSD and WRI used UNFCCC negotiations as a platform for a wide range of activities promoting uptake of the GGP, such as workshops, panels and technical trainings. This illustrates the potential for international negotiations to provide a platform to support the dissemination of a private organizational standard. In the second case, he argues that interest in the uptake of the GGP was furthered by companies' anticipation of the introduction of international carbon markets pursuant to climate negotiations. He concludes that, for companies to take seriously the need to report their GHGs, they must receive a clear stimulus for action, in the form of strong international and national regulatory frameworks and requirements (Hickman, 2017).

As Lang and Messenger document, there are examples of Free Trade Agreements incorporating references to technical or sanitary and phytosanitary standards (Lang and Messenger, 2024, p. 30); however, references to organizational standards are rarer. One is the EFTA-Indonesia FTA, which imposes land-use requirements for palm oil that can be met through compliance with the voluntary standard set by the Roundtable on Sustainable Palm Oil (EFTA-Indonesia FTA, 2021, Article 8.10). In this example, compliance is linked to trade incentives: the waiving of tariffs on palm oil.

iv. Non-complementary relationships between organizational standards and national regulation

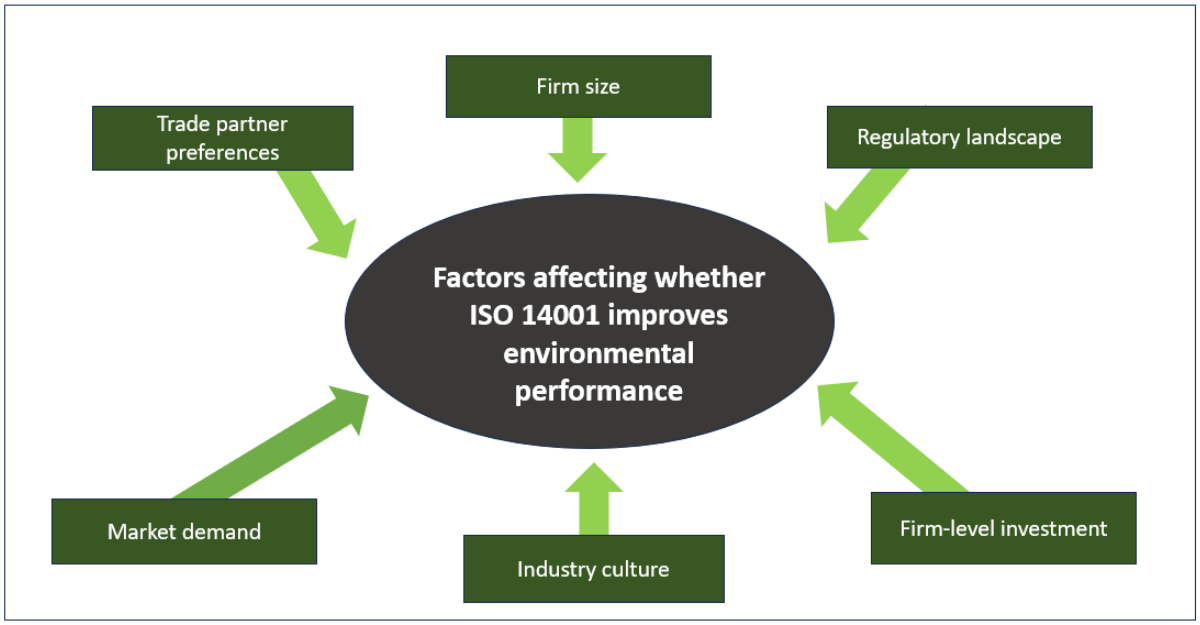
The heterogeneity of standards means there is a wide range of levels of rigour, oversight and accountability. Private standards may be formulated in a way that is contestable, or lacks stakeholder participation, and thus risk being perceived as illegitimate. Reliance on standards also risks a weakened ability to drive change, if the standards themselves are weak or their enforcement is not robust. (Hale, 2021).

E. The effectiveness of organizational standards in changing firm behaviour to benefit the environment

As there is not as much scholarship on organizational standards focused on the net zero transition, it is useful to review lessons learned from more established standards. A body of academic literature documents the impact of ISO 14001, which focuses on environmental management systems, and its ability to influence environmental performance of firms. Their conclusions vary significantly (Nemati et al., 2019). Some researchers argued that these standards help firms improve their environmental performance (Franchetti, 2011; Comoglio and Botta, 2012; Dahlström et al., 2003; Testa et al., 2014; Nguyen & Hens, 2015). Others contended that they fail to make sufficient contributions (Ziegler & Rennings, 2004; Barla, 2007). These widely varying results demonstrate the complexity of factors influencing the environmental performance of firms.

Here we briefly review this literature and identify some causal factors that enable organizational standards to drive change. In sum, the success of ISO 14001 in encouraging better environmental practices is shaped by factors including the regulatory environment, firm-level investment, firm size, market demand, trade partner preferences and company culture. We summarize these factors in Figure 3.

Fig. 3. Factors affecting whether ISO 14001 improves environmental performance



Source: Authors

i. ISO 14001 driving improved environmental performance

A number of qualitative, sector-based studies suggest positive contributions of ISO 14001 to environmental performance. Comoglio and Botta (2012) conducted a questionnaire-based survey on a sample of 45 ISO 14001-certified companies in the

automotive sector in the Turin area to examine the impact of this standard on corporate environmental management. Their findings indicate that ISO 14001 enhances the monitoring of several critical environmental aspects by companies, including emissions to air, waste management, resource use, and noise. They reported that ISO 14001 increases the number of companies committed to environmental management and broadens the extent of their commitment (Comoglio and Botta, 2012). They quantified the environmental improvements achieved by adopting the standard over three years, revealing a clear and direct relationship between enhanced monitoring and improved environmental performance (Comoglio and Botta, 2012). Despite the limited sample size, their case studies provide evidence of the positive contribution of ISO 14001 certification to corporate environmental performance.

Nguyen and Hens conducted an empirical analysis to examine the impact of ISO 14001 on the environmental performance of the cement industry in Vietnam. They found that ISO compliance in Vietnam leads to an improved legal compliance profile, enhanced communication and dialogue regarding environmental issues, and increased employee awareness (Nguyen & Hens, 2015). Additionally, their research compared the environmental performance of certified and non-certified plants, revealing that ISO 14001 certification contributes to improved environmental performance in cement plants, particularly for dust, SO_2, and NO_2 indicators (Nguyen & Hens, 2015). Other scholars expressed disagreement regarding the contribution of organizational standards such as ISO 14001 and EMAS to improving corporations' environmental performance.

Dahlström et al. conducted comparative research in England and Wales to examine the environmental impact of ISO 14001 and a related standard, the Eco-Management and Audit Scheme (EMAS). They found that sites with externally (third-party) verified Environmental Management System, either through ISO or EMAS, tended to exhibit higher levels of operator performance. Additionally, sites registered to both EMAS and certified to ISO 14001 showed higher performance levels than those certified only to ISO 14001. However, they found no conclusive evidence to suggest that EMAS is more effective than ISO 14001, or vice versa, in inducing continuous improvement (Dahlström et al., 2003).

ii. ISO 14001 as ineffective

Barla examined whether adopting ISO 14001 improved environmental performance in Quebec's pulp and paper industry by measuring the change in the total quantity of water rejected from 37 plants between 1977-2003. Reject water is water that does not meet applicable reclaimed water standards after treatment, which is diverted by the reclamation or satellite reclamation system. Barla found no significant change in the quantity of rejected process water, implying that environmental performance had not improved. Additionally, he discovered that non-

adopting plants experienced more significant emission reductions than those that eventually adopted ISO 14001 (Barla, 2007).

Other researchers also found no relationship between organizational standards and environmental performance (King et al., 2005; Darnall and Sides, 2008; Gomez and Rodriguez, 2011; Zobel, 2015). For instance, King et al. found no evidence that the certification process itself leads to improvement or that certification signals superior performance (King et al., 2005).

iii. Causal factors influencing ISO 14001's effectiveness

A causal analysis of why ISO 14001 compliance proves more effective in some firms and sectors reveals several themes. First, national laws incorporating relevant regulations can significantly boost the adoption of organizational standards. Nemati et al. found that US companies may adopt ISO 14001 on pollution to mitigate public pressure and reduce inspections from the US Environmental Protection Agency (Nemati et al., 2019).

Support from industry culture and consumer preferences can significantly enhance the acceptance of organizational standards within a country. Corbett discovered that firms might seek certification due to coercive pressure from customers and supply chain partners (Corbett, 2006). Christmann and Taylor (2006) demonstrate that Chinese firms adopt selective compliance with ISO standards depending on customer preferences and the degree of customer monitoring.

Testa et al. compared the impacts of ISO 14001and EMAS on the improvement of CO2 emissions (Testa et al., 2014). They found that both ISO 14001 and EMAS help implement environmental management systems, significantly influencing corporations' environmental performance in energy-intensive industries (Testa et al., 2014). While the adoption of ISO 14001 improves environmental performance more in the short term than in the long term, the impact of EMAS on firms' environmental performance is more pronounced over the long run (Testa et al., 2014).

According to Testa et al. (2014) this difference arises from the differing motivations for implementing an environmental management system under each certification framework. The shorter-term benefit of ISO 14001 demonstrates that changes occur the initial implementation phase. The authors speculate that this likely reflects the fact that firms apply for the certification when they have already committed to investing in the attainment of green objectives. In contrast, the adoption of EMAS typically results from regulatory compliance pressures, requiring firms to integrate specific regulations to meet verification requirements over the longer term. Despite these differences, the two standards are mutually supportive (Testa et al., 2014).

Testa et al. also note that large firms with a higher number of employees derive greater benefits from the implementation of an environmental management system.

Explaining this effect, they state that '…if a company is large, not only does it need to face larger environmental problems, but also the opportunity to capture the larger gains in efficiency that are associated with a rigorous distribution of goals, resources, roles and responsibilities (Testa et al., 2014, 171). Nemati et al. (2019) supported the findings of Testa et al., particularly regarding the impact of ISO 14001 on large facilities. They argued that ISO 14001 does not uniformly affect the environmental performance of all manufacturing sites across different industry subsectors. Their study suggests that encouraging voluntary adoption of ISO 14001 might be an effective government strategy for reducing on-site pollution in large facilities. However, for small facilities or to address off-site pollution, additional economic incentives or regulations are necessary (Nemati et al., 2019).

Another factor influencing the relationship between environmental performance improvement and ISO 14001 is trade partner preferences. Analysing ISO 14001 adoption levels in 147 countries between 1999-2014, Di Ubaldo et al. (2022) found that increased adoption of the ISO 14001 standard is associated with lower levels of GHG emissions, specifically carbon dioxide and methane. The study revealed that countries with FTAs with the EU that included environmental provisions demonstrated reduced emissions of harmful air pollutants, such as sulphur dioxide (SO_2) and nitrogen oxides (NO_X). The researchers also discovered that the effect of ISO14001 on pollution reduction is more pronounced in such countries. This implies a positive interaction effect between the levels of ISO14001 adoption at the country level and entering into EU trade agreements with environmental protection provisions (Di Ubaldo et al., 2022).

Another study (Reverdi, 2024) showed that the adoption of ISO 14001 and EMAS increases export performance, in terms of both the likelihood of exporting and the value of exports. However, these gains are heterogeneous with respect to destination countries, products and firms. The majority of export gains accrue to destinations with higher environmental awareness. Reverdi assessed a country's environmental awareness through the presence of environmental provisions in their FTAs, using this as a proxy for their preference for more environmentally friendly goods.

Finally, industry culture and sound management shape the effectiveness of ISO 14001. Bowler et al. argued that the acceptance of organizational standards is influenced by a corporation's absorptive capacity (Bowler et al., 2017), which refers to the ability to recognise, assimilate, and apply new values (Cohen & Levinthal, 1990). Their study indicates that the strength of a company's absorptive capacity depends on having a sound management system and an accurate understanding of market demand for certified products (Bowler et al., 2017). Similarly, and related to absorptive capacity, effective training and involvement of employees in the adoption of the standard plays a role (Ivanova and Sinha, 2014).

These lessons are instructive when considering what determines the success of net zero supporting organizational standards: they function as part of an ecosystem of regulation, consumer demand and company culture.

F. Organizational standards and trade promotion

While standardizing processes may have evolved to promote the interchangeability of components, thus facilitating dispersed supply chains, mass production and dissemination, proliferation of organizational standards does not correlate with manufacturing gains so obviously. Despite this, both academic literature and trade policy practitioners have largely viewed organizational standards as trade-promoting. This perception supports the willingness of multinational corporations to adopt and sustain these standards over time.

i. Economics and management literature

There is evidence dating from the 1990s and early 2000s of a correlation between trade, investment and the uptake of organizational standards. Scholars have examined the impact of organizational standards on international trade, broadly categorised into two areas: market access and direct effects. The first focuses on how organizational standards help firms comply with the regulations of importing countries, thereby facilitating market access. The second investigates how the adoption of organizational standards directly enhances a firm's ability to increase exports of goods or services (for instance, foreign buyers may prefer to purchase goods from firms that adhere to specific organizational standards).

On the former point, a literature review by Shepherd (2020) concluded that, while implementing organizational standards requires an initial financial investment, it ultimately helps businesses meet compliance obligations more effectively, thereby enhancing operational efficiency. The adoption of these standards is often driven by changes in government regulations. Further, organizational standards do not increase the costs of firms. Since standards like ISO 14001 are voluntary, companies typically choose to adopt them after carefully weighing pros and cons. In such cases, the investment required for adoption is usually manageable. Another possibility is that they simply don't comply with them (Christmann and Taylor, 2006).

More broadly, Shepherd finds that both firms and governments can adapt to the negative cost impacts of importing-market requirements (encompassing both voluntary standards and mandatory regulation), often thriving in the new environment. Moreover, standards can serve as catalysts for increased productivity and improved quality (Shepherd, 2020).

Additionally, some studies suggest that organizational standards such as ISO 14001 may eventually be supplanted by mandatory local regulations (Di Ubaldo et al., 2022; Prakash and Potoski, 2014). This is reasonable, as firms often adopt organizational standards in anticipation of forthcoming national regulations. Consequently, it is likely that national regulations will emerge in regions where these

standards have already been widely adopted. In such instances, organizational standards can assist firms in complying with national laws, thereby facilitating international trade between these countries.

Further research indicates that adopting organizational standards can enhance firms' efficiency, performance and level of innovation, supporting international trade (Cebr, 2022, Clougherty, 2008; Treacy et al., 2019). Guler et al. (2002) found that, even though adoption is voluntary, multinationals prefer certified suppliers and thus their presence increases the number of ISO 9001-certified firms. Grajek also found that ISO 9000-certified firms tend to trade more with other certified firms than with uncertified ones (Grajek, 2004).

Shepherd examined the impact of regulation in importing countries on bilateral trade and found that the negative impacts on developing country exporters are significantly reduced, or even reversed, if the importing market's standards align with international standards, such as ISO standards (Shepherd, 2020). Shepherd also found evidence that certain industries with specific standards facilitate trade, by reducing information asymmetries between producers and consumers and providing credible quality signals (Shepherd, 2020). This effect occurs independently of increased regulatory cooperation between countries, as both producers and consumers voluntarily recognise the same standards and are willing to bear the associated costs. However, compliance with international standards is more accessible for large firms with more resources to undertake complex compliance procedures, and generally less accessible to SMEs and firms in developing countries (Cebr, 2022, p. 61).

Scholars have advocated the use of private organizational standards to serve as private club rules, uniting like-minded businesses to promote bottom-up reductions in GHG emissions from their operations (Prakash and Potoski, 2006; Bodansky and Van Asselt, 2024). The expense of compliance, regional asymmetry, and lack of transparency associated with private standards have also led to controversy, discussed further in Section 2(F)ii below. While their research does not focus on organizational standards, Wijkström and McDaniels, researchers at the Economic Research and Statistics Division of the WTO, emphasised the importance of international standards in facilitating trade, which is also recognised in the preamble of the TBT Agreement. They noted that these standards enhance production efficiency, facilitate international trade, and encourage the development of additional standards. Furthermore, they concluded that the TBT Agreement utilises international standards to promote the global harmonisation of technical regulations, conformity assessment procedures, and national standards. According to their research, international standards can significantly contribute to greater regulatory alignment worldwide (Wijkström and McDaniels, 2013).

The direct contribution may not always be apparent. In countries where there is no anticipation of forthcoming environmental regulations from national regulators, firms

may not be inclined to increase their imports from companies with standard certifications (e.g., ISO-certified firms). Some studies suggest that this lack of tangible trade benefits can lead to frustration among firms, potentially causing them to abandon the maintenance of organizational standards (Mosgaard and Kristensen, 2020).

ii. The WTO context

As the only international organization dedicated to international trade, with near universal membership among countries, the WTO provides an important forum for evaluating countries' views on the relationship between standards, the net zero transition and trade. WTO Agreements impose obligations for international trade conduct. The WTO also provides discussion fora for countries to raise concerns about other countries' trade measures.

Standards and regulation that support the low-carbon transition have been the subject of significant attention in disputes adjudicating compliance with WTO obligations, as well as through discussion in specialized committees (World Trade Report, 2022, WTO).The WTO TBT Agreement has been a major focus of this attention (WTO, Trade and Climate Change, 2022). There are other WTO Agreements and Committees which facilitate discussion on climate regulation, notably the WTO Committee on Trade and Environment (CTE) and the more recent plurilateral Agreement on Trade and Environmental Sustainability Structured Discussions (TESS-D). Here we focus primarily on the TBT Agreement due to its explicit focus on standards and conformity assessment procedures.

a. Obligations of the TBT Agreement and functions of the TBT Committee

The TBT Agreement seeks to balance the right of WTO Member States to pursue legitimate policy objectives with preventing protectionism. Technical regulation, voluntary standards and conformity assessment procedures are all subject to non-discrimination requirements.

With respect to technical regulation, WTO Members must treat 'like' products equally, regardless of their origin. Countries may introduce technical regulation necessary to pursue legitimate regulatory objectives. The TBT Agreement's Article 2.2 contains an open-ended list which includes some environmental objectives. With respect to voluntary standards and conformity assessment, the TBT Agreement refers to a Code of Good Practice (CGP) for the Preparation, Adoption and Application of Standards (CGP) (Annex 3, TBT Agreement) Article 4.1 requires that WTO members ensure that central government standardizing bodies accept and comply with the CGP, 'take reasonable measures' to ensure that non-governmental standardizing bodies comply and do not require or encourage such bodies to act inconsistently with the CGP. These obligations reply irrespective of the standardizing bodies' acceptance of the CGP.

The TBT Agreement encourages Members to base their regulations on international standards. Article 2.4 states:

> Where technical regulations are required and relevant international standards exist or
> their completion is imminent, Members *shall use them*, or the relevant parts of them,
> as a basis for their technical regulations except when such international standards or
> relevant parts would be an ineffective or inappropriate means for the fulfilment of the
> legitimate objectives pursued, for instance because of fundamental climatic geographical factors or fundamental technological problem [emphasis added].

Article 2.5 further clarifies that regulation prepared in accordance with a relevant international standard that supports legitimate objectives listed in the TBT Agreement 'shall be rebuttably presumed not to create an unnecessary obstacle to international trade.' (WTO TBT Agreement, 1995)

The TBT Committee undertakes two main types of work: peer review of trade measures and developing guidance on the interpretation and implementation of the TBT Agreement (Wijkstrom, 2015) Bohnenberger categorizes this as 'specific work' discussing particular technical barriers to trade and 'normative work', discussing the interpretation of TBT Agreement obligations. Due in part to the lack of transparency regarding the content of discussions in the TBT Committee, he argues that understanding of this work remains limited, with significant gaps (Bohnenberg, 2021).

As part of its 'specific work', the TBT Agreement includes a requirement that Members notify draft measures that are likely to be trade restrictive and that are not in accordance with the existing relevant international standards. Members can raise concerns about others' regulations and other actions that affect trade, including by raising specific trade concerns (STCs) arising from technical regulations introduced by states. Persistent trade concerns, and those that cannot be resolved at the Committee or diplomatic level, are more likely to escalate to disputes. STCs thus provide a useful proxy for understanding how WTO Members discuss standards in practice.

b. International standards as trade facilitators

According to Wijkström and McDaniels (2013), one-third of all STCs raised in the TBT Committee are associated with international standards. This means that during discussions of a particular trade concern, a delegation has mentioned international standards, either by referring to a specific body or organisation or through general

references to the existence or non-existence of some source of international guidance.

They found that, while forty different bodies or organisations are mentioned, several recur frequently in discussions. The International Organisation for Standardisation (ISO) appears in 30% of STCs related to international standards, the FAO/WHO Codex Alimentarius Commission in 19%, the International Electrotechnical Commission (IEC) in 12%, the International Laboratory Accreditation Cooperation (ILAC) in 10%, and the United Nations Economic Commission for Europe (UNECE) in 10%. The significance of international standards varies from one STC to another: in some cases, it is central to the issue, while in others, it is only a minor aspect.

Their research reveals that most times that international standards are raised, it is because WTO Members are concerned that other Members are not relying on such standards when they should be. There are two main types of deficiencies. The first occurs when there is no internationally recognised definition for a specific concept. The second involves situations where guidance on a particular standard is developing in a specific region but has not yet gained widespread international acceptance.

c. International vs private standards

This positive view of international standards as trade-promoting is tempered by controversy among WTO Members regarding their definition. The WTO TBT Agreement does not provide a definition of international standards. Also, unlike the Agreement on Sanitary and Phytosanitary Measures, which also contains provisions encouraging the use of international standards, it does not provide an indicative list of international standardizing bodies. This lack of clarity is significant: in the words of Mavroidis and Wolfe (2017, p. 12), international standards are effectively 'immunized from challenge in the dispute settlement system' pursuant to TBT Agreement Articles 2.4 and 2.5 (see Section a).

A report from RSE identifies 'the main difference' between different types of standards as 'the process by which the consensus was reached' (RSE, 2024). Mavroidis and Wolfe (2017, p. 3) explain that international standards are 'effectively multilateral in the sense that they have accepted the WTO principles for standards bodies…'.

These principles are set out in the Code of Good Practice (CGP), introduced in Section a but elaborated here. The CGP stipulates that standards should be non-discriminatory, avoid unnecessary trade barriers, constitute the basis of national standards (unless inappropriate), avoid duplication, be performance-based rather than descriptive (unless inappropriate), be published/notified and be open to comments from other WTO Members. Six principles for the development of international standards, agreed by WTO Members in 2000, further elaborate on the

CGP (WTO, 2000). These principles stipulate that the development of standards should be transparent, open to all relevant bodies in the WTO, impartial and consensus-driven, and that standards should be effective and relevant, coherent (avoiding overlap) and avoid excluding developing countries.

The TBT Agreement requires that central government standardizing bodies adopt the CGP and that Members to take "such reasonable measures as may be available to them" to ensure that local governmental, non-governmental and regional standardizing bodies (of which they are a member) accept and comply. Despite this, Mavroidis and Wolfe (2017, p. 9) argue that a broad definition of non-governmental body in the TBT Agreement means there is effectively no accountability, in the form of obligation to comply with the CGP, for private standards.

WTO committees and jurisprudence reveal debate regarding the definition of international vs private standards. In the WTO Committee on Sanitary and Phytosanitary Standards, an ad hoc working group on private standards was unable to agree on a definition, with sharp dividing lines between developing and developed countries: the former wished to ensure that the definition of private standards required them to be subject to SPS Committee core disciplines (WTO, 2014). Stemming initially from concerns about the introduction of the EurepGAP (now GlobalGAP) food safety standards, WTO Members raised concerns about the potential of private standards to complicate trade and impede exports from developing countries (Du, 2018).

While the definitional issue hasn't been as explicit a focus in the WTO TBT Agreement, concerns about the proliferation of voluntary sustainability standards are an ongoing discussion item at the WTO, including the TBT Committee. For example, the WTO Committee on Trade and Environment includes labelling on its work programme, and ecolabelling is regularly discussed in the TBT Committee in the context of Specific Trade Concerns raised. In this context, similar issues have been raised by developing country members regarding the legitimacy of private standards and their potential to impede international trade (WTO, 2024b; UNCTAD, 2022).

TBT Agreement disputes have required the Appellate Body to provide interpretative guidance on Article 2.4. When determining whether the Agreement on the International Dolphin Conservation Program (AIDCP) was an international standard that the US should have relied on in imposing dolphin safety requirements for tuna, the Appellate Body, with reference to ISO/IEC definitions, clarified that:

> [A] required element of the definition of an 'international' standard for the purposes of
>
> the TBT Agreement is the approval of the standard by an 'international standardizing

> body', that is, a body that has recognized activities in standardization and whose
>
> membership is open to the relevant bodies of at least all Members (US-Tuna II, 2012, para. 359).

The Appellate Body concluded that the WTO Panel had erred in classifying AIDCP as an international standard, because the invitation to accede was not issued automatically to a WTO Member interested in joining but required instead a decision by consensus of the parties to the AIDCP (US-Tuna II, 2012, Appellate Body Report, paras. 351-375) While few private standards appear likely to meet these criteria, the interpretation retains some ambiguity: theoretically, they could.

d. Are organizational standards TBT Agreement standards?

An unresolved question concerns the relationship between the TBT Agreement and organizational standards. The TBT Agreement's focus on standards and conformity assessment makes the TBT Committee a particularly relevant forum for discussion of organizational standards supporting the net zero transition. If organizational standards are not considered relevant to the TBT Agreement, this also implies limitations to the jurisdiction of the WTO more broadly. Likely due to differences in terminology among different stakeholders, we were unable to locate any legal analysis of whether organizational standards fall under the remit of the WTO TBT Committee. However, there is a great deal of WTO jurisprudence and academic analysis on whether non-product-related Process and Production Methods (NPR-PPMs) constitute technical regulation. NPR-PPMs focus on how products are produced and are invisible in the final product. This gives them some overlap with organizational standards, though the former focuses on regulation of processes rather than standards on firm behaviour. But the definition of standards and technical regulation is also very similar in the TBT Agreement. As set out in Annex 1.1, both address product characteristics or *related processes and production methods*, and both may '…also include or deal exclusively with terminology, symbols, packaging, marking or labelling requirements as they apply to a product, process or production method.' A technical regulation differs in being defined as being mandatory.

This suggests that an analysis of literature and WTO case law regarding whether NPR-PPMs constitute technical regulation can help illuminate the interpretative issues at stake when determining whether organizational standards constitute standards under the TBT Agreement.

In practice, the determination of whether a particular NPR-PPM constitutes a technical regulation takes place on a case-by-case basis. This is evident in three disputes that fell between 2012-2024. All focus on regulation that conditions, or prohibits, particular production processes to support animal welfare and environmental objectives; in other words, NPR-PPMs.

US- Tuna II (2012) focused on US requirements to obtain a dolphin-safe tuna label. It banned the use of so-called purse sein nets in the Eastern Tropical Pacific to protect dolphin safety. The Appellate Body considered that these requirements *did* constitute a technical regulation, as a 'labelling requirement'.

In *EC-Seal Products* (2014), the regulation in dispute was an exemption to a ban on seal products for traditional hunts undertaken by Arctic indigenous people (on the basis that Arctic indigenous people in Canada did not benefit). Here, the Appellate Body determined that this was *not* a technical regulation because the regulation:

> '…. establishes the conditions for placing seal products on the EU market based on criteria relating to the identity of the hunter or the type or purpose of the hunt from which the product is derived….' (*EC-Seal Products* (2014) Appellate Body Report, para. 5.58.)

Most recently, the *EU-Palm Oil* dispute concerned an EU cap and phase-out of biofuels that were at high risk of contributing to Indirect Land Use Change (ILUC) by leading to the expansion of agricultural land onto previously unfarmed territories. The WTO Panel decided that this *was* a technical regulation. It stated '…the Panel considers that the quality of a biofuel being produced (or not) from a specific raw material or input would in principle fall within the broad category of "product characteristics", regardless of whether the raw materials or inputs are identified.' (*EU- Palm Oil* (2024), Panel Report, para 7.103).

In all cases, the WTO dispute settlement bodies tried to find a nexus between a product and the condition/prohibition. The first two cases concerned labelling requirements (technical) versus identity or purpose of seal hunters (non-technical). In the last case, the regulation was technical because particular feedstocks were an identifiable product, even though the requirements that pertained to them were not product characteristics (at least as traditionally understood) but had to do with their indirect contribution to deforestation.

These disputes have no direct bearing over whether organizational standards are included in the TBT definition of standards, as they focus on technical regulation, but similar ambiguity arises. This ambiguity results from applying the logic of products to requirements focused on environmental production. The TBT Agreement was negotiated to reflect a more traditional understanding of technical product standards.

e. Are organizational standards international?

Another way of approaching the question of whether organizational standards constitute technical standards is to establish whether the TBT Agreement's Article 2.4 recommends that Members base their national regulation upon them where relevant. In other words, are they 'international standards'?

While ISO is a non-governmental standardizing body, its national delegation-based membership, openness to all countries and close relationship with member countries via their national standards bodies and governments means that its standards seem likely to meet this threshold (Du, 2018). This suggests that organizational standards from ISO would be considered international.

This is borne out in *EU – Palm Oil* (2024). In challenging the EU biofuel sustainability criteria's compliance with the TBT Agreement, Malaysia advocated the use of ISO standards relating to environmental management: lifecycle assessment (ISO 14040:2016; ISO 14044:2017), assessing carbon footprint of products (ISO 14067:2018), and sustainability criteria for bioenergy (ISO 13065:2015). Malaysia argued that these constituted relevant international standards that the EU should use (EU-Palm Oil, Panel Report, 2024, paras. 7.114-7.117). According to our taxonomy, ISO 14040 and I4067 would constitute organizational standards, in that they prescribe principles and guidelines for firm-level assessment across various sectors: oriented towards behaviour and firms rather than products.

Malaysia also argued that the fact that ISO carbon footprint standards don't include indirect land use change suggests that it can't be measured accurately and shouldn't be included until there is international agreement. (*EU-Palm Oil*, Panel Report, para. 7.170) While the Panel disagreed, this shows that Malaysia viewed ISO organizational standards as international standards that the EU should use as a basis for its national regulation.

Standards developed by NGOs or other non-Governmental bodies, comprise private standards, and are less likely to be deemed to be international and thus considered to be consistent with WTO members' commitments under the TBT Agreement and be adopted within the technical regulations of other WTO members.

f. The relationship between regulation, international and private standards

The analysis above shows dividing lines between technical regulation, international standards, and private standards in the TBT Agreement. To reprise: technical regulation has been the focus of complaint and dispute; international standards seen as trade facilitating (though with controversy about what constitutes an international standard) and private standards viewed with more scepticism. While WTO jurisprudence retains some ambiguity that a private standard open to all WTO members and conforming to the CGP could constitute an international standard, in practice they are subject to TBT Agreement obligations only very obliquely, through the CGP.

In practice, the lines between these categories blur in various ways. For example, voluntary standards can become mandatory when cited in regulation, or as embedded in conformity assessment processes. This leads to legal ambiguity. Do these then constitute technical regulation, and should they be treated as such in the

context of WTO law? Kim argued that current WTO case law has not yet clearly addressed whether standards embedded in national laws should be considered technical regulations (Kim, 2018).

Lang and Messenger (2024, p. 27) point out that transnational private standards are increasingly being integrated into domestic law, raising the question of how they interact with national standard-setting bodies. Another sense in which blurring occurs is procedural. Delimatsis sets out the hybrid private-public nature of the ISO process, which involves national standard-setting bodies working with Government officials (Delimatsis, 2014, p. 4). He also notes ambiguity in the TBT Agreement on what comprises a standard-setting body.

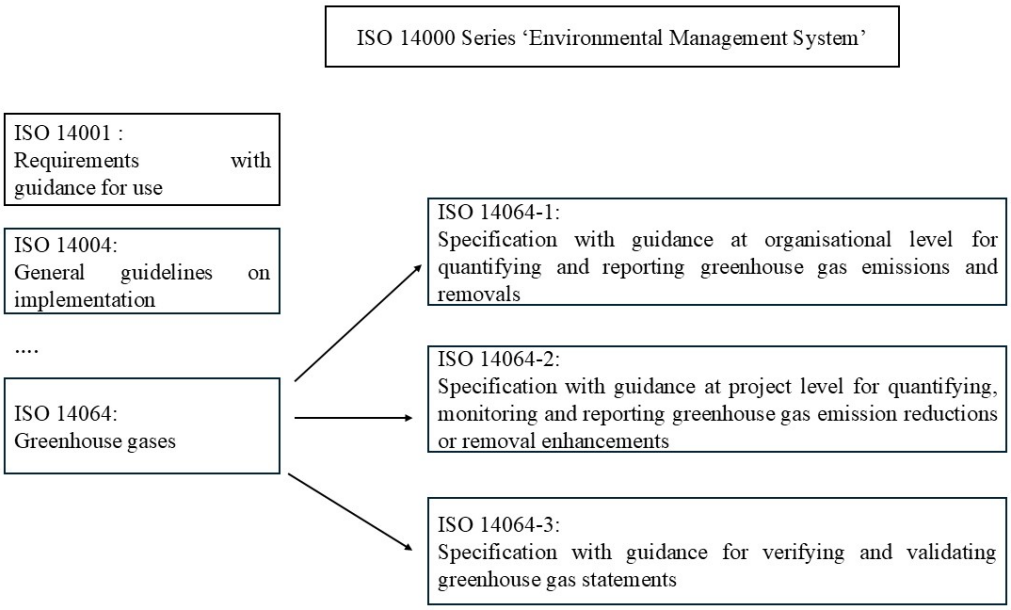
3. Case study 1: ISO 14064-1

A. Introduction

To provide a deeper investigation into net zero organizational standards, we begin with a case study of ISO 14064-1. In order to ensure an effective global net zero transition, it is essential that organizations can measure and report their emissions accurately, and that reporting is accepted internationally as accurate and robust. This requires accepted standards for GHG emissions accounting. ISO 14064-1[1] is a prominent organizational standard facilitating the transition to net zero. It forms a component of the ISO 14000 series on Environmental Management Systems, providing specifications and guidance for quantifying and reporting greenhouse gas emissions at the organizational level. Alongside other standards in the ISO 14000 series, it contributes to the broader environmental management framework provided by ISO.

[1] The full title is: Greenhouse gases – Part 1: Specification with guidance at the organisation level for quantification and reporting of greenhouse gas emissions and removals

Fig. 4. ISO 14000 series



Source: Authors

In drafting ISO 14064-1, ISO collaborated closely with the European Committee for Standardisation. The European Union officially recognised this international standard in Commission Implementing Decision (EU) 2020/1835, dated December 3, 2020. This decision acknowledges ISO 14064-1 as a harmonised standard for accreditation and conformity assessment, formally integrating it into the EU regulatory framework. However, the EU does not limit firms and organizations to the use of ISO 14064-1. For example, European Sustainability Reporting Standards (ESRS), which are embedded in regulation such as the Corporate Sustainability Reporting Directive (CSRD), and based on standards developed by the European Financial Reporting Advisory Group (EFRAG), enables use of either ISO 14064-1 or the Greenhouse Gas Protocol as the methodological basis for reporting emissions (ESRS E1 Climate Change, AR 39).

ISO comprises a network of 172 national standards bodies, representing member countries. They are categorised into three tiers based on their rights and obligations: full members (128), correspondent members (40), and subscriber members (4). Full members play a pivotal role in the ISO framework. They shape the direction of ISO standards development and strategy by appointing representatives from their national committees to participate in the technical development of these international standards and vote in ballots during ISO technical and policy meetings. Additionally, they are responsible for adopting ISO standards into their national portfolio of standards, including selling ISO standards at the national level.

These full members typically include the national standards bodies of key WTO members. Although ISO membership does not obligate these bodies to adopt ISO standards, their involvement in the standards development process makes it more likely that they will do so. ISO 14064 standards also play a role in environmental reporting assurance for voluntary greenhouse gas accounting schemes (Uddin and Holtedahl, 2013).

ISO 14064-1 outlines principles and operational procedures necessary for measuring an organisation's GHG emissions. Organisations must include all GHG emissions and removals associated with their activities to ensure the accuracy and transparency of the data while minimising uncertainties in measurement (Bartoszczuk and Horabik, 2007). The process begins by identifying the measurement boundary and defining the scope of GHG emissions to be included. Next, organisations identify specific GHG sources within this boundary and collect the relevant data. Finally, organisations must quantify their GHG emissions through field measurements or calculations and sum them to determine total emissions. If using calculations, organisations must either select an existing model or design one based on the elements outlined in ISO 14064-1. These elements include: (a) how accurately the model represents emissions and removals; (b) its application limits; (c) its uncertainty and rigor; (d) the reproducibility of results; (e) the model's acceptability; (f) its origin and level of recognition; and (g) its consistency with the intended use.

The most common calculation model involves multiplying an organization's activity data by an emission factor. It is crucial that the final carbon emissions are converted to tonnes of CO_2 equivalent. ISO 14064-1 recommends using the Intergovernmental Panel on Climate Change's (IPCC) Global Warming Potential (GWP) for this conversion, as it compares the potential of different greenhouse gases to trap heat in the atmosphere over specific periods (typically 20, 100, or 500 years). If an organization opts for a method other than the IPCC's GWP, it must provide a valid justification. Additionally, ISO 14064-1 mandates using a 100-year time horizon for these calculations, though organisations may also provide values for other time frames. The annexes of ISO 14064-1 offer further guidance on quantifying GHG emissions related to biogenic sources, imported and exported electricity, and agriculture.

B. Contribution

ISO 14064-1 sits alongside other standards on Greenhouse Gas accounting, including, prominently, the Greenhouse Gas Protocol (GGP) Corporate Accounting

and Reporting Standard and GGP Corporate Value Chain standard. Interviewee B, the head of a Cooperative Climate Initiative, told us that in their experience '…GGP is the most common for [companies to use for] inventory statements….'[2] The GGP has become embedded in climate disclosure mandates at various levels of governance, in particular in relation to capital markets. Examples include the EU's mandatory climate reporting regime through its ESRS, cited above, as well as the International Sustainability Standards Board (ISSB), California State Legislature and United States Securities and Exchange Commission (SEC) (though the latter has withdrawn its Scope 3 emissions reporting requirement) (Greenhouse Gas Protocol).

Interviewee A, an assurance provider for a Conformity Assessment Body, noted that the demand for ISO 14064-1 assurance has increased, stating that:

> *Thinking about 14064-1, we launched and we had very little business, because … unless it was required [organizations] weren't going to do it; not many were. Now that is changing….*
>
> *The EU ETS does not rely on the ISO standards with the exception of accreditation. So it relied on some of the ISO standards for accreditation bodies to accredit ourselves [verifiers]. For the majority of the work, [the EU] had their own rules, and those were the rules that were followed. And the ISO standards, the voluntary world, was quiet for many many many years. …. We are seeing that countries are starting to specify 14064-1… particularly the APEC regions…they are using our accreditation locally to meet local requirements.*[3]

Although their governance systems differ, the methodological approaches of GGP and ISO 14064-1 are comparable. Interviewee A noted three main methodological differences, alongside more subtle ones. First, ISO 14064-1 provides participants in climate management with specifications for more comprehensive GHG emissions measurement by requiring a larger scope of indirect (Scope 3) emissions than the Greenhouse Gas Protocol (GGP) Corporate Accounting and Reporting Standard; second, it requires the use of a location-based factor when quantifying energy from electricity, while the GHG Protocol allows the use of a market-based factor; and finally, the GHG Protocol is freely available while the ISO standard must be purchased.

[2] Conducted 9 July 2024 by Emily Lydgate and Xinyan Zhao.
[3] Conducted 2 July 2024 by Emily Lydgate and Xinyan Zhao.

Fig. 5. Emissions scopes

SCOPE 1: Direct GHG emission from sources owned or directly controlled by the organization
SCOPE 2: Indirect GHG emission from the generation of purchased electricity, heat, cooling or steam consumed by the organization
SCOPE 3: Indirect GHG emission that is a consequence of the organization's activities but arises from sources that are not owned or directly controlled by the organization

Source: Adapted from ISO Net Zero Guidelines

Of the differences, the most significant is the fact that the GHG Protocol Corporate Accounting and Reporting Standard includes only Scope 1 and Scope 2 emissions and does not require the mandatory inclusion of Scope 3 emissions; in other words, indirect emissions unrelated to energy consumption (Sundin and Ranganathan, 2002; Martínez-Blanco et al., 2015; Cano et al., 2023; Kasperzak et al., 2023). Tracking Scope 3 emissions requires a comprehensive record of the GHG emissions generated by their activities. There is a separate GHG Corporate Value Chain standard that does address Scope 3 emissions, rendering this difference less meaningful. However, the fact that this standard is separate may make it less likely that organizations utilize both; they may also disclose that they use the GGP without specifying which one (Becker et al, 2024, p. 23). Both the GHG Protocol and ISO 14064-1 are being updated. This gives rise to the possibility that the methodological differences will either converge or diverge in the future.

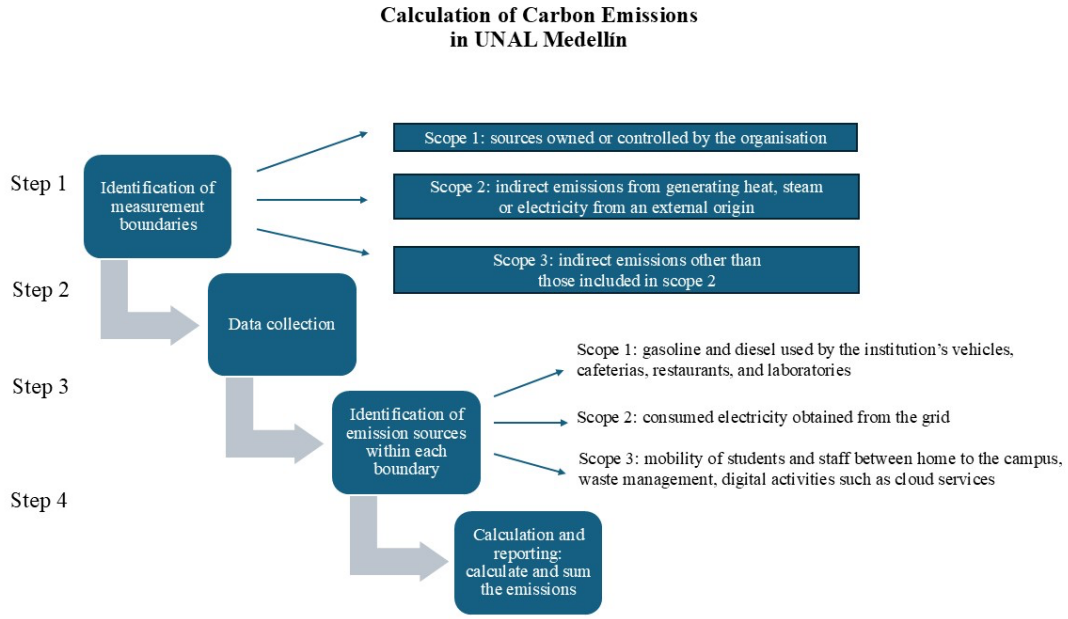
Another difference is that the GHG protocol does not verify who is certifying against their standard, but leaves it up to organizations (GHG Protocol). Although ISO standards do not mandate a particular form of verification, they are embedded in a QI system which encourages best practice for conformity assessment. The QI system is set up to provide robust verification of standards that is rooted in impartiality and competence and avoids conflicts of interest (e.g. an industry-led standard being developed and checked by the same organization.)

ISO 14064-1 enables the implementation of decarbonisation measures, generating momentum for the adoption of more emission reduction policies. Clear and accurate measurement data, as specified by ISO 14064-1, can better demonstrate the effectiveness of emission reduction efforts and climate management policies. This transparency encourages governments and other stakeholders to be more willing to implement further emission reduction initiatives. Additionally, ISO 14064-1 motivates organisations that are not traditionally large carbon emitters to participate in climate governance (Bastianoni et al., 2014).

The application of ISO 14064-1 in academic analyses reveals the importance of the inclusion of Scope 3 emissions. Cano et al. (2023) calculated the carbon emissions

of the main urban campuses of Universidad Nacional de Colombia, Medellín, employing ISO 14064-1: 2006. The process for measuring campus GHG emissions was organised into four phases. (To facilitate cross-comparison, we applied a standardized graphic to this and the subsequent examples of the application of ISO 14064-1.)

Fig. 6. Carbon Emissions in UNAL Medellín

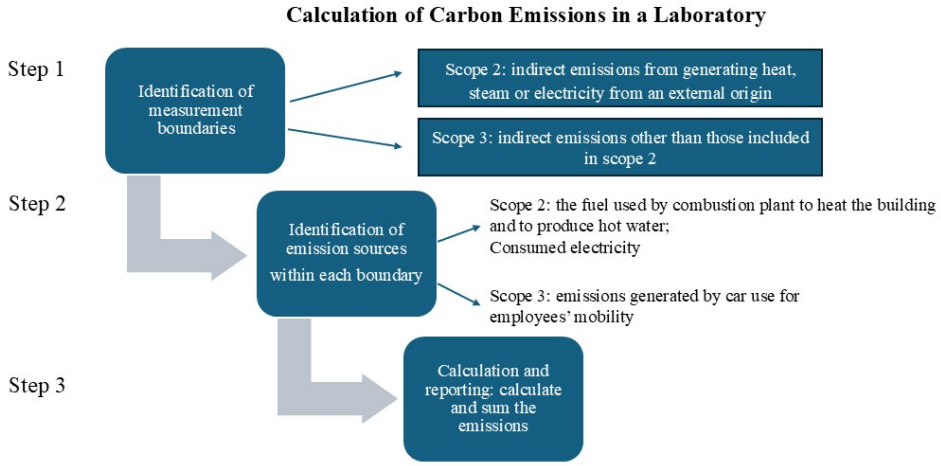


Source: Authors' synthesis of analytical stages in Cano et al. (2023), Creative Commons Attribution 4.0 International License

According to Cano et al., the total carbon emissions for the main urban campus of the National University of Colombia in Medellín amount to 7,250.52 tons CO2 equivalent per year (eq/yr). Of this total, Scope 3 emissions are 6,037.039 tons CO2 eq/yr, representing 83.13% of the overall emissions. Scope 2 emissions total 1,009.333 tons CO2 eq/yr, accounting for 14.03% of the total. Scope 1 emissions are the lowest, at 204.148 tons CO2 eq/yr, which constitutes just 2.84% of the total emissions (Cano et al., 2023).

Ghermec and Ghermec (2013) use ISO 14064-1:2012 to calculate GHG emissions from a University campus laboratory.

Fig. 7. Carbon emissions in a University Laboratory

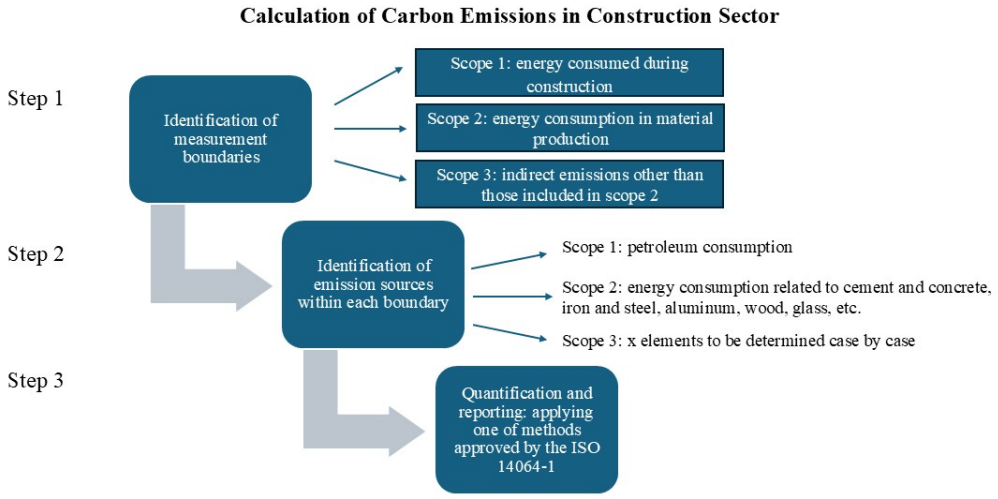


Source: Authors' synthesis of analytical stages in Ghermec and Ghermec, 2013, [Creative Commons Attribution 4.0 International License]

Ghermec and Ghermec employed a quantification methodology based on the correlation between consumption data and specific emission factors, as permitted by ISO 14064-1:2012. Using this approach, they calculated the total GHG emissions for the laboratory to be 21,417.8 kg CO2 equivalent, with Scope 3 emissions accounting for 996 kg CO2 equivalent (approximately 4.6%) (Ghermec and Ghermec, 2013). Although Scope 3 emissions are typically the largest source of carbon emissions for higher education institutions, this laboratory's primary emissions source is Scope 2. This study also illustrates how climate managers can apply ISO 14064-1 to measure carbon emissions from different sources, implying the need for different mitigation strategies in different sectors.

ISO 14064-1 can also be applied to calculate carbon emissions from the construction industry. Given the construction sector's significant contribution to global GHG emissions, measuring emissions from this industry is vital for effective global climate governance (Ahmetoğlu and Tanik, 2020). The methodology for measuring GHG emissions follows the same principles as those used for campus emissions, though the sources of GHG emissions in construction have distinct characteristics.

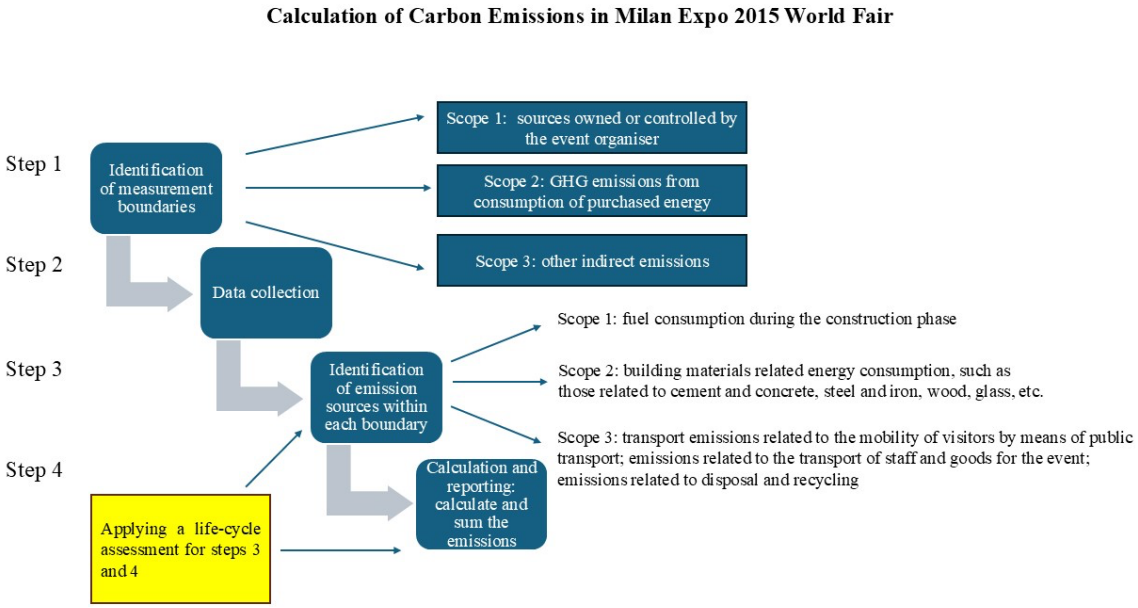
Fig 8. Carbon emissions in the Construction Sector



Source: Authors' synthesis of analytical stages in Ahmetoğlu and Tanik, 2020, Creative Commons Attribution 4.0 International License

ISO 14064-1 can also be applied to measure GHG emissions from large-scale social events. A specific case is provided by Gallo et al., who used ISO 14064-1:2006 to assess the GHG emissions from the Milan Expo 2015 World Fair (Gallo et al., 2020).

Fig. 9. Carbon Emissions in the Milan Expo 2015



Source: Authors' synthesis of analytical stages in Gallo et al. (2020), Creative Commons Attribution 4.0 International License

Gallo et al. additionally employed life cycle assessment to identify and calculate the sources of greenhouse gases for the Milan Expo 2015. They segmented the event's organisation into distinct phases, from preparation through to the end of the event, and performed the third and fourth steps of the process for each phase (Gallo et al., 2020).

C. Challenges

ISO 14064-1 has faced critiques regarding its effectiveness in supporting the net zero transition. These largely focus on the precision of its GHG emissions measurements and limitations to its global adoption. Pelletier, et alnote that guidance for product-level accounting is much more specific than organization-level guidance, characterizing ISO 14064-1 as focusing on 'how to report' rather than 'how to calculate' (Pelletier, et al., 2014, p. 402). As noted, ISO 14064-1 provides only a reference framework for selecting a calculation model and does not prescribe specific or alternative measurement models. Therefore, organisations can use any calculation model endorsed by climate regulators, given the reference factors outlined in ISO 14064-1. This flexibility allows climate regulators in different countries to develop their own unique computational models. This can lead to variations between firms and countries and discrepancies in measurements.

Uddin and Holtedahl (2013) focus on the inability of the standard to offer robust accounting criteria:

> *While ISO 14064-I does cover issues such as setting organizational and operational boundaries, defining greenhouse gases, how they are measured and calculated, and recommends an approach for an accounting treatment of greenhouse gas reductions, it does not propose a set of criteria for designing a robust greenhouse gas accounting protocol for business.*

Rather than (lack of) methodology, this critique focuses on the limited ability of the standard to provide effective guidance on the organizational level that changes firm behaviour.

Another significant challenge in implementing ISO 14064-1 is the accurate collection and reporting of GHG emissions data (Dragomir, 2012). The precision of this data is crucial for accurately quantifying GHG emissions. Organisations often struggle to track relevant GHG emissions, particularly those which are beyond their direct control (Brohé, 2017). These emissions often pertain to waste disposal and transportation by individuals associated with the organisation, including non-affiliated individuals such as tourists. Interviewee B stated that estimating downstream emissions with precision is very difficult: '…If you're a company which

sells products that use energy, then the uncertainties involved in estimating the emissions from the use of those products are huge, if you're selling globally….'[4]

Holtedahl (2013) described the approach of ISO 14064-1 to Scope 3 emissions as 'problematic'. Interviewee A pointed to the fact that 'significant' indirect emissions must be reported, without a clear definition of what is significant. They stated:

> *You know, to accurately … quantify them, and report them, there is that balance between the completeness and accuracy of the data that is being provided and whether it is verifiable. In some instances, it is not so.*[5]

Difficulties in quantifying Scope 3 emissions are also noted in Becker, et al (2024). The voluntary nature of standards enables organisations to select alternative standards, which may not include Scope 3 emissions in their measurements (Andrew and Cortese, 2011). The use of differing standards can create confusion and compromise the accuracy of GHG reporting. We reflect further on the emergence of standards and regulatory frameworks addressing Scope 3 emissions in Section 5 below.

Despite these difficulties, measuring scope 3 GHG emissions helps organisations and climate regulators understand the potential GHG emissions linked to the organisation's activities in upstream and downstream industries. This awareness enables proactive adjustments in production or management practices to reduce emissions, even if precise quantification is challenging.

D. Conclusions of the case study

ISO 14064-1 provides guidance, including principles and methods, at the organization level for quantification and reporting of greenhouse gas emissions and removals. It requires reporting on direct, indirect and supply chain emissions (all 3 scopes). Importantly, it doesn't require the use of a specific methodology. ISO 14064-1 is less prevalent than Greenhouse Gas Protocol, which is embedded in a number of US regulatory frameworks, such as State of California reporting requirements (California Senate, 2023). The EU allows both, but the EU Corporate Sustainability Reporting Directive (CSRD) lists GGP as default option. Both assist with conformity with a range of other regulations and standards supporting the net-zero transition. Critiques include the fact that flexibility in calculation methods can

[4] Head of a Cooperative Climate Initiative, conducted by Emily Lydgate and Xinyan Zhao, 9 July 2024.
[5] Interviewee A, assurance provider for a Conformity Assessment Body, conducted by Emily Lydgate and Xinyan Zhao, 2 July 2024.

lead to variations between firms and discrepancies in measurements, and the difficulties associated with gather accurate data, particularly for Scope 3 emissions.

4. Case study 2: B Corp

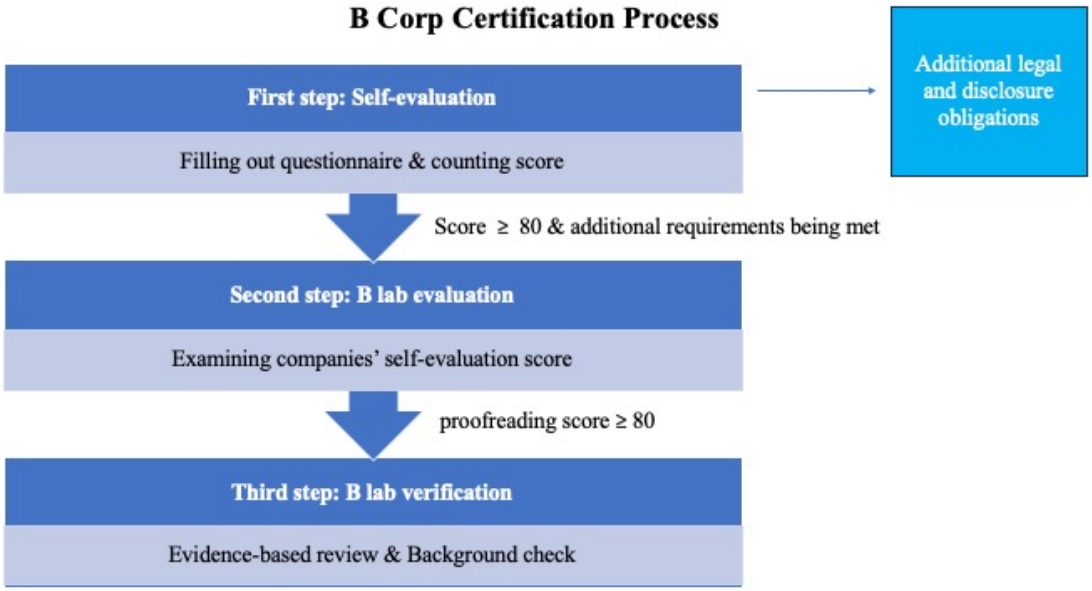
A. Introduction

B Corp Certification is an evaluation and verification process managed by B Labs, a global network of nonprofit organisations that collectively form the B Corporation community (Fonseca et al., 2022). The case study was selected due to its differences with ISO 14064-1. First, it is a private standard. More specifically, a B Corp is a private company certified as meeting the requirements of NGO B Lab. Second, it is much broader in scope. B Corp standards address a wide range of different organizational practices under the rubric of sustainability.

The US, followed by the UK, contain the highest number of B Corps. In the UK, B Corp certification is growing rapidly: between September 2022-23, the number of registered B Corps increased by 50 per cent, and there are over 2000 certified organizations (B Corp UK).

Companies that successfully complete B Lab's B Impact Assessment (BIA) are awarded a certificate, verifying that they operate in accordance with the sustainability standards recognised by the B Lab community. The B Corp Certification process consists of three stages: self-evaluation, B Lab assessment, and final certification by B Lab.

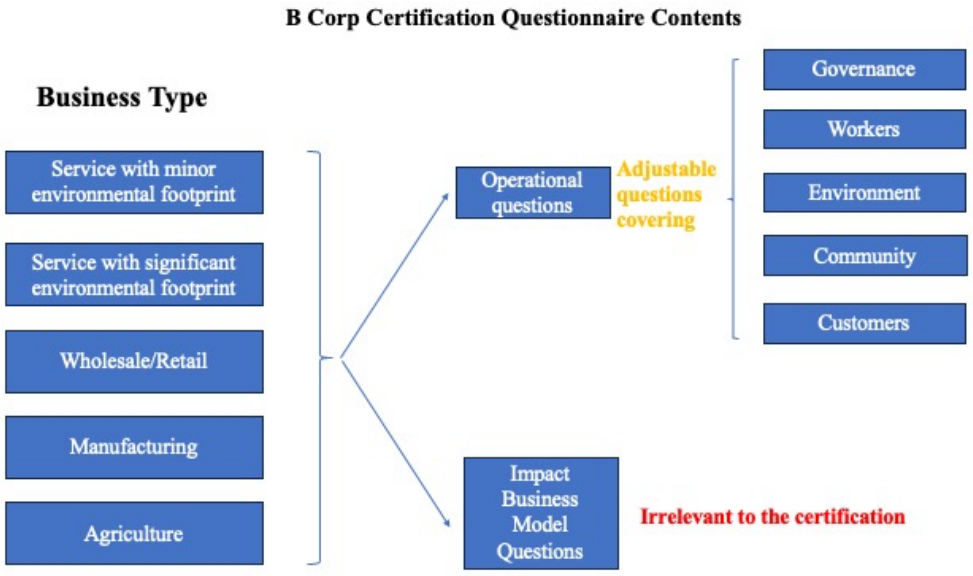
Fig. 10. B Corp Certification Process



Source: Authors

The self-evaluation is a preliminary assessment conducted by companies seeking B Corp Certification. Applicant companies respond to a series of questions tailored to their specific business type (as shown in *Figure 1*). These questions are divided into two categories: operational questions and impact business model (IBM) questions. The former's question set covers five key areas: governance, workers, environment, community, and customers.

Fig. 11. B Corp Certification Questionnaire Contents



Source: Authors

The applicant company's responses to the questions determine the points they receive. To qualify for B Corp Certification, a minimum of 80 points is required. However, B Labs recommend that companies aim for at least 83 points before submitting their application, as the final evaluation often results in a slightly lower score than the initial self-evaluation.

The certification includes a legal requirement worth 10 points. This requirement may vary depending on the location of the certification. In the UK, to meet this requirement, the applicant company must incorporate the legal provisions specified by B Labs into its constitutional documents, typically including a shareholders' agreement and other relevant documents.

UK B Corp certification requires organizations to enhance corporate social responsibility in line with the UK Companies Act Section 172 and improve the sustainability of corporate operations. B Corp certification achieves this goal through an evolutionary interpretation of Section 172, clarifying ambiguous terms used in the Act to set specific sustainability targets for companies. For instance, while the Companies Act Section 172 mandates that a company's directors promote the company's success, it does not define what constitutes 'success.' Traditionally, this term has been understood to focus on financial performance. However, this legal requirements document expands the definition of success to encompass the achievement of social and environmental goals. In sum, B Corp's legal requirements aim to shift the responsibility of corporate leadership from being solely accountable to shareholders to also being accountable to the broader interests of societal stakeholders.

In addition to its focus on promoting sustainable operations, the legal requirements document also addresses procedural rules for amending a company's constitutional documents. These rules outline the amendment procedures, the management level involved, and the required voting thresholds for amendments. The significance of these rules lies not just in their specifics but in ensuring the seriousness of amendments and the active involvement of the entire management team. This depth of management engagement is a key way in which B Corp Certification fosters sustainable business practices. B Corp Certification seeks to embed a lasting business model that endures across different leadership generations.

B Lab in the UK does not require companies to complete all legal requirements before obtaining B Corp Certification. In practice, if a company has 50 or more employees, it can fulfil these requirements after the certification. Larger companies are given more time to meet the legal requirements: for example, LLPs have an additional 90 days, while limited companies are granted up to 12 months.

After completing the self-evaluation described above, companies can apply for certification with B Labs. The B Corp Certification process involves both an evaluation and a verification session conducted by a B Lab. The evaluation session verifies the accuracy of companies' self-evaluation scores, while the verification session ensures that companies' practices align with the claims made in the self-evaluation questionnaire through an evidence-based review and background check.

Once a business has successfully completed the process, it will be awarded a B Corp Certification valid for three years. To maintain its certification beyond this period, the company must undergo a new certification. During the validity period of the certificate, the business has two key obligations: paying the annual membership fee (which varies based on revenue) and preparing and publishing an annual report detailing its adherence to B Corp standards.

B. Contribution

B Corp Certification plays a role in driving the transition to net zero GHG emissions by embedding sustainability goals that exceed legal requirements into corporate strategy and operations. This certification aims to ensure corporate leadership remains accountable through annual reporting and periodic reviews. By adopting this model, organizational behaviour is transformed to prioritise societal and environmental well-being in operations, ultimately fostering a business model that acts in the best interests of both people and the planet.

B Corp Certification aims to significantly increase the number of certified B Corps, thereby creating a robust and influential community. Companies within this network can leverage their collective economic power to influence the broader business environment, including supply chains and investment practices within their region. As a result, production, marketing, and investment behaviours are more likely to incorporate social and environmental considerations. As the B Corp community's economic influence grows, it can increasingly drive the adoption of sustainable business practices across industries (Stubbs, 2017).

Another key function of the B Corp community is to foster the economic growth of its members, thereby enhancing their ability to influence the marketplace. The community serves as a platform not only for exchanging ideas but also for forming business partnerships (Stubbs, 2017). This dual role promotes the business development of members and strengthens the market influence of companies that advocate for sustainable business models. Moreover, the B Corp community extends beyond businesses to include consumers who are passionate about social justice and environmental protection. By supporting B Corps through their purchasing choices, these consumers help bolster the business standing of B Corps,

thereby contributing to the transformation of capitalist markets towards models that prioritise social rights and environmental sustainability (Marquis, 2020).

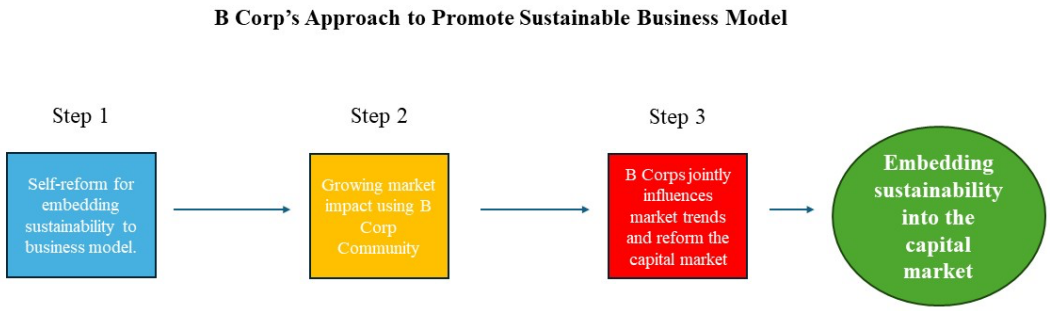
In an empirical study, Stubbs explores the approach of B Corporations to reforming their business models by interviewing 14 B Corps in Australia (Stubbs, 2017). This approach is succinctly described as 'making a profit so that the business can do more and better' (Stubbs, 2017; Handy, 2002). It involves reinvesting profits into products and services that fulfil a social or environmental purpose, ensuring the company can sustain its business while advancing these goals. According to Stubbs' findings, eight of the 14 B Corps referenced this idea in their interviews, with one stating:

> *I think the reason we are in business is to make change and our ability to make change is though the business model to support those activities. So, it's all funded through the business, so the more products we can sell, the more profit we can make; the more profit we can then allocate to taking up these issues that we think need changing within the industry but also the community broadly. (Stubbs, 2017)*

Stubbs' research highlights that B Corps not only promote sustainability through their business practices—such as enhancing the sustainability of their products and adapting their business models—but also reinvest their profits in initiatives like awareness-building, education, advocacy, and lobbying in relation to sustainability. These efforts significantly bolster the promotion and adoption of the sustainable business model embraced by B Corps (Stubbs, 2017).

In summary, B Corp Certification's approach to facilitating the transition to net zero GHG emissions involves three key strategies: reforming the business models of B Corps, promoting their corporate growth, and leveraging their market influence to challenge and transform the prevailing capital market practices that often overlook social and environmental values. This strategy for advancing sustainable business models is illustrated in the figure below.

Fig 12. B Corp's Sustainable Business Model



Source: Authors

C. Challenges

The core concept of B Corp Certification is to shift the traditional business focus from pursuing economic development alone to adopting a model that balances the interests of the economy, society, and the environment (Liute and De Giacomo, 2022; Marquis, 2020). This approach aligns with the United Nations' definition of sustainable development and is referred to by B Labs as the Triple Bottom Line principle (Stubbs, 2017). However, an empirical study of B Corps in the UK revealed that B Corp Certification does not require UK companies to fully ensure that their operations balance the three dimensions of sustainable development (Liute and De Giacomo, 2022).

Liute and De Giacomo found that a company could achieve certification even with a zero score on environmental aspects during a self-evaluation. Companies can selectively focus on specific sustainability dimensions of their choice. They argue that while certification does not prevent companies from aiming for high environmental performance, it does permit strategic trade-offs (Liute and De Giacomo, 2022). Moreover, their research reveals that certification overlooks industry-specific sensitivities, allowing companies to prioritise less challenging issues rather than addressing the most material ones for their industry.

Liute and De Giacomo (2022) were also critical of the effectiveness of B Corp Certification in enhancing companies' environmental performance. They observed that several companies managed to gain approval by completing self-evaluation

questionnaires based on scores from only two of the five categories, allowing some firms to achieve B Corp status despite low environmental scores. Scholars have noted that companies often boost their social scores to compensate for weak environmental performance to meet B Corp Certification requirements (Kono et al., 2018; Liute and De Giacomo, 2022). Their research suggests that this trend arises because improving environmental performance is significantly more challenging for companies compared to enhancing their social performance (Liute and De Giacomo, 2022).

Current B Corp Certification lacks a mandatory minimum standard for environmental criteria. Consequently, B Corp Certification should not be seen as definitive evidence of a company's environmental excellence. Instead, it functions more as a tool to encourage voluntary improvement in environmental practices. Liute and De Giacomo (2022) found that 70 per cent of the 68 UK-based B Corps they surveyed were able to match their reported social and environmental performance with their actual scores. However, the remaining B Corps failed to show in their annual reports an environmental performance that aligned with their reported scores.

There is no comprehensive accountability mechanism to monitor how B Corps incorporate environmental sustainability into their production and business models or track the improvement of their performance in this area. Therefore, holding B Corp Certification for an extended period does not necessarily indicate progress in environmental performance. This is because the renewal process for B Corp Certification does not require companies to show that their environmental performance has improved compared to previous years.

Liute and De Giacomo (2022) highlight that consumers do not receive sufficient information about B Corps' actual environmental performance from their annual reports. As reports fail to disclose the maximum possible scores for each assessed aspect, consumers do not have a clear understanding of the true value of the scores the companies have achieved. Similarly, Carvalho et al. asserted that B Lab's effectiveness in anchoring sustainability at the core of small and medium-sized enterprises (SMEs) is hindered by insufficient information and is limited to the BIA users that unlock specific questions through their previous answers and reach the verification and auditing phase (Carvalho et al., 2022).

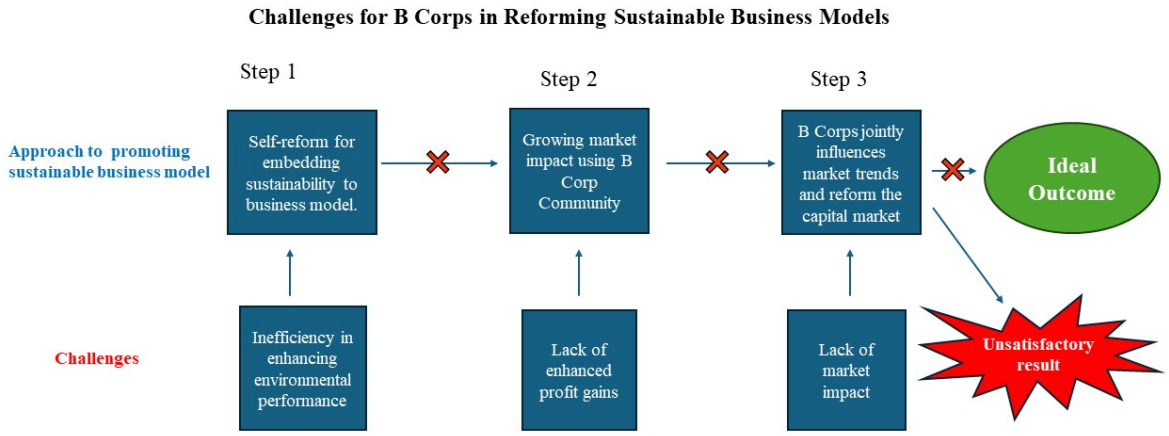
As a result, if a company uses the B Corp label but does not score well in environmental performance, consumers might mistakenly assume that the company excels in this area. These issues highlight the challenges that B Corp Certification faces in driving meaningful business model transformation.

Another significant challenge for B Labs is finding ways to provide sufficient incentives for B Corps to commit to long-term sustainability improvements in their business models. Primary motivations for joining the B Corp community are potential financial gains and an enhanced corporate reputation. However, some research indicates that B Corp certified companies do not necessarily outperform non-certified private companies economically (Stubbs, 2017).

Currently, most companies apply to become a B Corp due to strong leadership support for social justice and environmental sustainability (Kim and Schifeling, 2022). While the B Corp business model may gain broader acceptance in the future, it currently represents a relatively limited segment of the business community. To make the B Corp model a prevailing norm, the community needs to attract more participants, particularly large and iconic brands. Expanding membership in this way is crucial for promoting the widespread adoption of the B Corp business model (Stubbs, 2017).

As a club of private organisations pursuing specific goals, it is crucial for the B Corp community to offer substantial benefits to its members to ensure its survival and facilitate growth in both membership and market reach (Paroussos et al., 2019). This means that B Labs must make difficult decisions regarding how to balance rigour with inclusivity. The challenges noted above likely arise from B Labs' strategy of creating more accessible application conditions for B Corp applicants. Expanding membership is crucial for the B Corp community to influence the broader market environment. However, if standards are too weak, B Corp Certification will undermine its role in promoting sustainable business practices. These risks are captured in the figure below.

Fig. 13. Challenges for B Corps in Reforming Sustainable Business Models



Source: Authors

D. The B Corp Climate Standards update

In 2020, B Corp commenced a consultative process to update its standards. Its new draft standards include a much stricter approach, including in relation to its climate standards. As explained by B Corp, 'Companies today can indicate if they measure their GHG emissions (on Scope 1, 2, and 3) and if they set any (science-based) reduction target. Nevertheless, the existing standards neither specify any criteria for these actions nor mandate companies to take action, which is changing now.' (B Corp, Impact Topic: Climate Action).

The new draft requirements for B Corp include three requirements. The first is mandatory reporting on Scope 1, 2, and 3 emissions, following the methodology of the Greenhouse Gas Protocol. Use of another tool is permitted if the methodology is the same. Examples are listed (they do not include ISO 14064-1). These emissions need to be verified by an independent third party. Second, the company needs a science-based net zero target to reduce its GHG emissions compatible with the 1.5°C goal of the Paris Agreement. Finally, the company must implement a climate transition plan, which includes several elements, including tying executive compensation to targets and undertaking a climate scenario analysis.

In a consultation session in 2023, B Labs stated that the most common concern voiced by stakeholders was that the new standards would be too difficult to meet (BCorp: Evolving the Standards for B Corp Certification).

B Corp states that:

> In the new standards, B Lab is also prioritizing 'interoperability' with relevant regulations, starting with EU directives and other certification schemes. This means that B Lab has identified areas of crossover with other standards and regulations so that companies avoid duplication of efforts when collecting their data while ensuring that our standards are up-to-date with leading frameworks. (B Corp, 2024)

When setting out its draft revised standards on climate accounting, B Corp cites as being interoperable the European Corporate Sustainability Reporting Directive (CSRD), set out in Directive 2022/2464.[6] The list does not include any additional mandatory regulation. IFRS S2 climate-related disclosures, accounting standards which companies in over 140 countries are required to use when reporting, are also listed, as is GRI 305, a private, non-profit (voluntary) standards provider (B Corp, Impact Topic: Climate Action).

The B Corp certification process overlaps with these mandatory requirements: its comprehensive approach to sustainability and its imposition on firms to examine their operating practices and supply chains. The revised B Corp standards also bring it in line with EU requirements on emission reporting, including Scope 3 emissions. Joining the B Corp community can potentially help companies improve their understanding of their own environmental performance, which may, in turn, improve their ability to comply with these specific regulations. In turn, by making supply chain sustainability reporting mandatory, these new EU Directives will change the commercial landscape and make it easier for affected firms to achieve B Corp certification.

E. Conclusions of case study

B Corps are firms that have been certified by the non-profit B Labs as meeting criteria which it describes as standards. B Corp standards cover a wide range of CSR objectives. The UK has the second-most B Corps in the world, after the US. B Corp Certification can support companies in enhancing the sustainability of their operations and has the potential to drive a shift in capital markets toward more socially and environmentally responsible models. While the certification offers a tool for companies to incrementally enhance their environmental performance, it lacks a mechanism to ensure that such improvements take place. Furthermore, B Lab does not have a system to expel companies that fail to improve their environmental performance, which diminishes the incentive for B Corps—particularly those with already low environmental scores—to make progress.

B Corp standards are currently being updated. New climate standards will require mandatory reporting for Scopes 1-3 emissions, which will bring B Corp in line with

[6] While the site lists the European Sustainability Reporting Standards, the link goes to the CSRD. As the former is embedded in the latter, the distinction is not materially significant.

EU CSRD. B Labs recognizes the EU CSRD as interoperable, but, unlike GRI standards which the EU recognizes as constituting a basis for fulfilling CSRD reporting requirements, the EU does not list B Corp.

5. Analysis

A. Increased demand for organizational standards supporting net zero

Our case studies suggest that firm-level interest in compliance with organizational standards that support the net zero transition is growing. As summarized by Interviewee A:

> *The voluntary world has only just really started to come forward with all the net zero claims that organizations and territories are making.*[7]

This increased interest is driven by a number of factors, which include the desire to qualify for voluntary certification schemes that assess organizational sustainability and compliance with emerging regulation.

B. Greenhouse gas accounting standards: the foundation of the firm-level net zero transition

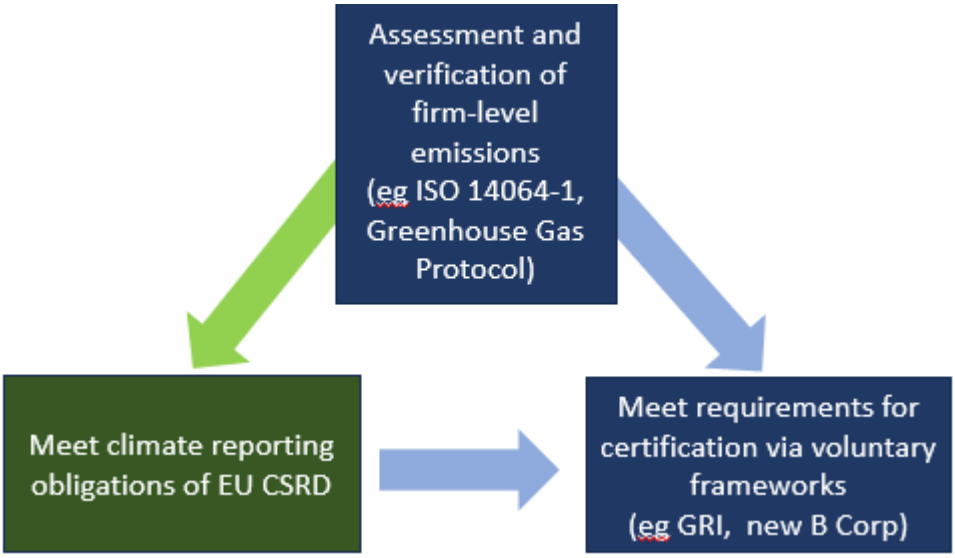
Greenhouse gas accounting standards provide a useful example of these drivers to take up organizational standards. For firms and organizations, both ISO 14064-1 and the Greenhouse Gas Protocol play an important role in the net zero transition, by enabling them to take stock of their existing emissions profiles. Applying these methodologies is necessary for compliance with emerging regulatory requirements for comprehensive sustainability reporting and due diligence requirements that include value-chain analysis, notably the EU CSRD. At the same time, their application enables compliance with other voluntary schemes, such as B Corp's new standards and GRI, both of which recognize these requirements as interoperable.

Setting out the importance of these standards to a cooperative climate initiative, Interviewee B stated that:

> *All the work we do relies very heavily on the fact that people are doing greenhouse gas accounting according to other people's standards. We need them to be doing it right in order for us to be able to assess it. We lean on things like ISO 14064 and 14067 and the Greenhouse Gas Protocol.*[8]

Fig. 14. Emissions reporting helps compliance with standards and regulations

[7] Assurance provider from a conformity assessment body, interviewed by Emily Lydgate and Xinyan Zhao, 2 July 2024.
[8] Head of a cooperative climate initiative, interviewed by Emily Lydgate and Xinyan Zhao, 9 July 2024.



Source: Authors

C. Organizational standards and regulation: complementary and competing

The increased uptake of organizational standards co-exists with the emergence of what might be described as 'organizational regulation'. For example, the EU CSRD sets out mandatory reporting and due diligence requirements that pertain to firms themselves, rather than their products, requiring them to capture not just firm-level emissions but also those that come from their value chains.

Another example is the EU Corporate Sustainability Due Diligence Directive (CSDDD), which entered into force in July 2024. It requires that companies identify and address both human rights and environmental impacts of their actions. The environmental requirements include that large companies must have a transition plan that aligns with limiting global warning to 1.5 degrees C by 2050.

Both Directives impose an obligation not only to report, but also to take some form of mitigation action, though subject to various qualifications. For example, under the CSDDD they must take 'appropriate measures…capable of achieving the objectives of due diligence by effectively addressing adverse impacts in a manner commensurate to the degree of severity and the likelihood of the adverse impact, and reasonably available to the company, taking account the circumstances of the specific case…' (European Commission, 2024, p. 10)

This leads to questions regarding the relationship between existing organizational standards and emerging organizational regulation. As set out above, greenhouse gas accounting standards such as ISO 14064-1 comprise an example of an organizational standard which is complementary with regulation: it does not duplicate requirements, but rather supports compliance with CSRD. But in other cases, organizational standards and regulations introduce duplicative requirements.

Where organizational standards overlap with existing regulation, it is possible that they can work constructively with regulators in order to become integrated into conformity assessment processes. An example is the EU Renewable Energy Directive, which allowed voluntary schemes to apply for recognition that their certification met the requirements of the Sustainability Criteria for biofuels established in the Directive (European Commission, 2024). In order to qualify for recognition, the Roundtable on Sustainable Palm Oil (RSPO) was required to make reforms to its standard. To do so, it developed a tailored standard known as RSPO-RED (RSPO, 2012). This example demonstrates that the alignment of standards with regulation can result in reform to standards themselves, which in this case took the form of stricter requirements.

Similarly, the emergence of regulatory requirements such as CSRD may have inspired B Labs to tighten the climate requirements for certification of B Corps. While there are differences in their standards and methods of assessing compliance, B Corp indicate that CSRD is interoperable with various elements of compliance, including its new, stricter carbon accounting requirements. Revised B Corp standards bring it in line with CSRD requirements on emission reporting, including Scope 3 emissions. Becoming a B Corp can potentially help companies improve their understanding of their own environmental performance, which improves their ability to comply with CSRD and CSDDD. By making supply chain sustainability reporting mandatory, these new EU Directives will change the commercial landscape and make it easier for affected firms to achieve B Corp certification.

However, the fact that B Corp overlaps with CSRD and CSDDD mandatory requirements for large firms to examine their operating practices and supply chains also entails risks. Proliferating requirements make market access more difficult and complex, or lead to particular standards becoming obsolete.

Indeed, CSRD has already eclipsed the strength of B Corp's existing climate reporting requirements. Interviewee B noted that CSRD applies 'by default' to global companies, since they will need to comply if they operate in Europe. They said '…It's a bit of a threat to standards organizations because it makes them potentially redundant, there are a few who I'm wondering, what is their future in this world with CSRD if that goes round the world as well?' They also reflected that '….at the end of the day, regulation trumps all. So, if something goes into regulation, like CSRD, and when that comes into full implementation, we will then stop doing some of the compliance stuff.'[9]

To remain relevant, schemes like B Corp will need to continue to ratchet upward their standards. This points to a wider contribution of organizational standards: they can act as norm innovators by identifying regulatory gaps and formulating approaches to address them. This has the potential to transform behaviour, but

[9] Head of Cooperative Climate Initiative, interviewed by Emily Lydgate and Xinyan Zhao, 9 July 2024.

more indirectly: as new norms become embedded in standards, and later, regulation. This also conforms with Hale's (2021) conveyor belt conception. The model gives voluntary standards a role in driving forward the net zero transition, as they inspire, and eventually become adopted by, national regulation. To be transformational, organizational standards must walk the line of being innovative but feasible. Imposing innovative norms too out of step with existing regulation may backfire and reduce uptake.

Another risk associated with duplication is the increasingly crowded nature of the organizational standards landscape, leading to fragmentation. To streamline the regulatory compliance burden, it is important to avoid duplicative certifications. Similar to how national standards bodies are directly involved in developing international standards, as seen in the ISO standard-setting process, strengthened cooperation between the European Commission and voluntary certification schemes would help to facilitate this integration, along the lines of the EU Renewable Energy Directive and RSPO (Jennings and Zandbergen, 1995; Stubbs, 2017). For example, there could be opportunities for B Corp certification to contribute more directly to conformity assessment for due diligence and reporting regulation. GRI has already achieved recognition by EU standardizing bodies. The EFRAG, which developed the EU's ESRS reporting requirements, permits firms to report 'with reference' to GRI standards in order to meet EU requirements (GRI-EFRAG).

Here, the desire to promote market access must be balanced against concerns regarding the trade-distortive impacts of the proliferation of private standards. Lang and Messenger (2024, p. 16) argue that: 'With the EU at the vanguard of leveraging its transnational supply chains to shape behaviour extraterritorially, analysis of the processes for making private standards meet the same levels of (procedural and substantive) quality expected from public standards, and their subsequent hardening through national legislative frameworks is essential to understand the current standards-regulation nexus.' This observation applies well to private organizational standards that support the net zero transition.

While EU recognition of interoperability is desirable for these voluntary schemes, it also contributes to the risk that the relationship becomes competitive rather than complementary, as they yield their position at the vanguard of progressive climate action.

D. The value chain revolution in emissions reporting

i. Shaping global supply chains

Within this expansion of firm-level interest in net zero claims, a major trade-related trend is the increase of reporting to include emissions throughout the value chain (Scope 3 emissions). With the EU CSRD and IFRS S2 as major drivers, such requirements are being disseminated globally, and their impacts on supply chains will continue to unfold in the coming years (IFRS 2, 2023). For any industry with

international suppliers, the transparency requirements may influence their sourcing decisions, in so doing shaping (and decarbonizing) international supply chains. Further investigation of the link between Scope 3 emissions reporting and international value chains will form an important contribution to academic literature on standards, trade and the net zero transition.

Both of our interviewees reflected that transparency likely contributes to greening supply chains, through incentivizing firms to switch providers and/or pressure their existing providers to decarbonize. Interviewee B stated: 'The firms we work with are [trying to reduce Scope 3 emissions], yes. So, they'll say, we've tightened up here, we've consolidated here, we're putting requirements on all our suppliers, so that they have to move as well…'[10]

Interviewee A stated that ', ''… with organizations quantifying and reporting their … Scope 3 emissions, the choice of the products that they use and where those products are being supplied from does have an impact on their greenhouse gas inventory and statement. If they want to make reductions…that might be something for them to look at…what actions can we take related to our supply chain to reduce our emissions?'[11]

ii. Methodological difficulties

Value chain (Scope 3) emissions reporting is burdensome for firms and difficult to assess accurately. We provided an overview of literature in the context of ISO 14064-1 in Section 3C. In sum, Scope 3 emissions stem from multiple and diverse sources, with uncertain and sometimes unavailable data, over which reporting firms do not have direct control. This reduces the accuracy of information received, but also the ability of firms to respond to this information. A recent report synthesizing the net zero voluntary standards landscape more broadly concluded that there has been significant progress since 2022, but still gaps in defining relevant emissions sources for Scope 3 emissions, alongside reporting limitations and discrepancies (Becker et al., 2024, Executive Summary).

Reflecting on methodological difficulties, Interviewee B stated that 'Some of them … struggle with reductions for their Scope 3 emissions, for a wide range of reasons, and that's part of the difficulty of Scope 3 is that there really isn't one size fits all, it's very individual – well, sector-based at least, and perhaps even individual.' Reflecting on the inability to respond, they concluded 'When it comes to reducing…. the levers on the products they sell they have are limited…so we have one company that essentially what they say is that, well, we can't…get rid of our Scope 3 emissions unless countries x,y and z decarbonize their grid. What do we do about that?'[12]

[10] Head of Cooperative Climate Initiative, interview conducted by Emily Lydgate and Xinyan Zhao, 2 July 2024.
[11] Assurance provider for a conformity assessment body, interview conducted by Emily Lydgate and Xinyan Zhao, 2 July 2024.
[12] Head of cooperative climate initiative, interview conducted by Emily Lydgate and Xinyan Zhao, 9 July 2024.

The extraterritorial reach of mandatory reporting and due diligence requirements means that they have the potential to be controversial from an international trade perspective. Currently, under the CSRD, firms must address 'impacts and risks', which may include reduction in Scope 3 emissions, though this is not prescribed (EU 2023/2772, 3.6). The reporting-oriented nature of these requirements, and lack of specific action required to respond to them, softens the likelihood that such requirements will be viewed as discriminatory to foreign suppliers. If future regulations make such reductions mandatory, or prescribe performance requirements on suppliers across borders, it is hard to imagine that they would not be immediately challenged in the context of the WTO. In the context of a WTO dispute, the methodological difficulties that make it difficult to measure emissions through the supply chain may prove a flimsy basis for a ban or restriction on an imported input.

The EU's introduction of a Carbon Border Adjustment Mechanism (CBAM) highlights these risks. EU CBAM applies only to a small subset of products: those that are heavily traded, high-emissions and priced domestically under the EU Emissions Trading System. The products are specified at the HS-code level, and methodologies for calculating their emissions profile are provided. Despite the modest scope and relative precision of this approach, it has been subject to international trade controversy and threat of dispute action (Lydgate, et al., pp. 29-30).

iii. Factors increasing the effectiveness of Scope 3 reporting

Three factors emerged from our research that increase the effectiveness of Scope 3 reporting. The first is for firms to do their own reporting and internalize the requirements into firm culture. Interviewee B stated that:

> *On the reporting side… this is being outsourced to consultants largely, and I think what needs to happen is this needs to be in-sourced…to a greater extent. It's costly, and unwieldy, and creates lots of uncertainty and unknowns if you outsource this task…if you can bring it in house into your own systems … and understand this is now your responsibility, and [it's].. integrated into your financial systems and your supply system, you can get there eventually.*[13]

A second recommendation is to increase digitization. UNIDO calls for 'smart Quality Infrastructure' which includes real time monitoring, measurement, feedback and reporting on climate change data. This can be achieved through 'smart standardization' and creation of machine-readable standards. While this recommendation was made more broadly to apply to climate data, it is also relevant for capturing Scope 3 emissions. (UNIDO, 2024, P. 74)

[13] Head of cooperative climate initiative, interview conducted by Emily Lydgate and Xinyan Zhao, 9 July 2024.

This points to the larger global context of Scope 3 emissions. Since Scope 3 emissions for one entity are often the direct emissions of others, on a global level, strengthening oversight of direct emissions can help address the gaps in Scope 3 emission reporting. Therefore, a well-established climate governance network at all levels can address the gaps in Scope 3 GHG measurements by enhancing the monitoring of direct emissions from organizations within its jurisdiction. Such comprehensive oversight at the macro level can significantly benefit firms.

A third recommendation is to create closer relationships with suppliers. Interviewee B speculated that Scope 3 emissions reporting can most effectively incentivize supply-chain decarbonization where firms have 'stable supply chains…and a history of working with their suppliers'.[14] In these cases, they may also provide support, such as reasonably priced finance, to support their suppliers in introducing decarbonizing upgrades. Clearly, some types of supply chains will better support such relationships. Where inputs are globally produced and interchangeable, such as agricultural commodity crops, it will be more difficult to implement this recommendation.

These recommendations are ambitious, but the increase in mandatory requirements will inevitably prompt a firm- and organizational-level learning curve that can help them bring them closer in reach.

E. Limitations of organizational standards in facilitating trade

The introduction of EU CBAM has stimulated debate in various fora about whether different countries' pricing and regulation addressing emissions are equivalent, and should act as a basis to waive CBAM charges and documentation (Lydgate, 2023). EU CBAM extends EU ETS charges to imported products in some sectors. Other countries, including the UK, US and Canada, are also considering their introduction. This debate is relevant to the intersection of net zero standards and trade. Harmonization of standards across national jurisdictions could form the basis for countries to waive regulatory requirements on one another. While the EU hasn't conceded that waiving of requirements on this basis is possible (instead requiring membership or linking with its domestic Emissions Trading System), it has engaged in discussions with the US that (at least from the US's perspective) worked toward this goal. Among other things, these discussions have focused on establishing 'mandatory minimum' greenhouse gas emissions standards for steel and aluminium (GASSA, 2023).

This example illustrates why standardizing product-level GHG emissions measurement potentially comprises an important component of facilitating international trade. Focusing on the steel sector, the WTO Secretariat convened a Trade Forum for Decarbonization Standards, bringing together industry

[14] Ibid.

associations, standards bodies and international organizations (WTO, 2024). Deputy Director General Jean-Marie Paugam stated:

> Underpinning any definition of **green steel** is the need for common, consistent, and comparable measurement of GHG emissions. Your technical discussions are crucial for advancing the green steel transition and achieving a shared understanding of emissions measurement. **Life Cycle Assessment (LCA) are vital** for measuring and managing both greenhouse gas emissions and sustainable resource use. An LCA, combined with certification, builds trust and confidence in claims regarding low emissions or sustainable steel products.' (WTO, 2024)

LCA standards include ISO 14040, which can be characterized as an organizational standard: it outlines principles and a framework, without specifying methods (ISO 14040:2006). The ISO family also includes ISO 14044, which contains more specific requirements for undertaking LCA (ISO 14044:2006). Both differ from ISO 14064-1 in that they focus on the environmental impact of 'product systems', rather than firm-level and value-chain emissions, and are thus a better match for capturing emissions in traded products than ISO 14064-1. CBAM focuses on emissions embodied in particular products and does not include Scope 3.

Emissions accounting provides a useful example of how organizational standards may fall short of product standards in some aspects of trade facilitation. As noted in Section 3C, one challenge in implementing ISO 14064-1 concerns the possibility that users will apply different methodologies. The emphasis of the standard on 'how to report' rather than 'how to calculate' means that two organizations could develop methodologies which are compliant and come up with very different results for organisation-level emissions. While applying this organizational standard might help facilitate standardization, there is not a guaranteed link. Similar issues apply in the context of ISO 14040. The very fact that organizational standards focus on organizations, rather than products or sectors, limits their ability to provide the level of detail that may be necessary for product-specific requirements. Generally speaking, organizational standards are applicable to a range of sectors, products, and even service providers. In this sense, there is an inherent tension between organizational standards' core objective of influencing firm behaviour and technical product standards. The WTO Secretariat's focus on the steel sector, and the EU-US discussion's focus on only steel and aluminium, implicitly supports the conclusion that progress on a product-based level is more likely to eliminate trade barriers.

In other words, widespread uptake of organizational standards (e.g., all firms using ISO 14064-1) does not equate with harmonization of technical standards. Their focus on operating principles means there is little prospect for even universal adoption of organizational standards to result in the waiving of regulatory requirements (such as carbon charges). This limits the potential for international organizational standards to result in trade facilitation.

However, prospects for waiving regulatory requirements based on harmonized product standards should be tempered with a note of realism. With the prominent exception of the EU, for a variety of reasons, in practice, it is relatively rare for countries to formally harmonize their regulation across borders. In the WTO's trade forum on decarbonization green steel discussions, for example, Members emphasized that they sought interoperability rather than harmonization (WTO, 2024).

F. The role of the WTO: Gaps and opportunities

In the WTO, organizational standards have not comprised an explicit item of discussion, at least defined as such. Organizational standards addressing the net zero transition, in conjunction with emerging regulatory requirements, appear set to re-shape firm-level trade strategies and international supply chains, though (as we argue above) it is too early to assess the full extent of these changes. This raises questions about impacts on WTO Members: not only pursuant to specific standards, but also more systemic.

The focus of organizational standards on internalizing principles and changing behaviour places significant demands on firms. As we identified in our literature review, the success of firm-level transformation pursuant to organizational standards is not fully under the control of firms – it is embedded in an ecosystem of regulation and consumer demand. Relevant literature reveals that successful internalization of organizational standards is easier in supportive regulatory contexts, and for larger firms. Concerns about the potential for voluntary sustainability standards to magnify inequalities, and pose new market access challenges, are well established in the WTO. Organizational standards that do not meet the criteria of the TBT Code of Good Practice and Principles for the Development of International Standards particularly risk exacerbating such concerns.

Further, organizational standards are increasingly being embedded into organizational regulation, such as the way that GGP or GRI compliance helps meet requirement for the EU CSRD. The legal status of private standards embedded into regulatory requirements remains unclear (Kim, 2018).

In the context of an increasing shift towards both standards and regulation that apply to organizations, the orientation of the WTO Agreements towards products and services creates gaps. More specifically, the WTO risks being left behind by the larger trend in both regulation and standards, away from regulation at a product- and service- level and toward regulation at a supply-chain and firm-level. This suggests the need to address organizational standards and regulation more systematically.

Rather than a bespoke discussion item or forum, a more realistic and feasible trajectory is that discussion of organizational standards will become increasingly integrated into existing WTO Agreements and Committees, including the TBT

Committee. In the context of a TBT Agreement dispute, the recent example of Malaysia arguing that the EU should base its biofuels regulation on ISO standards on lifecycle assessment (including organizational standard ISO 14044) and assessment of carbon footprints (including organizational standard ISO 14067) to assess the impacts of biofuels cultivation (EU-Palm Oil, Panel Report, 2024) illustrates that international organizational standards, like other types of international standards, are generally advocated as preferable to unilateral regulation.

The pathway for the WTO to address concerns raised by organizational standards more effectively build upon recommendations made in the context of standards more generally. These focus on better using WTO Committees to promote integration of discussion on standards and trade into the WTO. Lang and Messenger write that 'We have examples from the literature on the influence that the creation of … an avenue of 'diagonal' influence of standards has had on practice by WTO members and standardising bodies such as the Codex Alimentarius Commission (Fisher, 2010; Winickoff & Bushey, 2010; Burkhard, 2012; Messenger, 2016).' They call for the WTO and FTAs to create additional 'entry points' for standards to become part of national regulatory frameworks (Lang and Messenger, pp. 28-29).This chimes with the recommendation of Delimatsis (2013), who argues that the WTO should play a role in diffusing international standards and in helping to improve standard-setting processes.

An important element of this discussion and dissemination concerns drawing a boundary between international and private standards. Controversy remains regarding whether and when private standards can be classed as international. This unfinished business is highly relevant for organizational standards: the GGP provides an instructive example. Self-described as 'the world's most widely used greenhouse gas accounting standards' (GGP, 2024) it has been disseminated globally and incorporated into a variety of regulatory frameworks; the standard is set by a multi-stakeholder consortium. However, its governance differs from ISO 14064-1, which was developed by an ISO technical committee open to participation by national standards bodies. Instead, the GGP was driven by NGOs and does not have a formal role for national standards bodies. These differences make it unlikely to meet requirements summarized by the Appellate Body in US – Tuna II:

> 'a required element of the definition of an 'international' standard for the purposes of the TBT Agreement is the approval of the standard by an 'international standardizing body', that is, a body that has recognized activities in standardization and whose membership is open to the relevant bodies of at least all Members (US-Tuna II, 2012, para. 359).

In contrast to provisions on technical regulations, the non-discrimination obligations of the CGP have not been adjudicated in a WTO dispute and the CGP remains 'somewhat a neglected' element of WTO Agreements (Du, 2020, p 40). Noting the difficulties with negotiating new WTO Agreements, Mavroidis and Wolfe (2017, p. 17) propose that the WTO should create a Reference Paper which would establish commitments for Governments to due diligence and enforcement of CGP principles where possible, given their limited influence over private actors. The Reference Paper would define private standards and establish commitments to transparency.

Given its increasing integration into national regulatory requirements, as in the examples provided in Section 3, the GGP example reveals why continued discussion on standards and their classification remains important. Supporting more robust QI, a recent set of guidelines on conformity assessment issued by the WTO TBT Committee highlights the importance of impartiality and independence of conformity assessment providers, and the desirability of having accredited conformity assessment – i.e. third-party verification, where the 'checker' of standards is also checked to be neutral and competent, to reduce regulatory risk (WTO, 2024).

Though the TBT Agreement contains the most explicit provisions on standards relevant to the net zero transition, our legal analysis suggested there is only limited overlap between technical standards and organizational standards (though some ambiguity remains). For similar reasons, many existing organizational regulations, such as EU CBAM and EU CSRD, are not notified to the TBT Committee as technical regulation, but have been subject to discussion in the WTO Committee on Trade and Environment (Third World Network, 2023). The CTE's cross-cutting remit makes it another promising venue for multilateral discussions on organizational standards. The WTO Appellate Body has determined that a relevant international standard does not have to comprise an entire document but could constitute an element of the document. This provides additional flexibility in the jurisdiction of the TBT Committee to discuss organizational standards where they are embedded into other standards or regulation (see discussion in Lang and Messenger, 2024, pp. 29-30)

G. The contribution of organizational standards on the net zero transition

We have argued that the hallmark of organizational standards is their focus on changing the behaviour of firms or other entities.

When applied to the net zero transition, Hale's 'conveyor belt' suggests that voluntary standards provide strategic direction (Hale, 2021). National standards bodies can encode best practice from private initiatives. The optimal configuration conforms with Cashore et al.'s notion of 'institutional layering', which includes a mutually beneficial 'division of labour between public and private standard-setting bodies.' (Cashore, Knudsen, Moon and van der Ven, 2021)

One way that organizational standards can achieve behavioural change in firms is through their conformity assessment, which (at its best) can help provide strategic

direction by supporting firms to think beyond day-to-day operational necessities. Assurance processes for assessing compliance with organizational standards can provide a deeper reach into organizational strategy than other types of standards and regulations. Interviewee B observed:

> *… It's very easy for a standard or regulation to say, please tell me these 20 or 100 pieces of information about what you're doing. The audit of that will not be: is what they're doing ambitious enough? It will be: have they reported it, and have they reported it correctly?*
>
> *ISO, on the other hand…has some standards that tell you how to do things, so that's good. And therefore, you report that you have followed a methodology. …the ISO Net Zero standard…has the very tricky question: is what this company is doing today sufficient to tell us that they are net zero aligned? I think that is the most difficult question of all, because there are so many parts of that that you have to be able to judge. Not only audit, but judge against some variable…. [it's] hard to make a black and white picture.*[15]

This quote insightfully sets out what might be seen as levels of behavioural advising, as captured by organizational standards: from (more basic) telling firms how to do things, to (deeper/more difficult) extrapolating their current behaviour to best practice principles for future trajectories. Assessing companies against what they are doing is challenging but means that organizational standards contain the promise of achieving a deeper reach into organizational practices than mandatory reporting requirements. In this way, organizational standards have a role to play that goes beyond national regulatory requirements, even where they overlap. Once adopted, their effectiveness in inducing changes to firm behaviour is shaped by several external factors, some of which we have identified in Section 2E.

One trade implication of the increase in firm-level regulation involves the shifting away from products and border checks. As set out by Pauwelyn in the context of emerging EU regulation (2024, p. 203): '…the trend is one away from physical inspection of products on a transaction basis at the point of entry, toward verification and control of firms before and especially after release of the goods.' This shift places the emphasis on quality assurance, raising the important questions of how such firm-level requirements can be effectively enforced, especially across borders. The independent third-party verification processes (e.g. conformity assessment, accreditation) associated with organizational standards promise to play an important role in assuring the implementation and effective enforcement of new regulatory requirements, as part of the role they play in Quality Infrastructure.

[15] Head of cooperative climate initiative, interviewed by Emily Lydgate and Xinyan Zhao, July 7 2024.

H. The contribution of the ISO net zero standard

The forthcoming ISO net zero standard is the first comprehensive international organizational standard supporting the net zero transition at the firm level. Based on the insights developed in this Report, we offer some thoughts on its potential contribution to the landscape of existing standards and regulation supporting the net zero transition.

The first potential contribution lies in its comprehensiveness. While a few existing standards address elements of the net zero transition, this will be the first that attempts to provide a standard for its overall achievement. Broad international participation in ISO means that its standards will likely codify, rather than innovate. Bringing best practice on the net zero transition into a single place is itself a useful contribution to addressing the problem of fragmentation of standards.

A second contribution is the relative robustness of ISO verification processes, vis-à-vis some private standards. It is as yet unclear how compliance with the forthcoming standard will be verified. However, participation of national accreditation bodies and their assurance systems in the conformity assessment process for the ISO standard will embed it in QI. This contrasts with voluntary standards based on self-certification or without third-party verification.

Finally, as compared to unilateral regulation, ISO provides process legitimacy. The emergence of CSRD and other EU unilateral regulatory requirements supporting net zero has helped to give the EU first-mover advantage, but the open approach of ISO holds the promise of inducing more widespread participation.

However, the development of the standard is not without risks. Its reliance on principles could mean that different firms might be verified as having met the standard while exhibiting vastly different levels of ambition. The moving target nature of attaining net zero makes specific targets elusive, contributing to this risk (RSE, 2024).

While relatively robust compared to some private standards, ISO standard-setting process have themselves been subject to critique. Delimatsis, for example, argues that the process of setting international standards is largely delegated to private actors, which undermines their legitimacy. He states that '…attributing to international standards developed elsewhere automatic legal force in the WTO is contrary to contemporary demands for more transparency and due process within global governance institutions….' (Delimatsis, 2014, p. 3).

6. Conclusion

Achieving net zero requires organizational strategy. A few organizational standards, both existing and in preparation, respond to this need. This Report has covered the evolution of key environmental organizational standards and how they affect firm

behaviour; why organizations adopt standards, how they affect trade, and how they affect emissions; and how standards are addressed and discussed in the context of the WTO Agreement on Technical Barriers to Trade, the most relevant WTO Agreement for net zero technical regulations and standards. It also undertook two case studies, on ISO 14064-1 and B Corp.

Our definition of organizational standards draws from an academic literature review, and identifies key features including emphasis on firm behaviour, orientation toward principles, voluntary nature, diverse and asymmetric sources, and interconnection. Of these, the most unique and prevalent features are their focus on organizational behaviour and emphasis on principles.

While there is little literature specifically examining the effectiveness of net zero-supporting organizational standards in inducing firm level change, we review a body of academic literature on a better-established environmental organizational standard, ISO 14001. We find that the success of ISO 14001 in encouraging firms to adopt better environmental practices is shaped by factors including the regulatory environment, firm-level investment, firm size, market demand, trade partner preferences and company culture. The implication is that the success of organizational standards in inducing change is contingent on several external (market and regulatory) and internal (firm-culture driven) factors.

There is a large body of academic evidence supporting that international organizational standards, including ISO 14001, help to facilitate trade and increase export. This effect occurs independently of increased regulatory cooperation between countries, as both producers and consumers voluntarily recognise the same standards and are willing to bear the associated costs. However, compliance with international standards is generally less accessible to SMEs and firms in developing countries.

The case studies provide more detail on two organizational standards that support the net zero transition. ISO 14064-1 provides guidance, including principles and methods, at the organization level for quantification and reporting of greenhouse gas emissions and removals, including direct, indirect and supply chain emissions (all 3 scopes). ISO 14064-1 is less prevalent than Greenhouse Gas Protocol, which is embedded in a number of US regulatory frameworks, such as State of California reporting requirements (California Senate, 2023). The EU allows both, but the EU Corporate Sustainability Reporting Directive (CSRD) lists GGP as default option. Both assist with conformity with a range of other regulations and standards supporting the net-zero transition. Critiques include the fact that flexibility in

calculation methods can lead to variations between firms and discrepancies in measurements, and the difficulties associated with gathering accurate data.

B Corps are firms that have been certified by the non-profit B Labs. B Corp standards cover a wide range of CSR objectives. While the certification offers a tool for companies to incrementally enhance their environmental performance, it lacks a mechanism to ensure that such improvements take place. B Corp standards are currently being updated. New climate standards will require mandatory reporting for Scopes 1-3 emissions, which will bring B Corp in line with EU CSRD. B Labs recognizes the EU CSRD as interoperable, but the EU does not recognize B Corp as constituting a basis for fulfilling CSRD reporting requirements.

In different ways, the case studies both demonstrate how the orientation of organizational standards toward principles (rather than precise and quantifiable outcomes) risks weakening these outcomes. They also reveal the large differences in governance systems and conformity assessment procedures that can exist between international and private standards. Finally, they underscore the importance of regulatory frameworks in embedding, or driving forward, standards.

Greenhouse gas accounting standards such as ISO 14064-1 comprise an example of an organizational standard which is complementary with regulation: it does not duplicate requirements, but rather supports compliance with CSRD. In contrast, B Corp certification overlaps with EU CSRD.

Duplication of requirements can lead to greater ambition. However, it also entails risks. Proliferating requirements make market access more difficult and complex, or lead to standards becoming obsolete, with potential sunk costs for firms. To remain relevant, schemes like B Corp will need to continue to ratchet upward their standards. This points to a wider contribution of organizational standards: they can act as norm innovators by identifying regulatory gaps and formulating approaches to address them.

Strengthened cooperation between the European Commission and voluntary certification schemes would help to facilitate this integration. But the desire to promote market access must be balanced against concerns regarding the trade-distortive impacts of the proliferation of private standards.

In the context of the WTO TBT Committee, many times that international standards are raised in relation to Specific Trade Concerns, it is because WTO Members are concerned that other Members are not relying on such standards when they should be. The TBT Agreement encourages countries to base their national technical

regulation on international standards where relevant. However, there is also significant controversy regarding what constitutes an international standard, and private standards have been viewed with more scepticism. The TBT Agreement and its jurisprudence retains some ambiguity.

The focus of organizational standards on internalizing principles and changing behaviour places significant demands on firms. Organizational standards that do not meet the criteria of the TBT Code of Good Practice and Principles for the Development of International Standards risk exacerbating concerns regarding the potential for voluntary sustainability standards to magnify inequalities and pose new market access challenges.

Organizational standards addressing the net zero transition, in conjunction with emerging regulatory requirements, appear set to re-shape firm-level trade strategies and international supply chains. In the context of an increasing shift towards both standards and regulation that apply to organizations, the orientation of the WTO Agreements towards products and services creates gaps. Rather than a bespoke discussion item or forum, a more realistic and feasible trajectory is that discussion of organizational standards will become increasingly integrated into existing WTO Agreements and Committees.

The pathway for the WTO to address concerns raised by organizational standards more effectively builds upon recommendations made in the context of standards more generally. These focus on better using WTO Committees to promote integration of discussion on standards and trade into the WTO, to clarify definitions and to provide more oversight over private standards.

One way that organizational standards can achieve behavioural change in firms is through accredited conformity assessment, which (at its best) can help provide strategic direction by supporting firms to think beyond day-to-day operational necessities. Assurance processes for assessing compliance with organizational standards can provide a deeper reach into organizational strategy than other types of standards and regulations.

The ISO net zero standard can contribute to the existing standards landscape through its comprehensive codification of best practice, and relative legitimacy when compared to either private standards or unilateral regulation.

Bibliography

Ahmetoğlu, S and Tanik, A, 'Management of Carbon Footprint and Determination of GHG Emission Sources in Construction Sector' (2020) 7(2) International Journal of Environment and Geoinformatics 191-204.

Andrew, J and Cortese, C, 'Carbon Disclosures: Comparability, the Carbon Disclosure Project and the Greenhouse Gas Protocol' (2011) 5(4) Australasian Accounting, Business & Finance Journal 5-17.

Banta, D, 'Developing Outcome Standards for Quality Assurance Activities' (1992) 4(1) International Journal for Quality in Health Care 25–32.

Barla, P, 'ISO 14001 Certification and Environmental Performance in Quebec's Pulp and Paper Industry' (2007) 53(3) Journal of Environmental Economics and Management 291-306.

Bartoszczuk, P and Horabik, J, 'Tradable Permit Systems: Considering Uncertainty in Emission Estimates' in Linerman, D et al., Accounting for Climate Change: Uncertainty in Greenhouse Gas Inventories – Verification, Compliance, and Trading (Springer 2007).

Bastianoni et al., 'The Connection Between 2006 IPCC GHG Inventory Methodology and ISO 14064-1 Certification Standard – A Reference Point for the Environmental Policies at Sub-national Scale' (2014) 44 Environmental Science and Policy 97-107.

Becker et al., (2024) 'Governing Net Zero: assessing convergence and gaps in the voluntary standards and guidelines landscape.' Oxford Net Zero.

Biatna, DT and Ellia, K, Standards, Practical Tools in Dealing with Climate Change (2010) 10(2) Eksergi 1-4.

Bodansky, D and Van Asselt, H, The Art and Craft of International Environmental Law (OUP 2024).

Bohnenberger, F., What is the 'regular work'? Constructing and contesting everyday committee practices in the World Trade Organization (2021) 29(6) Review of International Political Economy, 2088-2111.

Bowler, K et al., 'Understanding Firm's Approaches to Voluntary Certification: Evidence from Multiple Case Studies in FSC Certification' (2017) 145(2) Journal of Business Ethics 441-456.

Brohé, A, The Handbook of Carbon Accounting (Routledge, 2017)

Brunsson, N et al., 'The Dynamics of Standardization: Three Perspectives on Standards in Organization Studies' (2012) 33(5-6) Organization Studies 613-632.

California Senate, Climate Corporate Data Accountability Act (CCDAA), SB 253, 2023, Regular Session.

Cano, N et al., 'Assessing the Carbon Footprint of a Colombian University Campus Using the UNE-ISO 14064-1 and WRI/WBCSD GHG Protocol Corporate Standard' (2023) 30 Environmental Science and Pollution Research 3980-3996.

Carvalho, B et al., 'Can B Corp certification anchor sustainability in SMEs?' (2022) 29 Corporate Social Responsibility and Environmental Management 293-304.

Cebr, the contribution of standards to the UK economy, a report prepared for the British Standards Institute, April 2022.

Charnovitz, S 'The Law of Environmental 'PPMs' in the WTO: Debunking the myth of illegality (2002) 27(1) Yale Journal of International Law 59-110.

Christopher, S, 'ISO 14001 and Beyond: Environmental Management Systems in the Real World' (Taylor & Francis 1998).

Christmann, P., Taylor, G. 'Firm self-regulation through international certifiable standards: determinants of symbolic versus substantive implementation' (2006) 37 Journal of International Business Studies 863–878.

Clougherty, JA, Grajek M, 'The Impact of ISO 9000 Diffusion on Trade and FDI: A New Institutional Analysis' (2008) 39 Journal of International Business Studies 613-633.

Cohen, Wesley M & Levinthal, Daniel A, 'Absorptive Capacity: A New Perspective on Learning and Innovation' (1990) 35(1) Technology, Organizations, and Innovation 128-152.

Comoglio, C and Botta, S., 'The Use of Indicators and the Role of Environmental Management Systems for Environmental Performances Improvement: A Survey on ISO 14001 Certified Companies in the Automotive Sector' (2012) 20(1) Journal of Cleaner Production 92-102.

Corbett, C. J. 'Global Diffusion of ISO 9000 Certification through Supply Chains' (2006) 8(4) Manufacturing & Service Operations Management 330-350.

Curkovic, S and Sroufe, R, 'Using ISO 14001 to promote a sustainable supply chain strategy' (2011), 20(2) Business Strategy and the Environment' 71–93.

Dahlström, K et al., 'Environmental Management Systems and Company Performance: Assessing the Case for Extending Risk-Based Regulation: EMSs and Company Performance.' (2003) 13(14) European Environment 187–203.

Darnall, N. and Sides, S., 'Assessing the Performance of Voluntary Environmental Programs: Does Certification Matter?' (2008) 36(1) Policy Studies Journal 95-117.

David, PA, 'Clio and the Economics of QWERTY' (1985) 75(2) American Economic Review 332-337.

David, PA, 'Some New Standards for the Economics of Standardization in the Information Age' (1987) in Dasgupta P and Stoneman P (eds), The Economic Theory of Technology Policy (CUP 1987).

David, PA, and Greenstein, S, 'The economics of compatibility standards: An introduction to recent research' (1990) 1 Economics of Innovation and New Technology 3-41.

Delmas, MA, Montes-Sancho, MJ, 'An Institutional Perspective on the Diffusion of International Management System Standards: The Case of the Environmental Management Standard ISO 14001' (2011) 21(1) Business Ethics Quarterly 103-132.

Di Ubaldo, M., McGuire, S. & Shirodkar, V, 'Voluntary programs and emissions revisited: What is the effect of EU trade agreements with environmental provisions?' (2022) J Int Bus Policy 5, 467–489.

Dragomir, VD, 'The Disclosure of Industrial Greenhouse Gas Emissions: A Critical Assessment of Corporate Sustainability Reports' (2012) 29(30) Journal of Cleaner Production 222-237.

Du, Ming, The Regulation of Standards in the WTO (Bloomsbury, 2020).

Du, Ming, 'What is a "Technical Regulation" in the TBT Agreement?' (2015) 6(3) European Journal of Risk Regulation 396-404.

Du, Ming, 'WTO Regulation of Transnational Private Authority in Global Governance' (2018) ICLQ (67), 867–902.

Farrell, J and Saloner, G, 'Coordination through Committees and Markets' (1988) 19(2) RAND Journal of Economics 235–252.

Fonseca, L et al., 'B Corp Versus ISO 9001 and 14001 certifications: Aligned, or Alternative Paths, Towards Sustainable Development?' (2022) 29 Corporate Social Responsibility and Environmental Management 496-508.

Franchetti, M., 'ISO 14001 and Solid Waste Generation Rates in US Manufacturing Organizations: An Analysis of Relationship' (2011) 19 Journal of Cleaner Production 1104–1109.

Fritz, JMH et al., 'Organizational Ethical Standards and Organizational Commitment' (1999) 20 Journal of Business Ethics 289-299.

Funk, JL, Global Competition Between and Within Standards: The Case of Mobile Phones (Palgrave 2002).

Gallo, M et al., 'GHG Accounting for Sustainable Mega-events: How Lessons Learnt During the Milan Expo 2015 World Fair Could Lead to Less Carbon-intensive Future Mega-events' (2020) 22 Sustainable Production and Consumption 88-109.

Garud, R and Kumaraswamy, A, 'Changing Competitive Dynamics in Network Industries: An Exploration of Sun Microsystems' Open Systems Strategy' (1993) 14(5) Strategic Management Journal 351–369.

Ghermec, O and Ghermec, C, 'Research Regarding the Reduction of the Greenhouse Gases Emissions in the Academic Laboratories; Case Studies' (2013) 37 Journal of Environmental Research and Protection 61-65.

Gomez, A. and Rodriguez, MA., 'The Effect of ISO 14001 Certification on Toxic Emissions: An Analysis of Industrial Facilities in the North of Spain' (2011) 19 Journal of Cleaner Production 1091-1095.

Grajek, M, 'Diffusion of ISO 9000 standards and international trade' (2004), WZB Discussion Paper, No. SP II 2004-16, Wissenschaftszentrum Berlin für Sozialforschung (WZB), Berlin.

Green, JF, 'Private Standards in the Climate Regime: The Greenhouse Gas Protocol' (2010) 12(3) Business and Politics 1-37.

Guler, I et al., 'Global Competition, Institutions, and the Diffusion of Organizational Practice: The International Spread of ISO 9000 Quality Certificates' (2002) 47 Administrative Science Quarterly 207-232.

Hale, T, 'The Net zero Governance Conveyor Belt' (2021), Kleinman Centre for Energy Policy 1-19.

Handy, C, 'What's a Business For?' (2002) 80(12) Harvard Business Review 49-55.

Hickmann, T, 'Voluntary Global Business Initiatives and the International Climate Negotiations: A Case Study of the Greenhouse Gas Protocol' (2017) 169 Journal of Cleaner Production 94-104.

Hillary, R, ISO 14001 Case Studies and Practical Experiences (Taylor & Francis 2000).

Hoffman, AJ, 'Climate Change Strategy: The Business Logic Behind Voluntary Greenhouse Gas Reductions' (2005) 47(3) California Management Review 21-46.

Hoffman. M, Climate Governance at the Crossroads: Experimenting with a Global Response after Kyoto (OUP 2011).

Holmes, P. et al., 'Qualified market access: an economic, empirical and legal analysis' (2013) 1 (1) Journal of International Trade, 47-71.

Ivanova, A, Gray, J and Sinha, K, 'Towards a unifying theory of management standard implementation' (2014) 34(10) International Journal of Operations & Production Management 1269–1306.

Jennings, PD and Zandbergen, PA, 'Ecologically Sustainable Organisations: An Institutional Approach' (1995) 20(4) The Academy of Management Review 1015-1052.

Johnson, DM and Walck, CL, 'Integrate Environmental, Quality, and Forest Certification' (2001) 55 Annual Quality Congress 123-133.

Jones, AW and Phillips, A, 'Voluntary Business Engagement in Climate Change: A Study of the ClimateWise Principles' (2016) 137 Journal of Cleaner Production 131-143.

Kasperzak, R et al., 'Accounting for Carbon Emissions – Current State of Sustainability Reporting Practice under the GHG Protocol' (2023) 15 Sustainability 994-1011.

Kim S and Schifeling T, 'Good Corp, Bad Corp, and the Rise of B Corps: How Market Incumbents' Diverse Responses Reinvigorate Challengers' (2022) 67(3) Administrative Science Quarterly 674-720.

Kim, Minjung, 'The 'Standard' in the GATT/WTO TBT Agreements: Origin, Evolution and Application' (2018) 52(5) Journal of World Trade 765-788.

King, AA et al., 'The Strategic Use of Decentralized Institutions: Exploring Certification With the ISO 14001 Management Standard' (2005) 48(6) Academy of Management Journal 1091-1106.

Kono, J et al., 'Trade-off Between the Social and Environmental Performance of Green Concrete: The Case of 6 Countries' (2018) 10(7) Sustainability 2309-2322.

Lang, A and Messenger, G, 'The Standards-Regulation Nexus: Mapping the Ecosystem of Standardisation', British Standards Institute, May 2024.

Lash, J & Wellington, F, 'Competitive Advantage on a Warming Planet' (2007) 85 Harvard Business Review 94-102.

Lee, SY, Park, YS, and Klassen, RD, 'Market Responses to Firms' Voluntary Climate Change Information Disclosure and Carbon Communication' (2015) 22(1) Corporate Social Responsibility and Environmental Management 1-12.

Lin, Li Wen, 'Mandatory Corporate Social Responsibility Legislation around the World: Emergent Varieties and National Experiences' (2021) 23(2) University of Pennsylvania Journal of Business Law 429-469.

Liute, A and De Giacomo, MR, 'The Environmental Performance of UK-based B Corp Companies: An Analysis Based on the Triple Bottom Line Approach' (2022) 31 Business Strategy and the Environment 810-827.

Marquis, C, How the B Corp Movement Is Remaking Capitalism (Yale University Press 2020).

Martínez-Blanco, J et al., 'Scoping Organisational LCA – Challenges and Solutions' (2015) 20 The International Journal of Life Cycle Assessment 829-841.

Mavroidis, P.C. and Wolfe, R. 'Private Standards and the WTO: Reclusive No More' (2017) 16(1) World Trade Review 1-24.

Mosgaard, MA, Kristensen HS, 'Companies That Discontinue Their ISO14001 Certification – Reasons, Consequences and Impact on Practice' (2020) 260 Journal of Cleaner Production 121052.

Nemati M et al., 'The ISO 14001 Standard and Firms' Environmental Performance: Evidence from the U.S. Transportation Equipment Manufacturers' (2019) 44(2) Journal of Agricultural and Resource Economics 422-438.

Nguyen, QA and Hens L, 'Environmental Performance of the Cement Industry in Vietnam: The Influence of ISO 14001 Certification' (2015) 96 Journal of Cleaner Production 362-378.

Paroussos, L et al 'Climate Clubs and the Macro-Economic Benefits of International Cooperation on Climate Policy' (2019) 9 Nature Climate Change 542-546.

Pauwelyn, Joost, 'Twenty-first century customs fraud: how to effectively enforce EU sustainability requirements on imports', Journal of International Economic Law, 2024

Pelletier, N., Allacker, K., Pant, R. *et al.* The European Commission Organisation Environmental Footprint method: comparison with other methods, and rationales for key requirements. *Int J Life Cycle Assess* **19**, 387–404 (2014), p. 404

Pinkse, J and Kolk, A, International Business and Global Climate Change (Routledge 2009).

Prakash, A and Potoski, M, The Voluntary Environmentalists: Green Clubs, ISO 14001, and Voluntary Regulations (CUP 2006).

Prakash, A, Potoski M, The Voluntary Environmentalists: Green Clubs, ISO 14001, and Voluntary Regulations (CUP 2006).

Reverdi, C, 'Building a New Reputation: The Impacts of Adopting Voluntary Standards', Geneva Graduate Institute, 24 July 2024, pp. 1-60.

Royal Society of Edinburgh (RSE) commissioned by the British Standards Institution (BSI), 'A more sustainable future: the role of the quality infrastructure in scaling net zero', October 2024.

Russell, AL, 'Standardization in History: A Review Essay with an Eye to the Future' (2005) 247 The Standards Edge: Future Generations 260-277.

Salim, HK et al., 'Global Trends in Environmental Management System and ISO14001 Research' (2018) 170 Journal of Cleaner Production 645-653.

Schepers, D., 'Challenges to Legitimacy at the Forest Stewardship Council' (2010) 92(2) Journal of Business Ethics 279-290.

Shepherd, B, 'International standards and trade: What does the research say?' (2020), ISO Research and Innovation 1-16.

Stubbs, W, 'Characterising B Corps as a Sustainable Business Model: An Exploratory Study of B Corps in Australia' (2017) 144 Journal of Cleaner Production 299-312.

Sundin, H and Ranganathan, J, 'Managing Business Greenhouse Gas Emissions: The Greenhouse Gas Protocol – A Strategic and Operational Tool' (2002) 9(2) Corporate Environmental Strategy 137-147.

Sustain, 2019, Response to UK Government consultation on US-UK Free Trade Agreement:
https://www.sustainweb.org/news/jul19_us_trade_consultation_response/

Tarí, Juan José et al., 'Benefits of the ISO 9001 and ISO 14001 Standards: A Literature Review' (2012) 5(2) Journal of Industrial Engineering and Management 297-322.

Testa, F et al., 'EMAS and ISO 14001: The Differences in Effectively Improving Environmental Performance' (2014) 68 Journal of Cleaner Production 165–173.

Treacy, R et al., 'ISO14001 Certification and Operating Performance: A Practice-based View' (2019) 208 International Journal of Production Economics 319-328.

Tushman, ML and Rosenkopf, L, 'Organizational Determinants of Technological Change: Toward a Sociology of Technological Evolution' in Cummings, LL and Staw, BM (1992) (eds), Research in Organizational Behavior (JAI Press 1992).

Uddin, N and Holtedahl, P, 'Emission trading schemes – avenues for unified accounting practices,' Journal of Cleaner Production, 52, 2013, 46-52.

UK Government, 2020, UK-US Free Trade Agreement, available at: https://assets.publishing.service.gov.uk/media/5e5ce566d3bf7f06f6ece234/UK_US_FTA_negotiations.pdf

UNCTAD, Voluntary Sustainability Standards, Sustainability Agenda and Developing Countries: Opportunities and Challenges (2022), 5th Flagship Report of the United Nations Forum on Sustainability Standards.

UNIDO (2024) 'Tackling climate change: Fostering trust in climate action through quality and standards.'

Vranes, E., Trade and the Environment: Fundamental Issues in International Law, WTO Law, and Legal Theory (Oxford 2009).

Werner, RO and Katz, BJ, 'Regulation of product characteristics' (1976) 40(3) Journal of Marketing 95–97.

Wijkström, E, McDaniels, D, 'International Standards and the WTO TBT Agreement: Improving Governance for Regulatory Alignment' (2013), WTO Staff Working Papers ERSD-2013-06, World Trade Organization (WTO), Economic Research and Statistics Division.

Wijkstrom, E., The third pillar: Behind the scenes, WTO Committee work delivers. In ICTSD E15 task force on Regulatory System Coherence (2015).

Wirth, D.A., 'The International Organization for Standardization: private voluntary standards as swords and shields,' (2013) in: Geert Van Calster & Denise Prévost (ed.), Research Handbook on Environment, Health and the WTO, 139-163, Edward Elgar Publishing.

WTO Appellate Body Report, European Communities – Measures Prohibiting the Importation and Marketing of Seal Products (EC – Seal Products), WT/DS400/AB/R, adopted on 18 June 2014.

WTO Appellate Body Report on United States – Measures Concerning the Importation, Marketing and Sale of Tuna and Tuna Products (US – Tuna II), WT/DS381/AB/R, adopted 16 May 2012.

WTO Panel Report on European Union and Certain Member States – Certain Measures Concerning Palm Oil and Oil Palm Crop-Based Biofuels (EU – Palm Oil), WT/DS600/R, adopted 5 March 2024.

WTO, 'Review of the Operation and Implementation of the SPS Agreement: Draft Report of the Committee', World Trade Organization, Committee on Sanitary and Phytosanitary Measures, G/ SPS/W/280/Rev.1, 18 September 2014.

WTO, World Trade Report (2022): Climate Change and International Trade. Available at: https://www.wto.org/english/res_e/booksp_e/wtr22_e/wtr22_e.pdf

WTO, 'What yardstick for net zero? How WTO TBT disciplines can contribute to effective policies on carbon emission standards and climate change mitigation' WTO Information Brief 6, 2022. Available at: https://www.wto.org/english/news_e/news21_e/clim_03nov21-6_e.pdf

WTO, Guidelines on Conformity Assessment Procedures, Committee on Technical Barriers to Trade, G/TBT/54, 19 March 2024.
Ziegler, A and Rennings, K, 'Determinants of Environmental Innovations in Germany: Do Organizational Measures Matter?' Discussion Paper 04-030, Centre for European Economic Research (ZEW), Mannheim, Germany, 2004.

Ziegler, AR and Sifonios D, 'The Assessment of Environmental Risks and the Regulation of Process and Production Methods (PPMs) in International Trade Law' in Monika Ambrus (ed.), Risk and the Regulation of Uncertainty in International Law (OUP 2017).

Zobel, T, 'ISO 14001 Adoption and Industrial Waste Generation: The Case of Swedish Manufacturing Firms' (2015) 33(2) Waste Management & Research 107-113.