Rising Powers and Global Standards

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Low carbon standards and labels in Rising Powers

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ABSTRACT

This paper examines the emergence of product carbon footprint standards and labels in developed countries, and in rising powers and other emerging economies, as one of the key drivers of the future global economy. The paper provides an answer to two sets of sub-questions addressed in this special issue: First, how do rising power firms, taking on more substantive roles in global production networks, engage with environmental standards, above all with sustainability standards focused on product carbon footprints and emission reductions in their supply chains? Second, to what extent and how are the rising powers likely to become active setters of sustainability standards in tomorrow's markets? The underlying question is what strategies rising power actors like China take in response to carbon standards. The core argument of the paper is that these actors do not have the choice of whether to, but only how to, react to the emergence of international carbon standards. Neither ignoring nor mitigating these types of standards is a promising option for rising power actors, at least in the short run. The most promising pathway is to leverage certain types of carbon standards, above all by creating standards that are tailored to the needs and interests of rising powers, but also by engaging in international standard-setting processes.

Carbon labels, developing countries, emerging economies, global supply chains, international standards, low carbon development, product carbon footprint, sustainability standards

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INTRODUCTION

Over the last decade, a new wave of sustainability standards has emerged (Zadek, 2010a, Boström and Klintman, 2008, Manning et al., 2011, Sudarsan et al., 2011, Riisgaard, 2011, Seuring et al., 2008). Numerous voluntary standards are beginning to fill the gap left by insufficiently regulatory statutory frameworks. The new sustainability standards cover a broad range of issues including extractive industries, sustainable forestry and carbon emissions (Guoqiang et al., 2010). To what extent these initiatives will strengthen the continuous progress of sustainability practices hinges crucially on how they are regarded and to what extent they are adopted by the companies and governments of the rising powers—Brazil, South Africa, India and China (Zadek, 2010a). It is important to examine this issue from the rising powers' perspective because of the significance of these economies in various dimensions, above all in terms of the enormity of their potential impact on the global economy, their current and future energy use and their role in some critical extractive sectors. Albeit still in their initial stages, carbon-labelling schemes have been surfacing swiftly in the developed world—and beyond. This paper examines the emergence of product carbon footprint standards and labels in developed countries, and in rising powers and other emerging economies, as one of the key drivers of the future global economy.

The appearance and evolution of sustainability standards such as carbon footprint standards in rising powers and emerging economies raises many issues that require further study. While there are a limited number of analyses of the implementation of carbon footprint schemes in developed countries, the emergence of carbon footprint labelling schemes in rising powers has not yet been explored. Moreover, while standards play an increasingly important role in international trade and global value chains, little is known about their role in value chains in rising powers and beyond. While considering some evidence from other rising powers, this paper focuses particularly on China because, while certainly not characteristic of all rising powers and emerging economies, China, in light of its large manufacturing base and increasing significance in global markets, can be considered as the acid test of how rising powers might engage with sustainability challenges. The core question is whether rising powers and their firms, supported by their governments, are likely to drive down international sustainability standards that affect producers and consumers across the world or whether they are more likely to strengthen them in light of their interest in being 'leaders' in a viable global

economy. In order to shed light on this issue, this paper provides an answer to two sets of sub-questions addressed in this special issue: First, how do rising power firms, taking on more substantive roles in global production networks, engage with environmental standards, above all with sustainability standards focused on product carbon footprints and emission reductions in their supply chains? Second, to what extent and how are the rising powers likely to become active setters of sustainability standards in tomorrow's markets? The underlying question is what strategies rising power actors might take in response to carbon standards. Building on Zadek (2010a), this paper assesses four options: ignoring, mitigating, promoting and leveraging carbon standards and labels. The paper argues that rising power actors do not have the choice of whether to, only how to, react to the emergence of international carbon standards. It illustrates that firms in rising powers are pursuing different approaches for different standards. Regarding carbon standards, the paper argues that neither ignoring nor mitigating them is a promising option for Chinese actors, at least in the short run. Moreover, it argues that the most promising pathway is to leverage certain types of carbon standards, above all by creating Chinese carbon standards that are tailored to Chinese needs and interests, but also by engaging in international standard-setting processes. The paper also makes the case that product carbon footprints have become a key element in governing global value chains and that the spillover effects of carbon standards and labelling schemes in developed countries and rising powers may have a negative impact on producers in less developed countries.

The paper is structured as follows. It begins by providing a summary of carbon standards and labelling initiatives in developed countries. Next, it explores how the emergence of carbon footprint standards and labels affects the governance of global value chains. After that, it focuses on the challenges rising powers and less developed countries are facing in light of the emergence of such standards. Against this background, the following section assesses how emerging powers are engaging with carbon standards and labels, and the final section provides concluding comments.

CARBON STANDARDS AND LABELS

Product carbon footprint standards and labels can contribute to the transition to a more sustainable consumption and production culture that is necessary in order to combat climate change (Micallef-Borg, 2010). Carbon standards and labels can increase awareness and

empower consumers by providing them with the information they need to choose less carbon-intensive products but they can also have an effect on a firm's production processes, independently of whether consumer decisions are shaped by the label: uncovering greenhouse gas hotspots—when measuring a product's carbon footprint—can help firms to save money by reducing the energy and resource use in the production process. From an environmental perspective, the question is how substantial is the emission reduction potential of carbon labelling (Upham et al., 2011). For example, in the case of LCD televisions, greenhouse gas emissions could be cut by 36 per cent if alternative parts were used (Songa and Lee, 2010). Product carbon footprint labelling schemes do not just bring environmental benefits, though; they can also generate economic benefits for participating companies. For example, in March 2009, Walker's Crisps reported that it had reduced its carbon emissions by 7 per cent and saved £400,000 on its bottom line as a direct result of its carbon footprinting and reduction exercises (UK Trade & Investment and Economist Intelligence Unit, 2010). For some companies, declaring carbon footprints on products can provide competitive advantages. For example, Tate & Lyle in the UK reportedly likes to show how carbon competitive its sugar is—even though its cane comes from Caribbean and Pacific countries—by pointing out that making 1 kg of Tate & Lyle sugar generates only 380g of carbon dioxide, compared with competitor Silver Spoon's 500g (Gardner, 2010). In addition, retailers are playing an ever increasing role, as will be discussed in more detail below: various key retailers are creating demand for lower-carbon products and demanding carbon accountability (eg, Tesco in the UK, Casino in France and Wal-Mart in the US). Some jurisdictions in Asia, for example, have taken up carbon labelling partly in response to initiatives by the global retailers on whom they depend for exports. While pursuing voluntary carbon labelling efforts can be an attempt to circumvent the introduction of mandatory regulations and rigid penalties for non-compliance, they can also be part of a Corporate Social Responsibility (CSR) plan (Zadek et al., 2003).

Most carbon labels are theoretically voluntary, but numerous voluntary schemes are in effect compulsory for producers who want to put their products into certain markets. Private labels mostly relate to food and agricultural products, but they also cover manufactured goods, such as clothes, footwear and cell phones. Three kinds of carbon labels are currently being applied (Carbon Label CA, 2011): First, low-carbon seals, which are granted to producers who stay within a specific carbon efficiency limit or have committed to reduce their emissions during the production process, are simple to grasp but do not help consumers to distinguish between different products that have been granted the seal. Second, carbon scores, granted on the basis

of the product's carbon footprint, allow comparisons across various products and brands. Third, carbon ratings, a tiered approach that resembles the energy label in Europe with its five-star system, permit comparisons between brands, at least if the average product score is known.

Currently, more than thirty carbon footprinting schemes exist across many developed countries, including the UK, the US, France, Switzerland, Canada, Germany and Sweden. As will be discussed below, product carbon footprint labelling is not only being implemented in developed countries but also in rising powers and other emerging economies. The largest existing scheme is the Carbon Reduction Label (CRL), operated by The Carbon Trust, a not-for-profit company set up by the UK government. The Carbon Trust has labelled over 2,800 products since 2007 using the PAS 2050 standard. The supermarket chain Tesco has carbon footprinted 1,100 products in the UK, more than 500 Tesco products currently display the label (Tesco, 2011), and its goal is to achieve the labelling of the entire product range of 70,000 items (Bridges, 2008). Carrefour and Wal-Mart have also announced low-carbon policies requiring the products they sell to display carbon labelling. In 2011, the European Commission released a draft version of an EU environmental footprinting methodology, currently under development. France planned to introduce compulsory carbon labelling on all products by January 2011 but instead initiated a one-year voluntary trial programme starting in 2011, to investigate how well the environmental information is perceived by consumers and how the requirements should be generalized for all products (Moïsé and Steenblik, 2011). Compulsory carbon labelling would actually be part of a larger initiative in France regarding mandatory environmental labelling. The Japanese government started a comparable pilot, the Carbon Footprint System (CFS), in 2009.

A carbon label is meant to depict the greenhouse gas emissions that can be ascribed to a specific product. The so-called product carbon footprint is usually calculated on the basis of a Life Cycle Assessment (LCA), which attempts to measure the carbon used from 'cradle to grave' (Bolwig and Gibbon, 2009), that is at various stages in the life cycle of a product, including its production, processing, transport and storage. Currently, carbon standards are based on three main methodologies: The first, the Publically Available Standard (PAS) 2050, was initiated in 2008 by the British Standards Institute and revised in October 2011.[2] It is used

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[2] Some of the changes arising from that review were as follows: provision for the development and application of 'supplementary requirements' to enable more specific assessments of greenhouse gas

for a broad range of different products. Certain greenhouse gas emissions are not part of the PAS 2050 assessment, including those attributed to the production of capital goods (eg equipment and buildings) used in the life cycle of the product, employees travel to work, human energy inputs, and animals providing transport services (Bolwig and Gibbon, 2009). Excluding the first two of these gives rise to a bias that disadvantages products from rising powers and developing countries, where production is relatively labour-intensive and employees are more prone to using public or non-motorized means of transport, as it artificially reduces the footprints of goods produced in industrialized countries; excluding the last two yields a bias, albeit probably much weaker, in favour of products from rising powers and developing countries (Bolwig and Gibbon, 2009).

Second, the International Organization for Standardization (ISO) has started work on a 'carbon footprint of products' with the aim of adding it to its ISO 14000 series of environmental management standards (ISO, 2009). The standard, to be made available in 2012, consists of two parts: ISO 14067-1 quantifies the carbon footprint of a product and tracks progress in greenhouse gas emission reductions, while ISO 14067-2 harmonizes methodologies for carbon footprinting (Bolwig and Gibbon, 2009). The standard is chiefly based on the existing ISO standards for life cycle assessments, ISO 14040/44, and environmental labels and declarations, ISO 14025.

Finally, the World Resources Institute (WRI) and the World Business Council on Sustainable Development (WBCSD) have developed the Product and Supply Chain Accounting and Reporting Standard, which also has two components: (1) product life cycle accounting and reporting and (2) Corporate Value Chain (denoted 'Scope 3') accounting and reporting, which measures indirect emissions other than brought-in energy. In October 2011, the two new greenhouse gas emissions Protocol Standards for Product and Value Chain Greenhouse Gas Emissions assessments were officially released. The standards establish the first internationally agreed-upon approaches for measuring and reporting greenhouse gas emissions throughout product life cycles and corporate value chains. The vision is that, in the next decade, performing scope 3 inventories and integrating them as a key component of a climate change management strategy, will become standard business practice worldwide, including in rising powers such as China, India, and Brazil.

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emissions within sectors or product groups, the inclusion of emissions from biogenic sources (eg, biomass), and greater clarity on the treatment of recyclable materials.

So far, most national governments and international organizations have not played a major role in the development of product carbon footprint standards or in the establishment of product carbon footprint certification schemes (Sullivan and Gouldson, 2011). The exception is the UK Department for Environment, Food and Rural Affairs (Defra), which supported the development of the PAS 2050. On a smaller scale, the French Agence de l'Environnement et de la Maîtrise de l'Energie (ADEME) has assisted in the development of a scheme operated by the retailer Casino, based on its elaborate methodology for corporate greenhouse gas emissions accounting and, as mentioned above, both the French and the Japanese governments have launched product carbon footprint pilots.

There is no single body that manages all the actors and organizations developing or introducing product carbon footprints, or guarantees that their standards are coherent (Cosbey et al., 2010). Yet, as in the case of other types of international standards (Nadvi, 2008), there are attempts at convergence on carbon standards in light of the emerging recognition that further standardization of the methods used for product carbon footprinting is needed. The Carbon Trust, ISO and the WRI are collaborating to further the global harmonization of product carbon footprint standards (Bolwig and Gibbon, 2009). The latest comparison of the most important product carbon footprint initiatives illustrates that there is potential for a harmonization of methodologies (Micallef-Borg, 2010). Yet, as with other international standards (Nadvi, 2008), despite attempts at convergence, company codes of conduct continue to remain relevant, and are dynamic, influenced by the ever-changing debate on carbon, carbon footprinting and regulation in this area.

CARBON STANDARDS AND VALUE CHAIN GOVERNANCE PATTERNS

This section turns to the relationship between carbon standards and global value chains from the perspective of governance and argues that product carbon footprints have become a key element in governing global value chains. Value chain governance can be defined as an organization's ability to define and enforce production parameters and product attributes, including formal (eg, contracts) and informal (eg, trust) instruments, control processes (eg, 'just in time'), information systems, structures and networks (International Trade Centre, 2011). Value chain governance can be described using a continuum of five types of relationships between firms (Gereffi et al., 2005): market based, modular networks, relational networks, captive networks and hierarchical relationships. In light of Gereffi et al.'s (2005)

framework, this section assesses how carbon footprint standards influence the nature of relationships and the type of governance in value chains: do such standards favour a market type of governance, driven by arm's-length relationships, and result in more market-based transactions, or are they a tool for tighter links between value chain actors, enhancing closer, explicit coordination of the relationships between global retailers and lead firms and their developing country suppliers?

From a governance perspective, standards are essential for 'inter-firm' relationships because they offer the possibility to codify complex forms of information and diminish transaction costs (Ponte and Gibbon, 2005, Gereffi et al., 2005, International Trade Centre, 2011, Nadvi and Wältring, 2004). Many standards enhance the codifiability of information and their implementation can thus shift the governance of inter-firm relationships from more hierarchical to more modular or market-based types of links, demanding less coordination by lead firms (Sturgeon, 2003, Gereffi et al., 2005). Yet, in the case of concerns over product carbon footprints and corporate emission reduction, standards increase rather than diminish the need for explicit coordination of the value chain. The companies that are reducing their emissions along the supply chain are working directly with, and building closer links with, suppliers to help reduce their greenhouse gas emissions, and are engaging in explicit coordination with independent audits and spot checks of suppliers. To illustrate, consider the case of the impact of the Carbon Disclosure Project, a London-based not-for-profit organization focused on driving the detailed reporting of carbon emissions by companies, and strategies for carbon dioxide mitigation in the supply chain. Its members are trying to make a difference by engaging with their suppliers and are making use of their increasing influence and power to bring about change. For example, they have put in place 'differentiated levers' to engage with their suppliers, including redesigning products, reducing demand for carbon-intensive purchases, working with suppliers to reduce emissions and introducing effective carbon management as a supplier selection criterion (Carbon Disclosure Project, 2011). In sum, close cooperation and explicit coordination with suppliers to develop carbon reduction strategies is the only way to reduce the overall carbon footprint of a product. This result, in turn, is in line with the finding that 'the need for chain coordination has not declined with the imposition of process standards around environmental, labour and social concerns' (Nadvi, 2008: 338).

The case of carbon footprint standards, and environmental standards in general, also provides a better understanding of how value chains can change significantly following the implementation of standards. While some actors can be excluded from value chains, new ones come in while others take on new roles (International Trade Centre, 2011). For example, Wal-Mart announced recently that it would no longer purchase from Chinese suppliers with poor environmental performance records. If they want to supply Wal-Mart, Chinese companies now have to present certification of their compliance with China's environmental laws and regulations (Ma et al., 2010, Meyer, 2011). Wal-Mart, which procures from over 10,000 Chinese suppliers, also conducts audits of factories' performance against specific environmental criteria, such as emissions, while Wal-Mart China has said it plans to include carbon footprint labels on its products (Ma et al., 2010, MacGillivray et al., 2009). Indeed, according to a study published by The Carbon Trust, 50 per cent of multinationals have decided to choose their suppliers based on carbon performance in the future, with 29 per cent of suppliers likely to lose their places on 'green supply chains' if they fail to exhibit satisfactory performance records on carbon (Dynamic Markets, 2011).

SUSTAINABLE VALUE CHAINS, RISING POWERS AND LESS DEVELOPED COUNTRIES

Rising powers face a number of challenges regarding the measurement and reduction of greenhouse gas emissions along the supply chain and the corresponding footprinting and labelling of products (Sullivan and Gouldson, 2011). Especially in rising powers such as China, suppliers are confronted with several financial barriers to operating more sustainably—regardless of the mounting demands that they advance their environmental performance: First, whereas reducing emissions by cutting back on the use of resource-intensive energy offers lasting cost savings in the future, the reimbursement for undertaking such sustainable investments can take several years, which is not viable for most suppliers in rising powers (Ma et al., 2010). Second, conducting the required analysis for carbon product labelling takes time and is costly, which is an obstacle for many producers, in rising powers and beyond. The cost of conducting a LCA can be very high for small and medium-sized enterprises (Moïsé and Steenblik, 2011): they may be relatively more disadvantaged than larger enterprises, that can absorb the extra costs more easily (Dresen and Herzog, 2009). Moreover, the general level of record-keeping and the accessibility of the energy data required for analysis is much lower in emerging economies such as China than in Europe (Lancaster, 2011). Effective participation in a carbon labelled trade requires measurement and

certification mechanisms that are often lacking (Brenton et al., 2009). Third, multinational buyers are frequently reluctant to modify purchasing commitments and contracts for suppliers in rising powers that invest in advancing their sustainability performance (Ma et al., 2010). Fourth, suppliers from China are confronted with increasing resource and labour costs, which deters them from further elevating operating costs by making environmental investments (Ma et al., 2010). Fifth, a large share of suppliers in rising powers are small and medium-scale enterprises (SMEs) with restricted access to formal financing channels, which means they often lack the financial means to make environmental investments (Ma et al., 2010).[3] Furthermore, while the high use of coal-based electricity generation in China is beyond the control of individual companies, it does negatively affect their footprints compared to European producers' (Lancaster, 2011). Last but not least, suppliers in China and other rising powers suffer from strong competition from thousands of firms, both domestic and international: the question then is whether and how they can—with a view to strategic repositioning that moves them up the value chain—adopt sustainability standards without losing competitiveness in the process (Ma et al., 2010, Guoqiang et al., 2010).

International trade, global supply chains and integrated production networks cause carbon footprint labelling requirements in end-use countries to spill over into other countries along supply chains (Xunpeng, 2010). In light of the importance of global value chains and highly integrated production networks, the implementation of carbon footprint standards in developed countries and rising powers can generate a considerable impact on other actors in these chains and networks, above all in less developed countries. This is especially pertinent for small firms in developing countries, due to their limited capacity to measure and label the carbon footprints of their products.

So far, many of the product carbon footprint labelling schemes have focused on agricultural goods and food products, which may offer certain benefits to less developed countries: given their often favourable climates and use of technologies that are typically less carbon-intensive, their participation may create more (probably cost-effective) opportunities to reduce carbon emissions in the products' overall life cycles (Brenton et al., 2009). However, carbon labelling is increasingly being implemented for other product categories, such as industrial products. In this case, the positive effects of such schemes are much more uncertain. Yet, footprinting

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[3] While many firms in rising powers are SMEs, in some sectors, such as electronics, Chinese first-tier suppliers (or original equipment manufacturers) are quite large firms, and it may well be in these larger firms that we will observe more concerted attempts to address carbon footprinting standards.

activities are rapidly expanding beyond agricultural goods and food products. Against this background, smaller producers, and producers from developing countries, are worried about the emerging product carbon footprint standards.

There are a number of general methodological reasons for concern, insofar as product carbon footprint standards are inherently imprecise, and are shaped by the assumptions hidden in the life cycle data inventories and models on which they are based. A majority of these general concerns pose special challenges for less developed countries: First, there is no scientific consensus on assessing a product's carbon footprint (Plassmann et al., 2010). Second, while advantageous production conditions can counterbalance the transport disadvantages, numerous developing countries are far away from developed country markets, generating higher carbon footprints because of supplementary transportation emissions (Brenton et al., 2009). Third, emissions can fluctuate according to season and location, and the footprint should also be adjusted depending on whether the electricity used in its life cycle originates from fossil or renewable sources (Brenton et al., 2009). Fourth, the Land Use Conversion (LUC) framework, which is usually part of agricultural product LCA and refers to the emissions generated by clearing natural land in order to convert it into agricultural land, disadvantages developing countries insofar as developed countries created their agricultural land so long ago that it has no effect on present carbon footprints (Brenton et al., 2010, Bolwig and Gibbon, 2009).

In sum, even a refined LCA would not guarantee the removal of concerns over carbon standards and labels in developing countries. Methodological biases in the LCA can have a heavy impact on developing countries because of the large effect methodology has on product carbon footprints (Plassmann et al., 2010). In light of these concerns, transparent use of carbon footprint methodologies is important, with data sources, uncertainties and variability explicitly noted. This is particularly pertinent because, as noted above, in a globalized world, spillover effects will become increasingly important and complicated, and may have effects on producers in countries that have not implemented these standards and labels.

CARBON STANDARDS AND RISING POWER STRATEGIES

This section assesses how emerging powers are engaging with international standards on carbon emissions and carbon footprinting. Are they opting in or opting out when it comes to

adopting such standards? Are they developing their own standards, and if so, how do their standards differ from global norms?

Rising power firms going global are being confronted with a new wave of sustainability standards in international markets. As will become clear in the course of this section, the strategic question for rising power actors is not whether, but how, to react to the emergence and spread of these novel international standards. An adequate response hinges on two key variables: the actual or potential effect of any specific standard on rising power firms' competitive position, and the ability of rising power firms to shape that standard (Zadek, 2010a). Considering these two variables, together with the expected significance of the standard in question, generates a strategic framework with the following four options for rising power actors to respond to the emergence of international standards: (1) *ignore*: avoid adoption if the standard and its proponents are of limited or no importance to the rising power's competitiveness and if the rising power has little opportunity to shape the standard itself; (2) *mitigate:* limit the effect of the standard if the rising power has no possibility of transforming the standard and if it could, if effective, decrease the rising power's competitiveness; (3) *promote*: push for a widespread standard, if the rising power actors are able to shape the standard so as to improve their competitiveness; (4) *leverage*: advance a new or underused standard if its wider use would improve their competitiveness (Guoqiang et al., 2010, Zadek, 2010b).

This section focuses on carbon standards and argues that ignoring this type of standard is hardly an option for rising powers like China because they are of crucial importance to their competitiveness. Next, it argues that mitigating the impact of carbon standards is also hardly possible because, due to their 'cradle-to-grave nature', they automatically filter throughout global value chains, of which China is usually a part. Promoting internationally well-established standards is not in China's interest as they tend not to enhance Chinese competitiveness. This, as will be argued below, leaves China with essentially one promising option at present: leveraging certain standards, mainly by creating carbon standards that suit the Chinese context, but also by trying to engage in the international standard-setting process.

Opting In? Ignoring or Mitigating Carbon Standards

The first possible response in the face of international standards is opting in: the strategy here

is to adopt prevailing sustainability standards, already established in international markets, with rising power firms 'signing up' and competing on the same terms as other global firms (Guoqiang et al., 2010). Opting out, on the other hand, refers to rising powers and their firms seeking to get around complying with prevailing international standards.

In terms of adopting voluntary sustainability standards more generally, China has set high targets for opting in. The government's objective is to make sure that 90 per cent of all standards used in China will be in alignment with international standards by 2020. Moreover, Chinese firms, particularly those going global, are starting to become aware of the value of widening the range of standards they apply (Xiaohong et al., 2009). For instance, Chinese firms are becoming more and more confident in taking up international process standards such as the Global Reporting Initiative (GRI), the International Organization for Standardization (ISO) and Occupational Health and Safety (OHS) and sustainability standards (MacGillivray et al., 2009). Possibly most remarkable is the implementation of Forest Stewardship Council (FSC) principles and criteria, with FSC certifications in China rising from zero to over 300 between 1998 and 2007, indicating that Chinese businesses have adopted an 'opt in and promote' approach to existing international sustainability standards in the context of sustainable forestry (MacGillivray et al., 2009, Zadek, 2010a).[4] Yet, in a number of cases, Chinese firms are currently choosing to ignore and, if necessary, avoid adhering to voluntary international sustainability standards. As an example, the case of the extractive industry—regarding efforts to address its footprint and often strongly negative social and environmental impacts—is noteworthy. The current initiatives in that sector are remarkable in that there has been practically no involvement from China—neither by Chinese firms nor the government (Guoqiang et al., 2010).

Do Chinese firms also opt for the 'ignoring' pathway in the case of carbon standards? While Chinese companies are slowly becoming more active in this realm, their uptake is still rather low. Yet, the small number of cases of opting-in can hardly be attributed to a strategy of ignoring carbon standards, since it is not true that these standards are of little or no importance to Chinese competitiveness. On the contrary, they are crucial because production in China is strongly emission-intensive, which in turn implies relatively high product carbon footprints for Chinese production processes. On the other hand, cutting emissions could generate

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[4] The adoption of social standards such as Social Accountability International's SA8000 has been much less prevalent (see Macgillivray, A., et.al., 2009)

substantial cost reductions and, in the longer run, China could mitigate the impact of existing carbon standards by reducing the carbon-intensity of its production and following an increasingly low-carbon pathway of economic development. Yet, in the short run, the mitigation pathway is hardly promising because the move towards low-carbon production processes takes time while carbon standards, due to their 'cradle-to-grave' nature, automatically and immediately filter to rising powers like China through global value chains, as will be discussed in more detail in the next section.

Standards Filtering Through to Rising Powers

Since the LCA for carbon standards is a 'cradle-to-grave' approach, implementing carbon labels requires information about the product carbon footprint at each step of the supply chain involved in moving a product from supplier to customer. The requirements of product carbon footprint labelling are thereby transmitted from end-user countries to other countries involved in the supply chain (Xunpeng, 2010). In fact, the emissions produced by suppliers in the development of products and services are acknowledged as one of the most important contributors to company carbon footprints. Over 50 per cent of an average corporation's carbon emissions typically come from the supply chain rather than from within its own four walls (Carbon Disclosure Project, 2011). Managing supply chain carbon emissions is thus critical in order to enhance efficiency and reputation and meet compliance with carbon footprint standards with a view to mitigating climate change effectively. Indeed, 93 per cent of multinationals are addressing their own direct carbon emissions and 40 per cent are already addressing the indirect carbon emissions of their supply chains; 42 per cent of those companies not yet addressing supply chain emissions, will do so within the next twelve months and a further 42 per cent will do so within the next two to three years (Dynamic Markets, 2011). The latest Supply Chain report of the Carbon Disclosure Project, based on a survey of its 57 member companies and many of their suppliers, indicates that these climate change leaders have a great influence on their suppliers and are using their power ever more to trigger a chain reaction in favour of more sustainable value chains (Carbon Disclosure Project, 2011). With a considerably stronger emphasis on monitoring, measurement and verification, retailers and manufacturers such as Wal-Mart, Marks and Spencer, IBM, Proctor and Gamble, Puma, Ford, Intel, Pepsi, Unilever, among many others, have announced that they are undertaking major efforts to involve, cooperate with and track suppliers and their sustainability efforts, with a focus on the large companies' carbon footprints. While the

sustainable supply chain requirements of these firms are starting to have global implications in rising powers and beyond, the impacts are particularly substantial for Chinese firms because of China's role as the world's factory and leading global exporter (Ma et al., 2010).

Due to spillover effects, product carbon footprint standards are indeed becoming increasingly important in rising powers such as China. For instance, in 2009, Tesco, the largest test case of the Carbon Trust Carbon Reduction Label, revealed ambitious targets to cut the carbon footprint of its entire supply chain by 30 per cent by 2020 as part of its long-term plan to become a zero-carbon business, targets which have an effect on all suppliers along the supply chain. In 2010, its UK headquarters announced plans to reduce the carbon emissions of its Chinese business by 10 per cent in the 2010 fiscal year. In China, Tesco works with the government on a large number of agricultural projects (Tesco, 2011), with 123 direct sourcing bases in forty cities, with 1,400 items sourced directly from farmers. The UK Carbon Trust's Carbon Reduction Label also has an indirect presence in China through its collaboration with multinational companies such as Coca Cola, and PepsiCo (Environmental Leader, 2009).

Carbon Standards and Rising Power Firms—Promoting Carbon Standards?

How do firms from emerging powers, when taking on more substantive roles in global production networks, engage with labour and sustainability standards, and how do they implement such standards in their own global value chains? Are rising power firms defensive, refusing to do anything unless forced by law or their retailers, or are they proactive, seeing environmental concerns as a challenge for innovation and finding new markets?

A frequent statement in the international media is that rising power firms do not have the maturity to be leaders with regard to sustainability. Yet, in 2010, according to the G100 list of role models in sustainable business practices, twelve of the world's most sustainable companies were from emerging economies (Corporate Knights, 2011) compared to zero in 2005. Other international sustainable business lists also show that change is in progress (Zadek, 2010a). Indeed, leadership in terms of sustainability is undoubtedly not restricted to Western companies, with Brazil's Natura, India's Tata, South Africa's Anglo American and the China Ocean Shipping Company all part of a growing group of companies from rising powers that are fulfilling or surpassing international sustainability standards (Zadek, 2010a).

Rising power firms are also becoming increasingly active in taking up sustainability standards. In India, Tata Motors is collecting environmental and energy data across its dealer and supply chain so as to compute their carbon footprints and identity opportunities for cutting down on carbon dioxide emissions (Times of India, 2010). Chinese companies are also starting to make their global value chains more sustainable. In 2010, Lenovo, the China-based multinational computer technology corporation, announced plans to drive down absolute emissions associated with the Lenovo supply chain and the carbon footprint of its products, by developing quantification methods and setting reduction targets for 2012.

Moreover, PAS 2050 is not just present in rising powers such as China though the Carbon Trust's collaborations with multinational companies. The Carbon Trust is also working directly with Chinese companies, for instance, in a joint venture to accelerate low-carbon innovation and technology development in China. From 2009 to 2010, the Carbon Trust ran a pilot project with the objective of learning about the acceptance of product carbon footprinting and the feasibility of applying the PAS 2050 product carbon footprinting standard in China using four products: glossy magazine paper (Gold East Paper), sugar from sugar cane, a non-electronic toy and a cardigan. In March 2010, Gold East Paper completed its Carbon Trust Pilot Project, becoming the first Chinese company to have its product carbon footprint assessment certified under PAS 2050. The pilot showed that there are organizations in China with the capability to run life cycle analyses and develop the models necessary to have a product certified under the PAS 2050 standard (Lancaster, 2011). Some of these organizations are Centre Testing International (CTI), Environmental Resource Management (ERM), Camco and the China National Institute of Standardization.

There is considerable interest in carbon product labelling in rising powers such as China, particularly amongst companies who supply organizations in Europe, are headquartered in Europe or are worried that their exports to Europe or the US will be negatively affected by border adjustments (Lancaster, 2011). Carbon labelling efforts have recently led to the marketing of China's first certified product with a carbon footprint standard: in October 2010, Zhangzidao Fishery Group in Dalian became China's first company to put a mark showing the carbon footprint of a product—their sea scallops. The footprint for the SGS Product Carbon Footprint Mark, provided by the international certification organization Société Générale de Surveillance (SGS), was calculated according to ISO 14040 LCA principles. After completing the application process for the product carbon footprint label, Zhangzidao

Group undertook a complete assessment of carbon dioxide emissions from scallops over their lifetime and the label depicts the number of grammes of carbon dioxide per 1 kg of product, produced during its entire lifecycle. The process helped Zhangzidao Group to discover cost saving areas at the farming and processing level, and made the company better-equipped to deal with green procurement requirements from domestic and foreign buyers.

It remains to be seen whether this is the beginning of a new wave of carbon standards and labels in China or whether Chinese companies will decide not to adopt international carbon standards. Many Chinese firms are reluctant to take up international standards because of a lack of knowledge of the rules of the game, few links to the pertinent organizations and a lack of direction from the Chinese government, especially for state-owned enterprises (Guoqiang et al., 2010). Moreover, due to the lack of tax policies or emissions trading schemes, there is still little incentive for Chinese firms to reduce carbon emissions. It is therefore unlikely that Chinese companies supplying domestic markets will want to pay to have the international Carbon Reduction Label (Lancaster, 2011). A Chinese label that would be cheaper and easier to obtain than the Carbon Trust's label would be a more promising pathway for domestic companies. Indeed, there is a Chinese low-carbon product-labelling scheme being developed by the Ministry of Environmental Protection that would be a natural choice for domestic firms, in particular those supplying domestic consumers. Against this background, the next section turns to the question of where active rising power actors in China and beyond are, in terms of creating their own standards.

The Creation of Carbon Standards—Leveraging Rising Power Standards

Many Chinese business leaders, and indeed business leaders from most rising powers and emerging economies, do not engage with international standards because they worry that they are not appropriate for rising power firms. In response to this outlook, Chinese actors have started developing their own standards tailored to their own needs and preferences (Guoqiang et al., 2010). Accordingly, there are a number of cases of China not only adopting and modifying international standards but also creating its own. For instance, the Chinese Banking Association has drawn up guidelines on social responsibility in its industry (MacGillivray et al., 2009). In the textile sector, in response to a number of standards that have materialized and are extensively adopted by international companies, a China-branded standard for textiles has been developed and promoted, the CSC9000T, which represents China's first voluntary

management system to be recognized by international standards groups and international buyers (Guoqiang et al., 2010). While the CSC9000T has been issued on the basis of some cooperation with existing standards bodies, this China-branded standard undoubtedly illustrates a decision by China not to be involved directly in existing international standard-setting processes related to the textile sector (Guoqiang et al., 2010).

As indicated above, China is also in the process of developing its own low-carbon standard and labelling scheme. In 2010, the Ministry for Environmental Protection issued an environmental labelling standard for low-carbon products, marking the official launch of low-carbon product certification in China (Xiaodan, 2011). According to the ministry, the move is aimed at encouraging manufacturers to develop low-carbon-intensive products so that consumers can make informed choices. According to Yan Yuping, an environment certification expert at the ministry, certification and labelling would be voluntary for Chinese manufacturers and certification would mostly apply to daily necessities. China's proposed label is a qualitative label, or seal, showing the low-carbon-intensive character of the product, rather than a quantitative assessment of the product's carbon footprint. Chinese environmental authorities will assess the carbon 'imprint' of products and certify 'low carbon' labels for use by manufacturers if their products meet their standards (Xinhua, 2009, Global Ecolabelling Network, 2009). In late 2010, the first batch of low-carbon-certified products under the China Environmental Label were released.

Other rising powers and emerging economies are also active in terms of low-carbon labelling activities. For example, Thailand has already introduced two carbon labels. The first is the Thai Carbon Reduction Label (CRL), which was initiated in 2008 and is organized by the Thailand Greenhouse Gas Management Organization (TGO) and the Thailand Environmental Institute. The CRL is a certification for products or services that achieve greenhouse gas emission reductions over their life cycles, measured against certain criteria (TGO, 2009). As of April 2011, TGO had approved carbon labels on 196 products from fifty-two companies, mostly large businesses. Currently they only consider the production phase when measuring carbon reduction, which means that, in an extreme case, a product that reduced greenhouse gas emissions in its manufacturing process but saw an emissions increase in other processes could qualify. Thus, measurement methodologies for greenhouse gas emissions from supply, usage, and disposal still need to be developed and considered as criteria (Anbumozhi et al., 2011). The second Thai carbon label, the Carbon Footprint Label (CFL), displays the

emissions through the entire life cycle of certain products. At present, twenty-six firms are road-testing the new CFL by applying the national guidelines for a product's carbon footprint. It is planned to award the CFL mainly to export goods for the EU and the US. Road testers include Thai Airlines (flight meals), President Rice and poultry feed producer Betrago (Priess, 2010).

The question, therefore, is why rising power firms are undertaking such carbon labelling efforts in spite of the existing practical challenges. According to the president of the Federation of Thai Industries' Food Processing Industry Club, in the case of Thailand, the main reason is the desire to stay ahead of major competitors from countries such as Brazil and China, supplying the European market, where carbon footprinting and labelling is considered likely to be mandatory in a few years time (Wiriyapong, 2011). Thai products certified in this manner could gain access to European markets more easily by soothing the greater environmental concerns of today's consumers. The second reason is that lowering carbon emissions reduces costs, making the products more competitive. With financial help from the EU, forty Thai firms have come together to create a carbon footprint calculator, making Thailand the first developing country to develop such an instrument (Wiriyapong, 2011). The participating companies include major processors of vegetables, fruits, livestock, fish, aquaculture, drinks, ingredients, animal feed and ready-to-eat meals, such as Charoen Pokphand Foods and Betagro. Competitors to these Thai products in the European market, led by Latin America and Indonesia, have yet to come up with such a tool, while China, as indicated above, is still in the process of developing one. Early preparations for carbon footprinting and labelling will enable Thai products to further penetrate the European market, where consumers are increasingly concerned about climate change. Europe, which accounts for 30 per cent of all food products exported from Thailand, is one of the biggest foreign markets.

Since emerging power actors can neither ignore nor fully mitigate the impact of carbon standards, they are essentially left with one pathway: leveraging either their own standards that are tailored to their needs and preferences or those they have helped to shape and transform in favour of their interests by engaging in international standard-setting processes. The two cases discussed above illustrate that rising powers and emerging economies are indeed developing their own carbon standards. They also indicate that these rising power standards are adjusted to the relevant country context, for instance they tend to be qualitative

or less detailed than international carbon standards such as PAS 2050. The remainder of this section explores the option of getting actively involved in international standard-setting processes.

The Transformation of Carbon Standards—Leveraging International Standards

Transformation occurs when rising powers, and the public and private actors within them, seek to shape international sustainability standards by becoming actively involved in existing standard-setting processes or by advancing new alternative international standards (Guoqiang et al., 2010). The issue of transformation raises the question of how the rising powers, and the public and private actors within them, are likely to emerge as setters of standards that affect producers and consumers across the world. This question is key because major advantages accrue to those actors who actively participate in the rule-setting process for standards; this in turn favours established actors and locations (Sturgeon, 2003). Since rising powers and less developed countries have important interests in product carbon footprint labelling implemented outside their boundaries, due to both direct and spillover effects, their interests must be properly reflected in the design and implementation of product carbon footprint labelling schemes.

Yet, so far, these countries have been very poorly represented in standard-setting processes, in part due to their lack of the technical capacity and resources needed to participate in standard development (Brenton et al., 2009). While PAS 2050 is currently the most widely accepted standard, the development of other standards, such as ISO 14067, can be said to be more inclusive. The ISO process includes forty-eight participating and eleven observing countries, whereas PAS 2050 development by the British Standards Institute included inputs from just forty countries in total (Krishnan, 2010). It is also noteworthy that ISO provides more support and training to developing countries than the British Standards Institute does. Moreover, the development of the ISO 14067 standard involved more transparency than did the development of PAS 2050. On the other hand, the development of ISO 14067 was less inclusive than that of other ISO standards, such as ISO 26000, a new standard for social responsibility published in 2010, whose development process involved eight-three participating and sixteen observing countries, fifty-three of which were developing and emerging economies (Hahn and Weidtmann, 2010). In the case of ISO 14067, only twenty-eight such countries were involved.

Chinese firms and the Chinese government have been rather hesitant so far in becoming active participants in state, and especially non-state, standard-setting processes (Xiaohong et al., 2009). Rising powers such as China and other developing countries are, however, becoming increasingly active in standard-setting processes and are beginning to get involved in the development of international sustainability standards, especially in the more structured institutional processes such as those led by ISO, which offers a forum that is known to Chinese players. In the case of ISO's social responsibility guidelines, ISO 26000, Chinese actors, including leading state-owned enterprises, have become active participants in their development (Guoqiang et al., 2010). If Chinese companies are aiming to influence the next wave of sustainability standards in global markets, as a competitive strategy in line with China's broader interests, they have to engage more in current standard initiatives (Guoqiang et al., 2010). Indeed, by 2020, the Chinese government's goal is that the proportion of representatives from China on the ISO Technical Committee and the sub-technical committee should reach 10 per cent, and China aims to be involved in the creation of 2,000 international standards (Hegang Entry-Exit Inspection and Quarantine Bureau, 2007 cited in Macgillivray et al., 2009: 55). Rising powers and developing countries still have time to acquire a strong voice in the global effort to cut greenhouse gas emissions, by getting involved in the process of international standard setting for carbon-labelling programmes.

CONCLUSION

More and more sustainability standards are emerging, covering an increasingly wide scope of issues. How rising powers interact with such standards is a key question that will strongly determine the future of the world economy, and the extent to which it can be characterized as sustainable. Against this background, this paper has examined how rising power actors respond to the emergence of sustainability standards, and to what extent they are active standard-setters for tomorrow's markets. The analysis conducted in this paper has generated three main results. Firstly, it challenges the conventional wisdom that the rising powers will drive a race to the bottom on sustainability standards. This conclusion is based on an assessment of the ways in which rising power actors engage with carbon footprint standards. The paper has demonstrated that the engagement with carbon footprint standards in the rising powers is more widespread then one would expect. Secondly, at the same time, rising power actors are pursuing an agenda of developing domestic standards that are better suited to local conditions and cheaper to implement. Thirdly, this paper has illustrated that rising powers are

increasingly involved in proactive standard-setting processes. Moreover, the paper contributes to the debate on how rising powers generate challenges and opportunities for other developing countries (Kaplinsky and Messner, 2008), by examining how the appearance of sustainability standards affects these economies. It points to potentially negative spillover effects from carbon standards and labelling schemes for producers in less developed countries, and argues that the emergence of standards in rising powers illustrates how the latter could affect other less developed countries.

Because of the country's increasingly important role both for the global economy and for many crucial environmental issues, this paper puts a particular emphasis on China. The analysis demonstrates that rising powers such as China are pursuing diverse approaches and have variously ignored, adopted and developed sustainability standards across different sectors. In the case of carbon footprint standards, rising power actors do not have the choice of whether to, but only how to, react to the emergence of international standards, because product carbon footprints have become a key element in global value chains. The strategy of ignoring these standards is hardly an option for rising powers, while the strategy of adopting them could be regarded with ambivalence, due to the potentially negative effects on competitiveness. The most promising way forward is for rising powers to try to transform international standards in favour of their own interests or to create their own, tailor-made carbon standards. Indeed, China is already moving forward with the adoption, transformation and creation of voluntary international sustainability standards. This, in turn, may have negative effects for producers in less developed countries. Rising power firms are now disclosing their carbon emissions to the Carbon Disclosure Project, and are taking over, advancing and developing internationally-recognized sustainability principles such as ISO14001 and the FSC standards, as well as developing their own standards such as China's first domestic CSR management and reporting system, CSC9000T, for textiles, and the low-carbon label. Eventually, rising powers like China will have a strong voice in influencing the next generation of sustainability standards, which they will pursue as a competitive strategy. Acquiring such a strong voice demands stronger participation in ongoing standards initiatives and more engagement with the communities that have developed and now govern these initiatives.

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