DIW BERLIN

1834

Discussion Papers

Deutsches Institut für Wirtschaftsforschung 2019

Can Government Ban Materials with Large Carbon Footprint?

Legal and Administrative Assessment of Product Carbon Requirements

Timo Gerres, Manuel Haussner, Karsten Neuhoff and Alice Pirlot

IMPRESSUM

DIW Berlin
German Institute for Economic Research
Mohrenstr. 58
10117 Berlin

Tel. +49 (30) 897 89-0
Fax +49 (30) 897 89-200
http://www.diw.de

ISSN electronic edition 1619-4535

Papers can be downloaded free of charge from the DIW Berlin website:
http://www.diw.de/discussionpapers

Discussion Papers of DIW Berlin are indexed in RePEc and SSRN:
http://ideas.repec.org/s/diw/diwwpp.html
http://www.ssrn.com/link/DIW-Berlin-German-Inst-Econ-Res.html

Can Governments Ban Materials with Large Carbon Footprint?
Legal and Administrative Assessment of Product Carbon Requirements

Timo Gerres, Manuel Haussner, Karsten Neuhoff, Alice Pirlot[1]

Abstract

This paper explores whether governments can ban carbon-intensive materials through product carbon requirements. By setting near-zero emission limits for the production of materials to be sold within a jurisdiction, governments would accelerate the phase out of carbon-intensive production processes. Their announcement could alert basic materials producers, financing institutions, and other relevant stakeholders, thus incentivising them to prepare for this shift by dedicating their innovation efforts and investments to climate-friendly production processes and low-carbon materials.

The paper analyses various product standards and technical regulations in the European context. The analysis of these standards and technical regulations offers an overview of the types of environmental requirements that the European Union has already adopted. Therefore, it provides a case study of the political, legal, and technical backgrounds for the development of product carbon requirements, both in the EU and beyond. Second, the paper presents an analysis of the provisions in WTO law that would apply to product carbon requirements, underlining the legal arguments in support of their adoption under international trade law.

Key words: Embodied Carbon, Climate Policy, Standards, Technical Regulations, WTO

JEL: K23, L61, Q54

[1] Timo Gerres, IIT, Comillas Pontifical University, Madrid. Manuel Haussner was research associate at the Chair for Tax Law and Public Law at the FAU Erlangen-Nürnberg. Karsten Neuhoff, DIW Berlin and Technical University Berlin. Alice Pirlot, Oxford University. The authors thank Roland Ismer and Oliver Sartor for their valuable comments and Mistra Carbon Exit, DG Clima and and Energie Campus Nürnberg for financial support.

1. Introduction

Basic materials are, and will be, essential for the functioning of our societies and economies. However, their production is highly emission-intensive, contributing a quarter of global GHG emissions (IEA, 2017). As recognized by the Paris Agreement, there is wide scientific consensus that, in order to limit the catastrophic impacts of climate change on our societies, the world community must limit the global temperature rise to well below two degrees. This requires a reduction of GHG emissions toward climate neutrality, as, for example discussed for a 2050 horizon in Europe (COM(2018) 773 final). Therefore, a drastic reduction of GHG emissions from the production of basic materials along with enhanced recycling and material efficiency is urgently needed. This implies the replacement of carbon-intensive production processes with clean production processes and, thus, involves large capital expenditures and, often, higher operating costs.

This paper explores the role of product carbon requirements (PCRs) as one of the instruments that could help phasing out the production of carbon-intensive processes.[2] PCRs would establish near-zero emission limits for the basic materials to be sold within a jurisdiction: only basic products that are near carbon neutral would be allowed for sale. This requirement would apply both to domestic and imported products. From a practical viewpoint, the implementation of such PCRs would need to ensure that low-carbon production processes or substitute materials have reached a certain technological readiness. However, the announcement of a future implementation of PCRs would impact the long-term viability of carbon intensive business models and investments as of today, potentially enhancing the efforts of firms toward aligning their business models and technologies with European and global climate objectives.

A labelling standard for basic materials linked to their emission-intensity could be a first possible (voluntary) step towards the implementation of PCRs.[3] Such a standard would set criteria for traditional carbon-intensive materials like steel, cement, plastics, and aluminium in order to evaluate whether they were produced without significant direct and indirect carbon emissions (near climate neutral). Materials complying with the standard, as well as products exclusively containing such materials, could obtain a corresponding label. A variety of actors would benefit from such a labelling scheme. It would allow businesses to provide evidence of the climate impact of their materials to final consumers and demonstrate the viability of their business model to financial investors in a carbon-constrained economy. An example of how voluntary schemes can establish new best practices within global value chains is, among others, the ISO 14000

[2] Please note that we use the term “carbon” as a generic reference to all GHG emissions released during the production process of basic materials.

[3] We use the term 'Standard' as defined in the Agreement on Technical Barriers to Trade (TBT): “rules, guidelines or characteristics for products or related processes and production methods, with which compliance is not mandatory” (cf. TBT, Annex 1). Under the TBT, standards are to be distinguished from “technical regulations,” which are mandatory. Note that the term “Standard,” under WTO law, is more narrowly defined than a general definition of standardization often understood as the process of articulating and implementing technical knowledge (Russell, 2005). As a consequence, some legally binding legislations framed at the European level as a “standard” like the EU vehicle emission standards (Commission Regulation (EU) 2017/1154), are – under WTO law – considered to be an emission requirement stated in a “technical regulation” (WTO, 2014). *See,* also, *infra,* section 3.1.1.

family of standards, which is used for certifying the environmental management of businesses and organizations.[4]

In a second step and after a predefined period of time, the voluntary standard could be complemented with mandatory PCRs. The sale of basic materials or products containing significant volumes of carbon-intensive basic materials like steel, cement, and aluminium, would only be permitted if the basic materials or the embodied basic materials are certified to be at, or near, climate neutrality. One option for implementation would be to allow companies to use the previously described voluntary standards in order to demonstrate the climate neutrality of their basic materials. In parallel carbon-intensive domestic production processes of basic materials would also need to be banned to avoid that producers export materials previously dedicated to the domestic market. Otherwise the environmental objective and therefore the political legitimacy of PCRs might be jeopardized.

PCRs differ from standards and requirements that address emissions from the use of products, such as emission efficiency requirements for certain road vehicles (ex: Regulation (EC) No 715/2007). They also differ from requirements that only limit the emissions released during the production process, such as limits on conventional pollutants like SOx/NOx for new and existing industrial installations and CO_2 emission limits for the participation of coal power stations in capacity mechanisms (Regulation (EU) No. 2019/943, Article 22 Section 4). When applied to industrial processes, it is often argued that stringent emission limits on their own could result in firms relocating their production to other jurisdictions and thus serving the same demand instead of changing production processes or products to reduce emissions (Pethig, 1976). This can motivate exemptions rules or less stringent implementation of emission limits. By contrast, PCRs allow for a more stringent implementation of environmental targets in line with the global emissions reduction objectives. If firms relocate production and continue to serve domestic demand, they will be subject to PCRs anyway.

PCRs would complement, rather than substitute for, other energy and climate policies. The logic would be similar as the one that has been proposed, in recent years, for the phasing out of coal, which triggered national governments to define phase out plans for coal power stations to supplement the incentives from the EU ETS, in order to accelerate the decarbonisation of power production. PCRs would become mandatory once there is sufficient production capacity for climate-friendly materials. Given the current degree of technological readiness, this is not likely before the mid-2030s at the earliest (Bataille et al., 2018). Thus, a first step for adequate incentives is to ensure innovation and investments in the first commercial scale installations of climate-friendly processes and materials. To this end, instruments like innovation funding, a climate contribution added to the EU ETS to ensure full carbon price internalization (Neuhoff et al., 2019), project based carbon contracts for pilot projects (Richstein, 2017; Sartor and Bataille, 2019), and

[4] ISO 14000 encompasses various voluntary international standards developed by the ISO/TC 207 technical committee of the International Organization for Standardization, chaired by the Canadian Standards Association. The standard can be used to show compliance with regulatory environmental requirements, but is also used by companies as contractual requirements with suppliers to implement sustainable supply chains, see for e.g. empiric evidence for Italian companies (Chiarini, 2012).

green public procurement (Chiappinelli and Zipperer, 2017) haven been discussed in the literature.

The anticipation of future PCRs could enhance the effectiveness of these other policy instruments. This could be achieved by creating an unambiguous vision or clearly defined targets in terms of the CO_2 performance of the basic materials' sector within the coming 10-20 years. By doing so, PCRs would significantly reinforce incentives for businesses to direct their strategies toward the full replacement of carbon-intensive production processes with clean alternatives over the next 10-20 years. Without anticipated PCRs, there is a risk that past failures of innovation policy for these sectors would be repeated, whereby companies have invested half-heartedly in pilot projects without a strong impetus to take the relevant technologies to commercialisation (Neuhoff et al., 2014). Additionally, uncertain carbon price developments create an additional option value for postponing new investments while waiting for more clarity, thus further increasing the carbon price required to overcome inertia. A credible announcement of PCRs can trigger a shift to climate-friendly production processes at an earlier point in time or at lower carbon prices. Companies would need to change their production processes to ensure their 'licence to operate' and continue to sell into a market. It may therefore result in the prioritisation of investments in climate-friendly production processes by those companies that aim to guarantee that their business model is compatible with the anticipated policy development.

The paper is structured as follows. First, we analyse examples of various product standards and technical regulations and their implementation. We focus on examples that are relevant to EU consumers but aim to provide insights that may also be of relevance for other regions and their implementation of climate policies. Indeed, the analysis of European environmental standards and technical regulations offers insight in the political, legal, and technical background for the adoption of PCRs, which could be useful for policymakers in the EU and beyond (*section 2*). Second, given the relevance of WTO law for the adoption of standards and technical regulations on products, we analyse the compatibility of PCRs with WTO law and identify possible risks with regard to their implementation (*section 3)*. Moreover, we discuss the legal arguments in support of the view that PCRs would not be found incompatible with WTO law, if they are designed carefully and with foresight. Finally, the paper concludes with a summary of the key finding and an outlook (*section 4)*. Our overall objective is to support today's investors, operators and policymakers in their considerations of PCRs.

2. Environmental standards and technical regulations: examples in the EU

Legislation that sets sustainability criteria for products, defines emission levels, or aims to ensure an environmentally friendly production process for products and services is an ongoing area of focus for European policymakers. The European Single Market is shaped by the design and implementation of these product rules concerning safety, health, and environmental protection.

This section provides an analysis of a (non-exhaustive) set of EU legislation that addresses the resource efficiency and environmental impact of certain products produced and sold on the EU single market, namely: requirements of CE-Marking, the Ecodesign Directive,

road vehicle emission requirements, the Environmental Management and Audit Scheme (EMAS), Biofuels Certification, Forestry Law Enforcement Governance and Trade Voluntary Partnership Agreements (FLEGT VPAs) and the EU Timber Regulation. In these examples rules are set for the market participation of domestic and non-EU market producers. Therefore, they provide useful insight in the context and design of environmental product requirements, which could serve as a basis for the introduction of PCRs.

2.1 Conformity with safety, health and environmental protection requirements: CE Marking

One of the oldest and most prominent criteria for products to be sold within the European Economic Area (EEA) is the CE marking (Conformité Européenne).[5] Introduced in 1985, CE-marking allows distributors to show the conformity of their products with safety, health, and environmental protection requirements laid down in relevant EU Directives. Conformity is expressed by affixing the CE-label to a product.[6]

CE-marking is mandatory for all product groups sold on the EU market that are covered by the relevant CE directives and regulations.[7,8] It applies to both imported and domestically manufactured products. Non-compliance can lead to the permanent removal of the product from the EU market. Considered as a success story with regard to end-consumer safety and producer liability, it is limited to physical product specific characteristics and does not address products' production processes.

CE-marking is required for 25 product groups, ranging from medical devices, various types of electrical and mechanical equipment, to explosives, and to toys.[9] Requirements for different product groups vary significantly. The distributor´s obligations are stated in product specific directives like the Toy Directive (2009/48/EC), Explosive for Civil Use Directive (2014/28/EU), and the Pressure Equipment Directive (2014/68/EU). Directives and regulations are restricted to "essential requirements." This means that technical details, such as the quantification of limits, dimensions, design characteristics, or production process requirements, are not specified.[10] Essential requirements remain mostly descriptive and often refer to harmonised standards as an option to demonstrate compliance.[11] Hereby, harmonised standards are defined as "non-binding technical

[5] *See* Regulation (EC) No 765/2008 of the European Parliament and of the Council of 9 July 2008 setting out the requirements for accreditation and market surveillance relating to the marketing of products and repealing Regulation (EEC) No 339/93, OJ L 218, 13 August 2008, pp. 30-47.

[6] *See, article 30, § 2 and 4 of* (EC) No 765/2008. *See* also Commission Notice 2016/C 272/01 Section 4.5.1).

[7] For a complete list of the relevant directives see, https://ec.europa.eu/growth/single-market/ce-marking/manufacturers_en

[8] *See* Article 26 of Regulation (EU) 2019/1020 (suspension of release for free circulation in case of false or misleading CE marking).

[9] *See* footnote 7.

[10] 'Blue Guide" Commission Notice 2016/C 272/01 Section 1.1

[11] Some directives, however, set quantitative criteria, for example the limits for lead stated in the Toy Directive (2009/48/EC) have been notified to the WTO (Notification: G/TBT/N/EEC/184/Add.1 on 05.10.2009). The "Proposal for a Regulation of the European Parliament and of the Council laying down rules and procedures for compliance with and enforcement of Union harmonisation legislation on products and amending Regulations (EU)" (Notification: G/TBT/N/EU/626 on 10.12.2018) list and refers to most CE marking related directive and regulations.

specification adopted by a standardisation body, namely the European Committee for Standardisation (CEN), the European Committee for Electro-technical Standardisation (CENELEC) or the European Telecommunications Standards Institute (ETSI)" (2006/42/EC Article 2(l)). [12]

The EU provides guidance to distributors on how to ensure compliance with the different directives concerning CE marking. For this purpose, the European Commission published its first 'Blue Guide' on the implementation of EU product rules in 2000 (European Commission, 2000). This 'Blue Guide,' which is regularly revised (e.g. with Commission Notice 2016/C 272/01), is not legally binding and distributors can opt to either comply by following harmonised standards or by applying their own technical specifications. Even though, for most product groups, the directives cover only product characteristics rather than the production processes, module D of the Blue Guide lays down quality management and assurance criteria, which apply for specific product categories that are defined within the different directives, such as pressure vessels of category III and IV according to the EU Pressure Equipment Directive (2014/68/EU Article 14 & Annex II).

In addition to the CE directives, the Product Liability Directive (Council Directive 85/374/EEC Articles 1 and 3.2, as later modified by Directive 1999/34/EC) requires the distributor to comply with safety, health and environmental protection requirements for products placed on the European market, for which he can be held liable. In case of domestically manufactured goods, the producer is normally also the distributor. For imported products, the liability remains with the distributor. As such, the legislation ensures that products that are produced in countries outside of the EEA comply with European safety, health, and environmental protection requirements.

In general, CE marking relies primarily on the concept of self-control for distributors and producers, which only indirectly implies third party certification in certain cases. This system is not immune to fraud, and cases have been reported for applications like medical devices (de Bruijn et al., 2009). CE-marking has a global reach in as much as it also applies to products neither produced but sold in the EU as well as products neither produced nor sold, strictly speaking, in the EU, but sold within the customs union (e.g. CE-marking is logically applied by Turkey (TSE, 2019)). From a WTO law perspective, CE-marking has not been challenged.

2.2 The Ecodesign Directive

The Ecodesign Directive (2009/125/EC) and the Energy Labelling Regulation (EU) No 2017/1369 target both the operational and material efficiency of products and form part of the Ecodesign framework legislation. The Ecodesign framework primarily targets product characteristics and not the production process. This means that products that fulfil operational and material efficiency requirements can be brought onto the market, regardless of their global carbon footprint resulting from the production process and transport. The Ecodesign Directive, though, provides legislators with the option to implement requirements targeting recyclability and enhancing material circularity, a potential that is considered to be untapped so far (Dalhammar, 2016).

[12] See, Regulation (EU) 1025/2012 on European standardisation, which sets the rules of standard setting and stakeholder participation in European standardisation.

The Ecodesign Directive covers a broad range of products, for which requirements are defined in product specific regulations, including heating and ~~and~~ water heating equipment, electric motor systems, lighting, domestic appliances, office equipment, consumer electronics, HVAC (heating ventilating air conditioning) systems, as well as measures reducing stand-by losses for a group of products ~~including heating~~.[13] For each of these product groups product specific regulations contain binding requirements about product design and functioning[14]. One prominent example is the Commission Regulation with regard to Ecodesign requirements for non-directional household lamps (EC) No 244/2009. Its implementation resulted in the quasi-phase out of 60W and 100W incandescent light bulbs in Europe and fostered the transition toward LED based lighting for domestic applications.[15]

Since the product specific regulations apply to products sold on the EU Market, they also apply to imported products. Such technical regulations must be notified to the WTO[16]. This gives other WTO members the opportunity to assess the impact of the measure on their exports and spot non-compliance with the TBT Agreement. As such, the unconditional conformity of the Ecodesign Directive with WTO law is not a given[17].

So far, the Ecodesign legislation has been very successful at establishing minimum operational energy efficiency and material resource efficiency requirements for certain product groups sold on the European Single Market. It illustrates the ability of the EU to impose European product requirements on non-EU producers. For example, for some product groups, like televisions, which are mainly produced by non-European manufacturers (Schlösser and Stobbe, 2014), binding resource efficiency criteria have been set (Commission Regulation (EU) No 642/2009) and have affected the product characteristics of imports.

2.3 Euro Emission Standards for Road Vehicles

The first emission standards for road vehicles were introduced by the European Economic Community as early as 1970, with the adoption of Directive 70/220/EEC in order to reduce air pollution. The current regulation was established with the introduction of the Euro 1 emission standard in 1992 (Directive 91/441/EEC). Subsequent tightening of emission standards and its role in the Air Quality Framework Directives (96/62/EC and 2008/50/EC) led to the subsequent introduction of Euro 2 to Euro 6d. According to definitions provided in the TBT (Annex 1), Euro emission standards form part of technical regulations, and set obligatory emission requirements rather than (voluntary) standards.

---

[13] All product-specific Ecodesign regulations is provided online: https://ec.europa.eu/energy/en/list-regulations-product-groups-energy-efficient-products.

[14] The (framework) Ecodesign Directive aims to improve the environmental performance for the entire product life cycle, while trying to drive the least efficient products out of the market. See also Ismer (2009) at p. 46.

[15] *See,* (EC) COM(2015) 443 final 'Market assessment on mains-voltage lamps as required by Commission Regulation (EU) No 1194/2012'.

[16] For example, for the aforementioned Commission Regulation with regard to Ecodesign requirements for non-directional household lamps (EC) No 244/2009, *see* Notification G/TBT/N/EEC/277/Add.1 under the TBT Agreement. *See* TBT Agreement article 2.9.2.

[17] For a review of legal issues in relation to resource requirements set under the Ecodesign Directive, see Dalhammar et al. (2014), Section 6.

The Euro emission standards set requirements for new cars, light commercial vehicles, and heavy-duty truck engines sold in the EU. These concern the operational characteristics of vehicles (not the process-intensity of vehicle manufacturing). Both locally and imported vehicles need to conform to the Euro emission requirements. Initially, Euro 1 defined limits only for carbon monoxide (CO), hydrocarbon (HC) and nitrogen oxygen (NO_x) emissions for petrol engines and, in addition, limits for particulate matter (PM) emissions for diesel engines. Over the years, limits have been tightened while additional limits were introduced for NO_x (Euro 3) and the particle number (PN) (Euro 5 and Euro 6).[18] Moreover, latter Euro emission requirements (5,5a to 5d and 6,6a to 6d) also set stricter requirements for fuel quality with regard to the cetane number and the sulphur content. Interestingly, various municipalities and regions in the EU have used the Euro emission regulations to restrict access of emission-intensive vehicles to city centres with the aim of improving the urban air quality (Holman et al., 2015).

While the implementation of the standards can be considered a success, monitoring and compliance mechanisms need to be improved[19]. Moreover, even though Euro emission standards have helped to reduce certain types of vehicle emissions significantly, they have failed in reducing NO_x emissions, due to non-compliance and test-cheating problems (Hooftman et al., 2018). The discrepancy between laboratory test cycles as the NEDC (New European Driving Cycle) and tests performed with portable emissions measurement systems (PEMS) showed discrepancy of up to 35 times the limits required by emissions standards (Thompson et al., 2014). In the aftermath of the NO_x emission scandal, the new "Real Driving Emissions" (RDE) and the "World Harmonised Light Vehicle Test Procedure" (WLTP) have been introduced in the EU (Commission Regulations (EU) 2017/1151 and (EU) 2018/1832). The WLTP is the outcome of a global effort under the leadership of the United Nations (UNECE, 2019). The development of new technical regulations in an international forum like the UNECE might facilitate global acceptance and improve the reach of new legislation. All the emission standards and later amendments, such as the aforementioned test procedures, have been notified to the WTO as technical regulations (e.g., Notification: G/TBT/N/EU/553 on 01.03.2018 for Commission Regulations (EU) 2017/1151).

2.4 The Eco-Management and Audit Scheme: EMAS

The Eco-Management and Audit Scheme (EMAS) was first introduced in 1993 with Council Regulation (EEC) No 1836/93 (see, now, Regulation (EC) No 1221/2009). Its aim was to "promote continuous improvements in the environmental performance of industrial activities" (Article 1, §2). In other words, EMAS can be described as an audit scheme that requires certified organizations to monitor multiple environmental aspects of their organization, including greenhouse gas emissions. Due to its organization view on resource efficiency, EMAS has been criticised for not capturing the concepts of a circular economy (Korhonen et al., 2018).

[18] Regulation No 715/2007 and No 692/2008 (passenger cars and light vehicles) and Regulation No 595/2009 (trucks).

[19] Improved monitoring and compliance mechanisms is one of the objectives of the EU's new Clean Mobility Package (Directive (EU) 2019/1161).

Among others, companies, registered associations, NGOs, and public institutions can be certified according to EMAS. In contrast to the CE-marking and the Ecodesign Directive, it focuses on environmental process management (instead of product physical characteristics) and it is fully voluntary. The non-mandatory character of EMAS implies that it qualifies as a standard under WTO law. All private and public organizations can opt for being certified according to EMAS through an accredited third-party certifying body. Although EMAS is not obligatory, it can be advantageous to be part of the scheme given that EMAS is a key instrument of the European green public procurement guidelines, according to which public authorities are advised to require evidence of an environmental management system from their contractor (European Commission, 2016b).

EMAS fulfils a similar role as the voluntary global ISO 14001 standard for environmental management systems. ISO standards are published by the International Non-governmental Organization for Standardization and provide "rules, guidelines or characteristics for activities or for their results" (ISO, 2019). However, EMAS covers additional aspects compared to ISO 14001 (Testa et al., 2014).

2.5 Biofuels Certification

A mechanism to validate the sustainability of domestic and imported biofuels became necessary in 2009 after the adoption of the Renewable Energy Directive (Directive 2009/28/EC) on the promotion of the use of energy from renewable sources.[20] This Directive sets sustainability criteria for biofuels and bio-liquids to account for the different environmental impact of land-use practices at the origin of different bio-energy sources. Among others, the use of biofuels needs to result in greenhouse gas emissions savings of at least 35% in comparison to fossil fuels and it shall not be from land with a high biodiversity value and not from land with a high-carbon stock (Directive 2009/28/EC, Article 17). Under the Directive, only sustainable biofuels are eligible to comply with EU renewable energy targets, while member states need to take national measures to respect the sustainable criteria.[21]

The EU system for the certification of biofuels was developed to help demonstrate compliance with the Renewable Energy Directive´s sustainability criteria. The backbone of the system comprises voluntary sustainability certification schemes, which contain specific rules to certify biofuel production.[22] Both domestic and international producers can benefit from these schemes to certify and quantify the sustainability of their production processes.

In practice, multiple issues regarding the European approach to biofuel certification remain unsolved. In 2016, the European Court of Auditors evaluated the implementation of the voluntary certification schemes and concluded that in its current state, "the EU certification system for the sustainability of biofuels is not fully reliable" (European Court of Auditors, 2016), pointing to weaknesses in the supervision of voluntary schemes by the European Commission and concerns regarding the transparency of the certification

[20] Now Recast Renewable Energy Directive (EU) 2018/2001.
[21] *See,* Directive 2009/28/EC, Article 17(7).
[22] *See* the list of approved schemes on this website: https://ec.europa.eu/energy/en/topics/renewable-energy/biofuels/voluntary-schemes.

process. These issues are addressed in the recast Renewable Energy Directive (EU) 2018/2001, which formulates stricter sustainability criteria and calls for new regulation addressing biofuel certification (Commission Delegated Regulation (EU) communicated with C(2019) 2055 final).

As to compliance of the EU system for the certification of sustainable biofuels with WTO law, some aspects of the scheme might be problematic (Echols, 2009; Mitchell and Tran, 2010; Perišin, 2014; Ponte and Daugbjerg, 2015).[23]

2.6 FLEGT VPAs and EU Timber Regulation

The EU uses two complementary sets of policy instruments to prevent the import of illegally harvested timber and timber products: the Forest Law Enforcement, Governance and Trade Voluntary Partnership Agreements (FLEGT VPAs) and the Timber Regulation.

FLEGT VPA are bilateral trade deals between the EU and third countries that oblige the partner country to implement national legislation and strengthen institutions to prevent illegal logging. In exchange, wood imported from these countries is considered, *per se,* as legally harvested. It is argued that FLEGT VPA with countries like Indonesia and Ghana reduced illegal logging significantly (Overdevest and Zeitlin, 2018).

The Timber Regulation (No 995/2010) applies to timber imported from countries without a FLEGT VPA in place. This Regulation forbids placing illegally harvested timber and products derived from such timber on the EU market. Operators placing timber or timber products on the EU market are required to exercise "due diligence" and keep records of their suppliers and customers. Similar to biofuel certification, this legislation targets the production process of goods placed onto the European Single Market. Some voluntary certification schemes, like the FSC (Forest Stewardship Council), can be used by importers to comply with these due diligence requirements. The effectiveness of the due diligence approach is reviewed biannually by the European Commission (e.g. COM(2018) 668 final), which evaluates Member States' implementation of the Timber Regulation.

The conformity with WTO law of some aspects of the EU Timber Regulation (such as the due diligence approach) remains under discussion (Geraets and Natens, 2013; Pontecorvo, 2018).[24]

2.7 Results

Over the last decades, the EU has adopted various pieces of legislation ensuring that goods traded within its single market fulfil minimum safety, efficiency and sustainability requirements (Table 1). Our review of selected examples demonstrates that product specific policies like CE-marking, Euro vehicle emissions standards, and the Ecodesign Directive, have a long history and are well established in EU policy making. Product

[23] *See* also Argentina's complain against the EU (*European Union and a Member State – Certain Measures Concerning the Importation of Biodiesels,* 17 August 2012, DS443*; European Union and Certain Member States – Certain Measures on the Importation and Marketing of Biodiesel and Measures Supporting the Biodiesel Industry,* 15 May 2013, DS459).

[24] *See* also Saul and Stephens (2012).

specific requirements apply equally to domestic and international producers who sell their products on the EU single market. For imported goods, the importer or distributor who places the product on the single market becomes responsible for the product conformity.

More recently, the EU has also gained some experience with standards that relate to the production process, for example in order to ensure the sustainability of biofuels and timber products. Biofuel certification is technically based on voluntary standards, which can be used by Member States to demonstrate that biofuels consumed on a national level meet the EU sustainability criteria. The timber regulation obliges importers to exercise due diligence when verifying the origin of timber products so as to ensure that production processes comply with criteria set by the EU legislation. Questions remain as to the compatibility of the EU Biofuel Certification and the EU Timber Regulation with international trade law, although they have not been found incompatible with WTO law so far. Finally, voluntary schemes like EMAS can play an important role in reducing the carbon footprint of certain parts of the relevant markets, e.g. in public procurement, by making it obligatory for contract partners in public tenders. Moreover, VPAs could help to reduce the carbon-intensity of imported products from specific partner countries, but their reach is limited to bilateral deals and requires the willingness of partner countries to cooperate.

Table 1. Summary of reviewed legislation

	Objective	**Scope**	**Type**	**WTO Compliance**
Requirements for CE Marking	Safety, Health and Environment	Product	Technical regulation (+ conformity assessment procedure)	No challenge
Euro Emission Standards	Emissions	Product	Technical regulation	No challenge
EMAS	Environmental management	Process	Standards	No challenge
Biofuel Certification	Sustainability	Process	Standards	Disputes (*see* Perišin (2014))
Ecodesign Directive	Resource efficiency	Product	Technical regulation	No challenge
Timber Regulation	Sustainability	Process	Due diligence requirements	No challenge, but questioned in the literature
FLEGT VPA			Bilateral treaty	No challenge

3. Climate product requirements and WTO Law

PCRs have an international trade component: they do not just apply to domestic products but also to imported products. Therefore, they are likely to fall under World Trade Organization (WTO) agreements – in particular the General Agreement on Tariffs and Trade (GATT) and the Agreement on Technical Barriers to Trade (TBT). The former includes general rules on how international trade in goods is to be organized. The latter specifically addresses technical regulations, product standards, and conformity assessment procedures.

If they fall under one of these two agreements, implementing countries should verify that the design of PCRs does not violate any of these agreements in order to ensure their long-term viability and, thus, relevance for innovation and investment choices. Against this background, we provide a detailed analysis of PCRs under international trade law and propose design recommendations that are unlikely to violate the GATT or the TBT. Our objective is to anticipate and prevent the risks of future international trade disputes.

To this end, we discuss the application of the GATT and the TBT to PCRs (section 3.1). If PCRs fall under the scope of one or both of these agreements, they will be subject to the requirements set in their provisions, including the National Treatment Obligation (GATT Article III:4 and TBT Article 2.1) and the prohibition of import restrictions (GATT Article XI) (section 3.2). We show that, depending on the interpretation of the provisions of the GATT and the TBT, PCRs are more or less likely to be found incompatible with WTO law. Therefore, it is key to draw the attention of policymakers to the design and administrative procedures that help reduce the likelihood that PCRs will violate WTO law (section 3.3.). In any case, if PCRs breach of substantive GATT provisions, they could still be justified under the general exception provision (GATT Article XX).[25]

[25] The different steps of our legal reasoning are summarised in Figure 1 (infra).

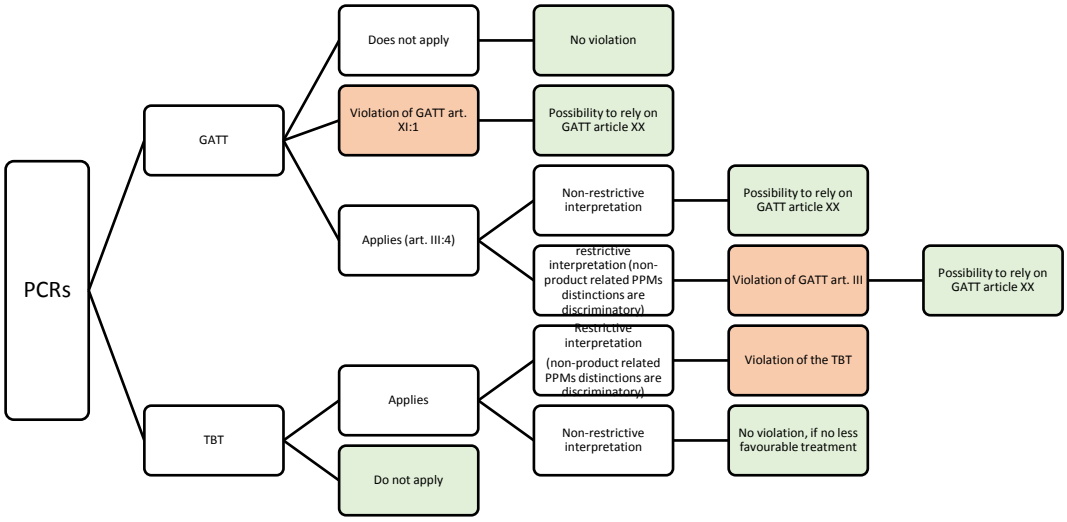

Figure 1. Structure of Section 3 and consequences of an application of one or both agreements.

3.1 Applicable legal regime: The GATT and the TBT

World Trade Law only puts constraints on PCRs if they fall within the scope of WTO Agreements. Considering that PCRs apply to imported products, PCRs are most likely to fall under the GATT and the TBT, specifically GATT Article III:4, GATT Article XI and TBT Articles 2.1 and 2.2. Both agreements are not mutually exclusive but can apply at the same time once the measure falls within their scope.[26] While the GATT has a broad scope of application and clearly covers PCRs (section 3.1.1.), it is not fully clear whether PCRs would fall under the TBT (section 3.1.2).

3.1.1. General Agreement on Tariffs and Trade (GATT)

GATT Article III:4 lays down the National Treatment Requirement. It mandates that imported products may not be treated less favourably than like domestic products. GATT Article III:4 applies to all laws, regulations, and requirements affecting the internal sale, offering for sale, purchase, transportation, distribution, or use of imported products.[27] As this provision is drafted broadly, it is likely that it would apply to PCRs. Consequently, it is critical to design PCRs so as to ensure that they do not discriminate against imported products. Otherwise, PCRs will face a high risk of being found incompatible with this provision.

GATT Article XI:1 covers quantitative restrictions that are specifically targeted at imports and/or exports and it is unclear whether PCRs would fall within its scope.[28] It mandates, among other things, that no prohibitions or restrictions other than duties, taxes, or other

[26] In case of the application of both agreements, but with a conflict in outcome, the TBT prevails over the GATT (*lex specialis* to GATT, see General Interpretative Note to Annex 1A of the WTO Agreement, which states that, "[i]n the event of a conflict between the provisions of General Agreement on Tariffs and Trade 1994 and a provision of another agreement in Annex 1A to the Agreement Establishing the World Trade Organization […] the provision of the other agreement shall prevail to the extent of the conflict"; see also Van Huffel (2006) at pp 348 et seq).

[27] On the scope of GATT Article III:4, *see* Matsushita et al. (2006) at p 252.

[28] WTO, Appellate Body Report, United States – Import Prohibition of Certain Shrimp and Shrimp Products (US – Shrimp), 12 October 1998, WT/DS58/AB/R.

charges, shall be instituted or maintained on the importation of products. If a PCRs qualifies as an import ban, it would violate GATT article XI:1. Given that PCRs are applied indiscriminately to highly-CO2-intensive basic materials, it can nevertheless be argued that they should not qualify to import bans and, therefore, are not covered by GATT article XI:1, but rather by GATT article III:4.[29] Yet, it is not always clear whether a measure falls under GATT article XI:1 and/or III:4. In the dispute *EC – Asbestos,* France's ban on asbestos was analysed under GATT article III:4 and the panel did not consider it necessary to examine the measure under GATT article XI:1.[30] In contrast, in the case *US – Shrimp,* which concerned an import prohibition on certain shrimp and shrimp products, the analysis focused on GATT articles XI and XX.[31][32]

In case PCRs violate general GATT provisions, such as GATT article III:4 and/or XI:1, they could still be justified under the general exemption provision of GATT (Article XX). Under this provision, Members to the Agreement can justify measures, that would otherwise have been found incompatible with other GATT provisions, because they pursue certain goals that are deemed to be legitimate (e.g. certain social and environmental objectives). The Dispute Settlement Body (DSB) applies a two-tier approach to analyse the legal conditions of Article XX GATT. First, the policy measure at issue must align with one of the exhaustive eight grounds of justifications listed under Article XX GATT, including the "protection of human, animal, plant life or health" (item b of the list) or "the conservation of exhaustible natural resources" (item g of the list).[33] Second, the measure must comply with the chapeau of Article XX and, thus, not constitute an arbitrary or unjustifiable discrimination between countries where the same conditions prevail or a disguised restriction on trade. It is important that policymakers keep these requirements in mind when designing proposals to establish PCRs, in case the measure were to fail the legal tests under GATT articles III.4 and/or XI.

3.1.2. Agreement on Technical Barriers to Trade (TBT)

The scope of the TBT is drafted narrowly. It applies only to technical regulations, standards, and conformity assessment procedures. Under the TBT, PCRs could be assimilated to a "technical regulation," which Annex I of the TBT defines as a "[d]ocument which lays down product characteristics or their related processes and production

[29] The question as to whether PCRs would qualify as import ban is intrinsically connected to the question as to whether or not products can be differentiated based on non-product related process and production methods (*section 3.2.1.).* If such differentiation is prohibited, PCRs could be described as import bans.

[30] WTO, Panel Report, European Communities – Measures Affecting Asbestos and Products Containing Asbestos (*EC – Asbestos)*, 18 September 2000, WT/DS135/R, para. 8.159.

[31] WTO, Panel Report, United States – Import Prohibition of Certain Shrimp and Shrimp Products (*US – Shrimp),* 15 May 1998, WT/DS58/R. On the differentiation between GATT Article III and XI see Pauwelyn (2005).

[32] In section 3.2., we analyse only GATT article III:4 and GATT article XX. We do not provide an analysis of GATT article XI:1 as its application on import bans is straightforward. Moreover, section 3.2. does not include an analysis of GATT article I, which requires WTO members not to discriminate between imported products from other WTO members. PCRs are not supposed to be targeted at certain specific countries: they will apply indiscriminately to all basic materials. Therefore, we consider that they would not violate GATT article I~~, delete *per se*~~.

[33] Interestingly, the Appellate Body Report referred to "measures adopted in order to attenuate global warming and climate change" when discussing GATT article XX(b). The United Nations Framework Convention on Climate Change was also mentioned – unsuccessfully - in relation to GATT article XX(d) in the case *India – Solar Cells* (AB, para.5.141 and 5.149).

methods, including the applicable administrative provisions, with which compliance is mandatory".[34] According to the WTO Dispute Settlement Body, a technical regulation "applies to identifiable group of products," is "mandatory," and lays down "product characteristics or their related production and process methods."[35]

While PCRs are undoubtedly mandatory and apply to a predefined group of materials and products containing such materials, it is not clear whether they lay down "product characteristics or their related production and process methods." Indeed, PCRs impose emission requirements on certain materials and products containing these materials, which cannot be fully assimilated to "product characteristics". Indeed, PCRs are aimed at limiting the types of products that can be sold in the EU based on how much greenhouse gas emissions were released during the production of basic materials. In other words, PCRs do not regulate the characteristics of basic materials and products containing basic materials but their non-product related process and production methods (PPMs) instead.[36] Whether such non-product related production methods fall within the scope of the TBT is yet not fully clear.

WTO case law makes clear that labelling requirements linked to non-product related PPMs fall under the scope of the TBT, but it is not clear whether non-product related PPM-based measures that go beyond labelling requirements would also fall under the TBT.[37] In the *EU – Seal products* case concerning an EU ban on the importation of certain seal products (with the exception of seal products that were hunted by Inuit or indigenous communities or that were justified by marine resource management purposes), the Appellate Body rejected the findings of the panel, which seemed to assimilated certain PPMs (such as the requirement related to the identity of the hunter) to "product characteristics."[38] According to the Appellate Body, neither the text of Annex 1.1. of the TBT (which defines technical regulations) nor prior case law can be used as a basis "to suggest that the identity of the hunter, the type of hunt, or the purpose of the hunt could be viewed as product characteristics."[39] Yet, these findings of the Appellate Body do not necessarily imply that non-product related PPMs-based measures fall out of the scope of the TBT. Indeed, the Appellate Body explicitly recognised that "the line between PPMs that fall, and those that do not fall, within the scope of the TBT Agreement raises important systemic issues" and refused to rule on the matter as "more argumentation by the participants and exploration in questioning would have been required."[40] Consequently, no clear statement can be delivered on the applicability of the TBT on PCRs.[41]

---

[34] On the application of the provisions on conformity assessment procedures to PCRs, *see infra, section 3.3.2.*

[35] *See,* i. a., WTO, Appellate Body, EC – Asbestos, *supra* n. 30 para. 61-77.

[36] The distinction between product-related and non-product related product PPMs is based on whether or not PPMs modify product characteristics.

[37] *See* the case United States – Measures Concerning the Importation, Marketing and Sale of Tuna and Tuna Products (US – Tuna II) where the Dispute settlement body analysed US "dolphin-safe" label requirement on tuna products (WTO, Appellate Body Report, US – Tuna II, 16 May 2012, WT/DS381/AB/R).

[38] WTO, Appellate Body Report, *European Communities – Measures prohibiting the importation and marketing of seal products* (EC – Seal Products), 22 May 2014, WT/DS400/AB/R, WT/DS410/AB/R, paras. 5.41 to 5.45 and para. 5.58.

[39] *Ibid.,* para. 5.45. *See* also footnote 942.

[40] *Ibid.,* para. 5.69.

[41] Some scholars assume that PPMs-based measures, like emission-intensity requirements for products, are unlikely to be assimilated to technical regulations. This implies that PCRs could fall out of the scope of the TBT

As mentioned before, if PCRs fall out of the scope of the TBT, they can be designed regardless of the requirements mentioned in this agreement. However, if PCRs fall within the scope of the TBT, they face the risk of being found incompatible with Article 2 of the TBT if they discriminate against imported products. We analyse this risk in the next section.

3.2. The national treatment principle (NTP)

We now turn to the question whether or not PCRs would stand the NTP Test. Both agreements contain similar wording, which requires that imported products are not treated less favourably than "like" domestic products (GATT Article III:4 and TBT Article 2.1). However, the WTO Dispute settlement Body (DSB) seems to apply the Nation Treatment Obligation slightly differently under the GATT and the TBT.

GATT Article III:4 rules out both *de facto* and *de jure* discrimination. TBT Article 2.1 also prohibits both kinds of discrimination. However, the DSB seems to interpret Article 2.1. of the TBT less restrictively with regard to *de facto* discriminations.[42] Where an origin neutral measure pursues a legitimate regulatory objective and where it is applied in an even-handed way, the DSB seems to consider that the measure does not violate Article 2.1. of the TBT.[43] Further requirements are then set by TBT Article 2.2, according to which a technical regulation shall not be more trade-restrictive than necessary to fulfil a legitimate objective.

3.2.1 Likeness

One key question under both the TBT and the GATT is the definition of products' likeness. Indeed, products that are not "like" can be subject to different legal requirements (different and "less favourable treatment," in the words of WTO law). It is only when imports and domestic products are considered "like" that imports may not be treated less favourably than domestic products.

In the case of PCRs, any difference in treatment for both domestic and imported products is made based on the emission-intensity of the product. Unlike current legislation that set emissions standards calculated based on how much emissions are released during the *use* of certain products (e.g. emissions standards for certain types of vehicles), PCRs set emissions standards that are calculated based on how much emissions were released during the production of certain basic materials.

Such a requirement linked to the PPMs of basic products is controversial under the national treatment principle. Indeed, the legal scholarship is divided as to whether or not WTO members are allowed to distinguish between domestic and imported products based on non-product related PPMs, namely factors that are not directly related to the product and its physical features. While some authors consider that products'

(*cf*. Bhala and Kennedy (1998) at p 127; Mathis (2006) at p 14.) See also the discussion in McDonald (2005) at p. 255. *See* also Ismer (2009) at pp. 48-49.

[42] *See* sections 3.2.3. and 3.2.4.

[43] See WTO, *United States – Clove Cigarettes – AB Report* (4 April 2012) WT/DS406/AB/R at para 182 and para 215 et seq. The legitimate character of a technical regulation was also discussed in the case *US – Tuna II (Mexico).*

differentiation cannot be based on process and production methods under GATT article III,[44] others seem to suggest that GATT article III should be read so as to allow such form of differentiation as long as the objective is not a protectionist one (aims-and-effect test).[45] If differentiation based on non-product related PPMs is not permitted under the GATT and the TBT, PCRs would most likely be found in violation of the national treatment principle because it would be presumed to be less favourable vis-à-vis imported products.

The Case law does not help draw a clear line in this debate. Some earlier cases seem to support the view that the national treatment principle allows for distinctions based on PPMs.[46] By contrast, latter decisions of the WTO Dispute Settlement Body may indicate the opposite.[47] Nevertheless, the case law also suggests that the dispute settlement body might consider elements that are not directly related to products' physical characteristics to assess whether two products are "like" products. In the case EC- Asbestos, the Appellate Body analysed whether a regulatory ban aimed at reducing health risks linked to asbestos was incompatible with GATT article III:4.[48] The Appellate Body did not find a violation, which could support the view that the GATT does not prevent the adoption of regulations differentiating between products based on legitimate regulatory objectives.[49] In justifying its decision, the Appellate Body referred not just to the "physical properties" but also to "consumers' tastes and habits" of chrysotile asbestos fibres compared to PCG fibres.

While the Asbestos case does not provide explicit support to differentiations based on non-product related PPMs under WTO law, it suggests that properties – whether product or non-product related – can impact likeness if they impact the relevant market as demonstrated by consumers' tastes and habits.[50] The Appellate Body clearly stated that "[u]nder Article III:4, evidence relating to health risks may be relevant in assessing the

[44] *See,* e.g., Schön (2004) at p. 289; Conrad (2011) at pp 487-488. See also Matsushita et al. (2006) at pp 240 et seq.

[45] *See,* e.g., Lydgate (2011) at p. 185 ("In fact, the AB seemed to employ the same 'subjective' approach to consumers that it had so clearly rejected both in *Japan-Alcohol* and *EC-Asbestos* itself. This temptation to use consumer preferences as a stand-in for discretionary action, may recur in disputes that concern public policy regulations"); Regan (2002).

[46] GATT, Panel Report, *United States – Measures affecting alcoholic and malt beverages* (US – Malt Beverages), 19 June 1992, paras. 5.24-5.25, which introduced the so-called "aim-and-effect" test. In para. 5.25, the Panel stated as follows: "The purpose of Article III is thus not to prevent contracting parties from using their fiscal and regulatory powers for purposes other than to afford protection to domestic production. Specifically, the purpose of Article III is not to prevent contracting parties from differentiating between different product categories for policy purposes unrelated to the protection of domestic production. The Panel considered that the limited purpose of Article III has to be taken into account in interpreting the term "like products" in this Article. Consequently, in determining whether two products subject to different treatment are like products, it is necessary to consider whether such product differentiation is being made "so as to afford protection to domestic production"…."

[47] *See* WTO Appellate Body Report, *Japan – Taxes on Alcoholic Beverages* (Japan –Alcoholic Beverages II), 4 October 1996, WT/DS8/AB/R, WT/DS10/AB/R, WT/DS11/AB/R.

[48] WTO, Appellate Body Report, *EC – Asbestos.*

[49] *Ibid.,* para. 113.

[50] *Ibid.* On this case, *see* Lydgate (2011), *supra* n.46 pp. 176-180. *See,* also, Appellate Body Report, *US-Clove Cigarettes*, para. 119: "…the regulatory concerns underlying a measure, such as the health risks associated with a given product, may be relevant to an analysis of the 'likeness' criteria under Article III:4 of the GATT 1994, as well as under Article 2.1 of the TBT Agreement, to the extent they have an impact on the competitive relationship between and among the products concerned."

competitive relationship in the marketplace between allegedly "like" products."[51] It further said that "evidence about the extent to which products can serve the same end-uses, and the extent to which consumers are – or would be – willing to choose one product instead of another to perform those end-uses, is highly relevant evidence in assessing the "likeness" of those products under Article III:4 of the GATT 1994."[52]

Against this background, one could argue that high and low-carbon materials must not be considered as "like" products as they serve different markets. The argument would go as follows: within the last years, consumers and investors have become more and more interested in their environmental footprint and have adapted their consumption decision so as to minimize their environmental impact. As such, the embedded GHG emissions in products are one parameter against which consumption and investment decisions are taken. Consumers choose "environmentally friendly" products over high-carbon products. Products' carbon footprint help differentiate between "near carbon neutral" and "carbon intensive" products. As such, the carbon footprint of products does affect tastes and habits. Consequently, high- and low-carbon products cannot be considered like products.[53] Based on this argument, WTO Members would be able to implement policies, such as PCRs, that treat differently low and high-carbon products.

3.2.2. Less favourable treatment

If products are considered not "like," then national policy may treat products differently without running afoul of WTO Law. However, if products are considered "like," then imported products may not be treated less favourably than "like" domestic products. Hence, we turn to the question, whether there is a less favourable treatment of "like" products (GATT Article III:4 and TBT Article 2.1). Both provisions prohibit *de jure* discrimination. This refers to measures that differentiate based on the origin of the product. Such a different treatment would be ruled out under PCRs. Indeed, these climate measures would apply indistinctively to both domestic and imported products, regardless

[51] This statement was delivered by the Appellate Body on the discussion whether any differentiation based on the health risk between products would render GATT Article XX meaningless (see WTO, Appellate Body Report, *EC – Asbestos, a*t para 115).

[52] *Ibid,* at para 117.

[53] Evidence for the relevance of carbon embodied in products for consumers and investors is illustrated for (i) construction materials like cement and steel (ii) green electricity (iii) corporate reporting on carbon intensity of electricity and other input factors.

(i) Leadership in Energy and Environmental Design (LEED) is globally the most widespread building labeling system, and includes, since version four, the carbon footprint of building materials into rating criteria (Gelowitz and McArthur, 2016). Studies assess the impact of LEED certification on market value and rental premiums typically in the order of 10% (Mangialardo et al., 2018). Environmental Product Declarations are used to determine the carbon footprint, in Europe based on common Product Category Rules from the European Committee for Standardization (EN 15804 - https://www.cen.eu/Pages/default.aspx).

(ii) Stigka et al. (2014) find that consumers are willing to pay up to 16.6% extra for green electricity and Sundt and Rehdanz (2015) find that consumers are on average willing to pay a premium of about EUR 12 per household per month for electricity from a higher share of renewable energy sources.

(iii) The Task Force on Climate-related Financial Disclosure (TCFD) of the Financial Stability Board (Carney, 2017) recommended that firms disclose not only direct greenhouse gas emissions (Scope 1), but also electricity input related emissions (Scope 2), and, if appropriate, emissions along the value chain including from embodied carbon in inputs (Scope 3). Given that the TCFD limited reporting requirements to relevant information (so called materiality), this suggest that Scope 3 emissions are relevant for investors. This is reflected in Scope 3 reporting by firms, gathered in data basis for investors like for example for 3600 firms by CDP (www.cdp.net).

of the origin of the products. Hence, there would not be *de jure* discrimination under this scheme.

Both provisions also prohibit *de facto* discriminations, namely when a formally neutral measure unfolds more restrictive effects on imports than on domestic products.[54] In the context of PCRs, such *de facto* discrimination could arise if climate requirements mostly affect imported products; accordingly, where the measure predominantly applies to imported products whereas domestic products are hardly affected by it. Moreover, *de facto* discrimination could stem from administrative requirements imposed on imported products.[55] This point could possibly be problematic for PCRs if their implementation impose higher compliance costs on importers than on domestic producers. For example, importers might face difficulties in providing the required information regarding the emission-intensity or production technology that was deployed during the production of input materials. Importers could then face high costs in obtaining this information, which would not have to be borne if the intermediary or final product are fully produced within the EU. Consequently, the importation of such products would be potentially disfavoured. Policymakers should ensure that they keep these costs to a minimum and also ensure that they do not require pieces of information from importers that are not necessary to fulfil the climate objective of PCRs (*see also* section 3.3.2).[56]

In the next sections, we analyse in more details the tests applied under the GATT and the TBT. Since they are slightly different, we analyse them separately.

(a) Under the GATT

The DSB assesses *de facto* discrimination by analysing whether the disputed measure "modifies the conditions of competition" in the market to the disadvantage of imported products.[57] Therefore, it is important to design PCRs such that domestic and imported products are subject to "equal competitive conditions."

There are two situations where this requirement to provide "equal competitive conditions" could possibly be violated. First, in the hypothesis that high-carbon and low-carbon products are considered "like" products, PCRs would necessarily be problematic

[54] See e.g. Matsushita et al. (2006) at p 253. See also the discussion on *de facto* discrimination in Ehring (2002).

[55] In the case *US-COOL* that dealt with certificates of origin, the Appellate Body held that "the recordkeeping and verification requirements impose a disproportionate burden on upstream producers and processors," in particular, because the information delivered to the final consumers was "far less detailed and accurate than the information required to be tracked and transmitted by producers"(AB, US – Cool para 349). Further, it created higher compliance costs for imports than costs to situations where only domestic livestock had been used. Combining its argumentation, the Appellate Body considered that the scheme was not designed to pursue a legitimate objective and was rendered incompatible with Article 2.2 (ibid paras 342-350). This judgement does not rule out certificates of origin on the emission-intensity or production technology deployed per se. However, it requires that recordkeeping is limited to a minimum.

[56] In contrast to the US – COOL case, an emissions certificate as part of PCRs would not be contrary to the legitimate objective but rather necessary to fulfil it. Therefore, it could be argued that the scheme is in line with the NTR under TBT Article 2.1.

[57] WTO, Appellate Body Report, *European Communities – Regime for the Importation, Sale and Distribution of Bananas (EC – Bananas III),* 9 September 1997, WT/DS27/AB/R, para. 213; WTO, Panel Report, *Korea – Measures Affecting Imports of Fresh, Chilled and Frozen Beef (Korea – Various Measures on Beef),* WT/DS161/R, paras. 629-639; Appellate Body Report, WT/DS161/AB, para. 144; WTO, Report of the Panel, *Turkey – Measures affecting the importation of rice (Turkey – Rice),* 21 September 207, WT/DS334/R, paras. 7.227-7.240.

because “like” products would be treated differently. Second, where high-carbon and low-carbon products are not considered as “like” products, discrimination could stem from administrative procedures that put a higher burden on imports than on domestic products (de facto discrimination, as explained above). If the Dispute Settlement Body concludes on a less favourable treatment, PCRs will be incompatible with WTO Law unless justified under GATT Article XX.

(b) Under the TBT

Just like under GATT Article III:4, *de jure* discrimination is prohibited under TBT Article 2.1.[58] However, the analysis undertaken under the TBT seems to be slightly different: the national treatment principle is interpreted as “not prohibiting detrimental impact on imports that stems exclusively from a legitimate regulatory distinction.”[59] To make this analysis, the DSB takes into account the design, architecture, revealing structure, operation, and the application of the measure to imports.[60] Moreover, the “even-handedness” of the measure plays an important role in assessing whether there is a violation of TBT Article 2.1.[61]

Consequently, it seems that any origin neutral measure that in principle would be considered as *de facto* discriminatory under the GATT could still stand the national treatment test under the TBT.[62] For example, the Appellate Body held in *US – Clove Cigarettes* that “where the technical regulation at issue does not *de jure* discriminate against imports, the existence of a detrimental impact on competitive opportunities for the group of imported vis-à-vis the group of domestic like products is not dispositive of less favourable treatment under Article 2.1.”[63] This, however, requires that the difference in treatment stems from a legitimate objective (rather than “reflecting discrimination against the group of imported products”) and that the measure at issue is applied in an even-handed way.[64] The condition of “even-handedness” must be understood so as to mean that a measure credibly aligns with the regulatory objective and that the measure is "calibrated" accordingly.[65]

---

[58] *See,* e.g., WTO, *United States – Clove Cigarettes – AB Report* at para 182 and para 223 et seq.

[59] WTO, *United States – Measures affecting the production and sale of clove cigarettes,* 4 April 2012, WT/DS4006/AB/R, para. 181. *See* also AB, US Cool, para 293. *Contra* Mehling et al. (2019) at p. 462. Their interpretation of GATT Article III:4 is similar to the interpretation of article 2 of the TBT.

[60] *Ibid.*

[61] *See,* e.g., WTO, *United States – Clove Cigarettes – AB Report* at para 182 and para 223 et seq. *See* also AB, *EC – Seal Products,* paras. 5.117 and 5.125, where the AB clearly distinguishes between the test applied under GATT III:4 and the TBT with regard to regulatory purposes. *See* also AB, US Cool, paras. 341 et seq. on the even-handedness test.

[62] On the comparison between the test under GATT article III:4 and 2.1. of the TBT, *see* WTO, *United States – Measures affecting the production and sale of clove cigarettes,* 4 April 2012, WT/DS4006/AB/R, paras. 176-182. See also AB, US Cool, para 286.

[63] See WTO, *United States – Clove Cigarettes – AB Report* (4 April 2012) WT/DS406/AB/R, at para 182.

[64] AB, *US – Clove Cigarettes,* para. 182 and para. 215. *See* also para. 95.

[65] For example, in US – Tuna II, the Appellate Body found a lack of credibility in the US measure. While the Dolphin-Safe Label took into consideration the fishing methods in the Eastern Tropical Pacific, it did not “address mortality (observed or unobserved) arising from fishing methods other than setting on dolphins outside the Eastern Tropical Pacific” US – Tuna II (Mexico), para 297. See also Panel Reports, US – Tuna II (Mexico) (Article 21.5 – US), para. 7.116. The requirement of “even-handedness” can also be found in DSB cases on Article XX GATT. There is means that a measure on imports must go hand in hand with measures on domestic production. See WTO, *China — Measures Related to the Exportation of Rare Earths, Tungsten and*

Nevertheless, the allegedly less restrictive interpretation of the national treatment principle under the TBT does not mean that the requirements under the TBT as a whole are looser than under the GATT as a whole. Indeed, Article 2.2 of the TBT also requires WTO members to design their technical regulation so as not to create unnecessary obstacles to international trade (TBT Article 2.2 first sentence).[66] A measure is deemed to be an unnecessary obstacle to trade if is it is more trade-restrictive than necessary to fulfil a legitimate objective (TBT Article 2.2 second sentence).

If we apply the national treatment principle to PCRs, it seems reasonable to argue that they stem from a legitimate regulatory distinction. Indeed, PCRs are aimed at distinguishing between (a) basic materials and manufactured products that have been produced in a way that significantly contributed to climate change and (b) basic materials and manufactured products that have been produced in a way that does not contribute to climate change to the same extent.

In order to make sure that the measure is considered "even-handed" or "calibrated," PCRs should be designed in such a way that they "make sense" in the light of their policy objective of mitigating climate change. Therefore, it might be worth reflecting on the level of the emissions standards that is considered "acceptable" and on the policy rationale underlying the choice for the threshold. Countries could choose to base the emissions standards on "best available technology" or on the "best average worldwide level" or on any other factors.[67] In doing so, countries should consider how their choice of emission levels affect the effectiveness of PCRs so as not to rule out their regulatory purpose. Moreover, considering the requirement of article 2.2. of the TBT, countries should be able to explain why PCRs are the least trade-restrictive, reasonably available measure, they can use in order to achieve their policy objective.[68]

3.3. Design issues

This section provide guidance on the design of PCRs' features so as to lower the risks that they would be found incompatible with WTO law. Guidance on the design of PCRs are given primarily by the TBT, which lays down a list of requirements – besides the national treatment principle – that must be considered when drafting technical regulations. This section draws the attention to the following elements: the role of international climate standards and the use of a precautionary approach (3.3.1.), the need to draft administrative requirements that apply to importers in the least burdensome possible way (3.3.2.), as well as the requirement to notify the measure under the TBT (3.3.3.).

3.3.1 Reference to international standards

Where possible and available, PCRs should be based on relevant international standards (TBT Article 2.4). If so, the TBT rewards members with the rebuttable presumption that such technical regulations do not create unnecessary obstacles to trade provided that the

Molybdenum – Report of the Appellate Body (20 May 2015) WT/DS431/AB/R, WT/DS432/AB/R, WT/DS433/AB/R at para 5.131. See also Van den Bossche and Zdouc (2017) at pp 577 et seq.

[66] See Howse and Levy (2013) at pp. 349-350.

[67] Note that this point could also influence the analysis under GATT article XX in case of a violation of GATT article III:4.

[68] Although, in case of a dispute, the burden of proof would initially rely on the complaining party.

technical regulation is used for environmental protection (TBT Article. 2.5 and Article 2.2). Two main arguments can be brought forward for the use of international standards. First, they reduce transaction costs and, as such, are beneficial to international trade.[69] Second, cooperation at international level reduces the risk of lobbying for specific national advantages, such that the rent-seeking behaviour of such groups can be limited.[70]

While the term "standard" is defined in Annex I to the TBT, the term "international standard" is not defined.[71] However, the DSB developed its own definition. Two requirements must be met. First, an international standard must meet the definition of a standard under § 1.2 of Annex I to the TBT. According to this, a standard is a "[d]ocument approved by a recognized body, which provides, for common and repeated use, rules, guidelines or characteristics for products or related processes and production methods, with which compliance is not mandatory". Second, the standard must be developed by a recognized international standardization body.[72] A "recognized body" under the TBT does not have one particular meaning but relates either to the acknowledgement of its existence or to an acknowledgement of its validity.[73] However, to qualify as "recognized body," the meetings must be open to all members of the WTO (§ 4 of Annex I to the TBT).[74] By contrast, it is not required that an international standard is approved by consensus.[75]

As there are no "international climate emissions standards," these provisions are not fully relevant for a proposal like PCRs. However, these rules indicate that countries that wish to adopt PCRs should invite all other members to discuss the level of emission intensity for PPMs used to define PCRs. Such invitations to reach an agreement at the international level could also have a positive impact on the legal analysis undertaken under the GATT. Previous case law indicates that international cooperation can affect whether or not the measure violates the GATT and, if so, be justified under GATT article XX.[76]

3.3.2. No burdensome administrative requirements imposed on importers

If conformity assessment procedures are established to implement PCRs, they shall meet the requirements of the TBT.[77]

According to the TBT, these procedures must be prepared, adopted, and applied so as to grant access for suppliers of like products originating in the territories of other WTO

[69] Matsushita et al. (2006) at p 487.
[70] See e.g. Sykes (2000); Matsushita et al. (2006) at pp 486 et seq.
[71] AB Report, US – Tuna II (Mexico), para 350
[72] AB Report, US – Tuna II (Mexico), para 354-356.
[73] AB Report, US – Tuna II (Mexico), para 361-362
[74] AB Report, US – Tuna II (Mexico), para 398.
[75] AB, EC – Sardines, at paras 225-227.
[76] See AB Report, US - Shrimp, para. 172. The duty to enter into bilateral or multilateral agreements is discussed by De Schutter in the general context of human rights. He also makes a reference to the Shrimp/Turtle case (UN, Human Rights Council, Working Group on the Right to Development, Report of Olivier De Schutter on "The international dimensions of the right to development: a fresh start toward improving accountability," 22 January 2018, A/HRC/WG.2/19/CRP.1, para. 40).
[77] Conformity assessment procedure are defined in the TBT (Annex 1) as "any procedure used, directly or indirectly, to determine that relevant requirements in technical regulations or standards are fulfilled". *See* also Panel, Russia – Railway Equipment, para 7.249.

members under conditions no less favourable than those accorded to suppliers of like products of national origin or originating in any other country, in a comparable situation (TBT Article 5.1.1). Further, conformity assessment procedures must be designed so as not to create an unnecessary obstacle to trade.[78] This means that they should not be stricter or applied more strictly than necessary (TBT Article 5.1.2). They shall also align with relevant guidelines or recommendations issued by international standardizing bodies for assessment procedures (TBT Article 5.4). Where such harmonized procedures do not exist, states shall support international standardization bodies to develop such procedures (TBT Article 5.5). Similar to the setting of technical regulations, PCR regulators should accept conformity assessment procedures of other states if these differ from their own but are equivalent (TBT Article 6.1).

3.3.3. Notification and acceptance requirement in the absence of international standards as well as conformity assessment procedures

As already mentioned, PCRs should be based on international standards, if existent. Where an international standard does not exist, the regulating state shall publish its intention to implement a technical regulation at an early stage (TBT Article 2.9.1.). This shall include the objective and the rationale of the measure at stake as well as the products covered (TBT Article 2.9.2). Further, the regulating state shall allow other states to comment on the technical regulation and take these discussions into account (TBT Article 2.9.4). At the end of the drafting stage, the technical regulation is to be published (TBT Article 2.11). In any event, the regulating state shall give reasonable time to allow producers of other states to adapt their products or their method of production to the technical regulation (TBT Article 2.12).

Similar rules apply for conformity assessment procedures that are not based on international guidelines. In this case, the regulating state has to publish its intended procedures, must inform about the product scope, and take into account comments made by other states (TBT Article 5.6.1 to 5.6.5). In any event, the regulating state shall give reasonable time to allow producers of other states to adapt their products or their method of production to the conformity assessment requirements (TBT Article 5.9).

4. Conclusion

This paper explores the possibility for countries to ban the sale of carbon-intensive materials by means of PCRs. First, we analyse various product standards and technical regulations in the European context. This analysis provides an overview of the types of measures that can be implemented: from product requirements (e.g. energy efficiency of lightbulbs as part of the Ecodesign Directive) to requirements that relate to non-product related PPMs (e.g. the sustainability of biofuels production and timber products). Our analysis of the administrative approaches chosen for the biofuel certification and the EU Timber Regulation highlights how compliance mechanisms for process related requirements could be implemented.

[78] See Panel, EC – Seal, para 7.418-7.419.

With respect to the legal feasibility, we analyse PCRs under both the GATT and the TBT. Our analysis highlights that the agreement on technical barriers to trade (TBT) would apply to PCRs only if the emission-intensity of basic materials is considered as a technical regulation; in this case the measure would have to comply with the national treatment principle and should be notified to the WTO. Under the GATT, the relevant provisions are Article III:4 and/or Article XI:1; in case of a violation of one of these two provisions, there is still the option of justification under GATT Article XX.

The national treatment principle under GATT and the TBT both require not to discriminate against “like” imported product; thus, the main issue is whether low and high carbon products would be considered “like” products. Our analysis shows that the evidence that consumers are – or would be – willing to choose one product instead of another could be highly relevant in assessing the "likeness" of those products. Such evidence of the choice of consumers and investors seems to exist for building materials, electricity, and other input factors to production process.

Therefore, we argue that WTO law would not be an obstacle to the adoption of PCRs, provided they are designed and adopted in a manner consistent with the main legal tests described above. For this, the measure should be designed in a way that does not discriminate against imports (e.g. administrative requirements should not be excessively burdensome for imported products) and it is recommended to favour international cooperation where possible (e.g. international standardisation bodies may help to foster acceptance and streamline compliance mechanisms).

Other environmental product requirements have already been implemented and are politically accepted. They have not been challenged under WTO. However, there is inevitably still some uncertainty regarding the interpretation of some of the relevant WTO provisions given that no ex-ante clearing process exists. A high likelihood of a successful implementation of PCRs will already be relevant for the decision making process of firms with regard to their innovation and investment strategy, which aims to secure their business model (licence to operate). Thus, governments might well decide to implement PCRs to accelerate the pace of the industrial transition toward climate-friendly production processes.

References

Bataille, C., Åhman, M., Neuhoff, K., Nilsson, L.J., Fischedick, M., Lechtenböhmer, S., Solano-Rodriquez, B., Denis-Ryan, A., Stiebert, S., Waisman, H., Sartor, O., Rahbar, S., 2018. A review of technology and policy deep decarbonization pathway options for making energy-intensive industry production consistent with the Paris Agreement. Journal of Cleaner Production 187, 960–973. https://doi.org/10.1016/j.jclepro.2018.03.107

Bhala, R., Kennedy, K.J., 1998. World trade law: the GATT-WTO system, regional arrangements, and US law. Lexis Law Pub.

Carney, M., 2017. Final Report: Recommendations of the Task Force on Climate-related Financial Disclosures. Financial Stability Board Bank for International Settlements.

Chiappinelli, O., Zipperer, V., 2017. Using public procurement as a decarbonisation policy: A look at Germany. DIW Economic Bulletin 7, 523–532.

Chiarini, A., 2012. Designing an environmental sustainable supply chain through ISO 14001 standard. Management of Environmental Quality: An International Journal 24, 16–33. https://doi.org/10.1108/14777831311291113

Conrad, C.R., 2011. Processes and production methods (PPMs) in WTO law: interfacing trade and social goals. Cambridge University Press.

Dalhammar, C., 2016. Industry attitudes towards ecodesign standards for improved resource efficiency. Journal of Cleaner Production 123, 155–166. https://doi.org/10.1016/j.jclepro.2015.12.035

Dalhammar, C., Machacek, E., Bundgaard, A., Zacho, K.O., Remmen, A., 2014. Addressing resource efficiency through the Ecodesign Directive. Nordic Council of Ministers. https://doi.org/10.6027/TN2014-511

de Bruijn, A.C.P., de Vries, C.G.J.C.A., Hermsen, H.P.H., 2009. Counterfeit medical devices-A risk indication (No. 360060001/2009). National Institute for Public Health and the Environment (rivm), Bilthoven (NL).

Echols, M.A., 2009. Biofuels Certification and the Law of the World Trade Organization. ICTSD Global Platform on Climate Change, Trade Policies and Sustainable Energy, Geneva, Switzerland. https://doi.org/10.7215/AG_IP_20090901

Ehring, L., 2002. De Facto Discrimination in World Trade Law National and Most-Favoured-Nation Treatment—or Equal Treatment? Journal of World Trade 921–977.

European Commission, 2016a. Emissions in the automotive sector [WWW Document]. Internal Market, Industry, Entrepreneurship and SMEs - European Commission. URL https://ec.europa.eu/growth/sectors/automotive/environment-protection/emissions_en (accessed 7.17.19).

European Commission, 2016b. Buying green! A handbook on green public procurement, 3rd ed. Publications Office of the European Union, Luxembourg.

European Commission, 2000. Guide to the implementation of directives based on the New Approach and the Global Approach. Office for Official Publications of the European Communities, Luxembourg.

European Court of Auditors, 2016. The EU system for the certification of sustainable biofuels. Special Report No 18, 2016. Special Report No 18, 2016. Publications Office, Luxembourg.

Gelowitz, M.D.C., McArthur, J.J., 2016. Investigating the Effect of Environmental Product Declaration Adoption in LEED® on the Construction Industry: A Case Study. Procedia Engineering 145, 58–65. https://doi.org/10.1016/j.proeng.2016.04.014

Geraets, D., Natens, B., 2013. The WTO consistency of the European Union Timber Regulation. Leuven Centre for Global Governance Studies Working Paper, 29.

Holman, C., Harrison, R., Querol, X., 2015. Review of the efficacy of low emission zones to improve urban air quality in European cities. Atmospheric Environment 111, 161–169. https://doi.org/10.1016/j.atmosenv.2015.04.009

Hooftman, N., Messagie, M., Van Mierlo, J., Coosemans, T., 2018. A review of the European passenger car regulations – Real driving emissions vs local air quality. Renewable and Sustainable Energy Reviews 86, 1–21. https://doi.org/10.1016/j.rser.2018.01.012

Howse, R., Levy, P.I., 2013. The TBT Panels: *US–Cloves, US–Tuna, US–COOL*. World Trade Review 12, 327–375. https://doi.org/10.1017/S1474745612000638

IEA, 2017. Energy Technology Perspectives 2017. International Energy Agency, Paris.

Ismer, R., 2009. Like Products, Energy Standards and Labelling, in: Gather, J.H.K. (Ed.), Eco-Innovation, International Trade, WTO and Climate: Key Issues for an Ecological Industrial Policy. Bundesministerium für Umwelt, Dessau, pp. 45–58.

ISO, 2019. The different types of ISO publication [WWW Document]. International Organization for Standardization. URL http://www.iso.org/cms/render/live/en/sites/isoorg/home/developing-standards/deliverables-all.html (accessed 9.25.19).

Korhonen, J., Honkasalo, A., Seppälä, J., 2018. Circular Economy: The Concept and its Limitations. Ecological Economics 143, 37–46. https://doi.org/10.1016/j.ecolecon.2017.06.041

Lydgate, Emily Barrett, 2011. Consumer preferences and the National Treatment Principle: emerging environmental regulations prompt a new look at an old problem. World Trade Review 10, 165–188. https://doi.org/10.1017/S1474745610000492

Mangialardo, A., Micelli, E., Saccani, F., 2018. Does Sustainability Affect Real Estate Market Values? Empirical Evidence from the Office Buildings Market in Milan (Italy). Sustainability 11, 1–14.

Mathis, J., 2006. The WTO agreement on technical barriers to trade. Consumer Policy Review 16, 14.

Matsushita, M., Schoenbaum, T.J., Mavroidis, P.C., 2006. The World Trade Organization: Law, Practice, and Policy, 1st ed. Oxford University Press.

McDonald, J., 2005. Domestic regulation, international standards, and technical barriers to trade. World Trade Review 4, 249–274. https://doi.org/10.1017/S1474745605002387

Mehling, M.A., van Asselt, H., Das, K., Droege, S., Verkuijl, C., 2019. Designing Border Carbon Adjustments for Enhanced Climate Action. American Journal of International Law 113, 433–481. https://doi.org/10.1017/ajil.2019.22

Mitchell, A., Tran, C., 2010. The Consistency of the European Union Renewable Energy Directive with World Trade Organization Agreements: The Case of Biofuels. Renewable Energy Law and Policy Review 33–44.

Neuhoff, K., Acworth, W., Ancygier, A., Branger, F., Christmas, I., Haussner, M., Ismer, R., van Rooij, A., Sartor, O., Sato, M., 2014. Carbon control and competitiveness post 2020: The Steel Report. Climate Strategies, London.

Neuhoff, K., Chiappinelli, O., Gerres, T., Haussner, M., Ismer, R., May, N., Pirlot, A., Richstein, J., 2019. Building blocks for a climate-neutral European industrial sector. Climate Strategies, London.

Overdevest, C., Zeitlin, J., 2018. Experimentalism in transnational forest governance: Implementing European Union Forest Law Enforcement, Governance and Trade (FLEGT) Voluntary Partnership Agreements in Indonesia and Ghana: Transnational forest governance. Regulation & Governance 12, 64–87. https://doi.org/10.1111/rego.12180

Pauwelyn, J., 2005. Rien ne Va Plus? Distinguishing domestic regulation from market access in GATT and GATS. World Trade Review 4, 131–170.

Perišin, T., 2014. Pending EU disputes in the WTO: challenges to EU energy law and policy. Croatian yearbook of European law & policy 10, 371–381.

Pethig, R., 1976. Pollution, welfare, and environmental policy in the theory of Comparative Advantage. Journal of Environmental Economics and Management 2, 160–169. https://doi.org/10.1016/0095-0696(76)90031-0

Ponte, S., Daugbjerg, C., 2015. Biofuel sustainability and the formation of transnational hybrid governance. Environmental Politics 24, 96–114. https://doi.org/10.1080/09644016.2014.954776

Pontecorvo, C.M., 2018. The EU Legal Framework on Trade in Timber and Timber Products: Recent Developments in the Implementation and Enforcement of the Timber Regulation, in: Bungenberg, M., Krajewski, M., Tams, C.J., Terhechte, J.P., Ziegler, A.R. (Eds.), European Yearbook of International Economic Law 2018. Springer International Publishing, Cham, pp. 229–259. https://doi.org/10.1007/8165_2018_8

Regan, D.H., 2002. Regulatory Purpose and "Like Products" in Article III:4 of the GATT (With Additional Remarks on Article II:2). Journal of World Trade 36, 443–478.

Richstein, J.C., 2017. Project-Based Carbon Contracts: A Way to Finance Innovative Low-Carbon Investments. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.3109302

Russell, A.L., 2005. Standardization in history: a review essay with an eye to the future. The standards edge: Future generations 247, 260.

Sartor, O., Bataille, C., 2019. Decarbonising basic materials in Europe: How Carbon Contracts-for-Difference could help bring breakthrough technologies to market (Study No. 06/19), IDDRI. IDDRI, Paris.

Saul, B., Stephens, T., 2012. Not yet out of the woods: Australia's attempt to regulate illegal timber imports and world trade organization obligations. Austl. Int'l LJ 19, 143–160.

Schlösser, A., Stobbe, L., 2014. Short market analysis on representative TVs (October 2014 update), Compliance of TVs with Energy Label and Ecodesign Requirements. Austrian Energy Agency, Technische Universität Berlin.

Schön, W., 2004. World Trade Organization law and tax law. Bulletin for international taxation (IBFD-Bulletin) 58, 283–296.

Stigka, E.K., Paravantis, J.A., Mihalakakou, G.K., 2014. Social acceptance of renewable energy sources: A review of contingent valuation applications. Renewable and Sustainable Energy Reviews 32, 100–106. https://doi.org/10.1016/j.rser.2013.12.026

Sundt, S., Rehdanz, K., 2015. Consumers' willingness to pay for green electricity: A meta-analysis of the literature. Energy Economics 51, 1–8. https://doi.org/10.1016/j.eneco.2015.06.005

Sykes, A.O., 2000. Regulatory competition or regulatory harmonization? A silly question? Journal of International Economic Law 3, 257–264. https://doi.org/10.1093/jiel/3.2.257

Testa, F., Rizzi, F., Daddi, T., Gusmerotti, N.M., Frey, M., Iraldo, F., 2014. EMAS and ISO 14001: the differences in effectively improving environmental performance. Journal of Cleaner Production 68, 165–173. https://doi.org/10.1016/j.jclepro.2013.12.061

Thompson, G.J., Carder, D.K., Besch, M.C., Thiruvengadam, A., Kappanna, H.K., 2014. In-use emissions testing of light-duty diesel vehicles in the United States. Center for Alternative Fuels, Engines & Emissions (CAFEE), Morgantown (West Virginia).

TSE, 2019. CE Marking [WWW Document]. Turkish Standards Institution. URL https://tse.org.tr (accessed 7.15.19).

UNECE, 2019. Working Party on Pollution and Energy (GRPE) [WWW Document]. URL http://www.unece.org/trans/main/wp29/meeting_docs_grpe.html (accessed 7.17.19).

Van den Bossche, P., Zdouc, W., 2013. The Law and Policy of the World Trade Organization: Text, Cases and Materials. Cambridge University Press, Cambridge. https://doi.org/10.1017/9781316662496

Van Huffel, M., 2006. The Legal Framework for Financial Services and the Internet, in: Regulating the Internal Market. Edward Elgar Publishing.

WTO (Ed.), 2014. The WTO agreements series: Technical barriers to trade. World Trade Organization, Geneva, Switzerland.