



The **E15** Initiative

STRENGTHENING THE GLOBAL TRADE AND INVESTMENT SYSTEM
FOR SUSTAINABLE DEVELOPMENT



Renewable Energy and Process and Production Methods

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August 2015

E15 Expert Group on
Measures to Address Climate Change and the Trade System

Think Piece

Co-convened with



Climate
Strategies

ACKNOWLEDGMENTS

Published by

International Centre for Trade and Sustainable Development (ICTSD)
7 Chemin de Balexert, 1219 Geneva, Switzerland
Tel: +41 22 917 8492 – E-mail: ictsd@ictsd.ch – Website: www.ictsd.org
Publisher and Chief Executive: Ricardo Meléndez-Ortiz

World Economic Forum
91-93 route de la Capite, 1223 Cologny/Geneva, Switzerland
Tel: +41 22 869 1212 – E-mail: contact@weforum.org – Website: www.weforum.org
Co-Publisher and Managing Director: Richard Samans

Acknowledgments

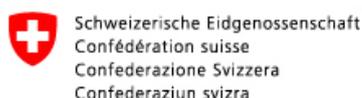
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The Expert Group on Measures to Address Climate Change and the Trade System is co-convened with Climate Strategies. <http://www.climatestrategies.org/>

The author is indebted to Kathrin Rueeggsegger, junior research fellow at the World Trade Institute, Bern (WTI), for valuable research assistance in preparing the paper, and to Eva Bienkowska, PhD student at the WTI, for her input on taxation.

With the support of:



And ICTSD's Core and Thematic Donors:



Norwegian Ministry
of Foreign Affairs

Citation: Cottier, Thomas. *Renewable Energy and Process and Production Methods*. E15 Initiative. Geneva: International Centre for Trade and Sustainable Development (ICTSD) and World Economic Forum, 2015. www.e15initiative.org/

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ISSN 2313-3805

ABSTRACT

In the debate on climate change, methods of producing products and energy are of paramount importance. While the product or the form of energy resulting may be the same, diverging production processes and methods of production may have a critical impact on climate change mitigation, and environmental and human concerns in general. Some may be detrimental, some may be beneficial. They vary from each other, notwithstanding that the final products cannot be distinguished from each other. This paper explores the extent to which renewable energy and non-renewable energy, in particular based on fossil fuels, may be regulated, labelled, or taxed differently, or whether the likeness of the product prohibits doing so in international trade law relating to production and process methods (PPMs). In doing so, the paper mainly focuses on the production of electricity from fossil fuels (coal, oil, and gas), atomic energy, and renewable energy (hydropower, thermal power, wind, solar and tidal energy, and biomass).

Energy produced from fossil fuel or renewable energy may sometimes be distinguished as products. More frequently, however, such distinctions cannot be made. Electricity as a product cannot be physically distinguished on the basis of the type of energy used to produce it. The physical properties of electricity do not vary and do not depend on the mode of production used. Electricity in contemporary international law is defined as a good. It is subject to the disciplines of World Trade Organization (WTO) law, in particular Article III of the General Agreement on Tariffs and Trade (GATT) 1994 and related international agreements. Thus, the basic principle of treating like products alike applies to all electricity. In particular, taxation, technical regulations, and other rules need to treat imported electricity no less favourably than domestic electricity, irrespective of the mode of production used. Given the principles of most-favored nation (MFN) and national treatment under GATT 1994, the question arises to what extent differential treatment may be based on the modes of production of energy. This question relates to PPMs, which are of two basic types—product-related PPMs (PR-PPMs); and non-product-related PPMs (NPR-PPMs). Incentives to bring about electricity production and trade on the basis of renewable energy or the promotion of biomass in the decarbonisation process requires full recognition of NPR-PPMs. Currently, incentives mainly consist of labelling schemes, such as guarantees of origin and green certificates. However, this kind of incentive alone is not able to induce the necessary shift in the energy production process.

The established concept of likeness in WTO law does not readily allow for product differentiation on the basis of PPMs and thus of differing PPMs. Such schemes, except for the purposes of labelling under the TBT Agreement, essentially depend on qualifications contained in the exceptions to Article XX GATT. Much depends on the precise modalities of implementing a scheme; the law does not offer adequate predictability and legal security. Moreover, current WTO law may allow for unilateral imposition of PPMs, but does not provide for compensatory mechanisms in transferring know-how and technology relating to PPMs. Parameters allowing for PPMs without invoking exceptions thus need to be developed in conjunction with facilitating investment and trade in PPMs. Access to technology for exporting countries will be a key component in accepting a shift in likeness of products and increasingly allowing for taking sustainable manners of production into account. While there is room for a general body of law to be further developed on PPMs beyond the case law of WTO panels and the Appellate Body, each sector needs assessing particular needs and whether special provisions should be included in particular sectoral agreements relating to different forms of energy production. PPMs may thus amount to an important component of sectoral agreements on trade in electricity.

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LIST OF ABBREVIATIONS

BITs	bilateral investment treaties
CDM	Clean Development Mechanism
COs	certificates of origin
DTTs	double taxation treaties
GATS	General Agreement on Trade in Services
GATT	General Agreement on Tariffs and Trade
GO	Guarantee of Origin
LDCs	least developed countries
MFN	most-favoured- nation
NPR-PPMs	non-product-related PPMs
OECD	Organisation for Economic Co-operation and Development
PPMs	production and process methods
PPPs	private-public partnerships
PR-PPMs	product-related PPMs
R&D	research and development
S&D	special and differential treatment
TBT	Technical Barriers to Trade
TM	Technology Mechanism
UNFCCC	United Nations Framework Convention on Climate Change
WTI	World Trade Institute
WTO	World Trade Organization

INTRODUCTION

In the debate on climate change, methods of producing products and energy are of paramount importance. While the product or the form of energy resulting may be the same, diverging production processes and methods of production may have a critical impact on climate change mitigation, and environmental and human concerns in general. Some may be detrimental, some may be beneficial. They vary from each other, notwithstanding that the final products cannot be distinguished from each other. This paper explores the extent to which renewable energy and non-renewable energy, in particular based on fossil fuels, may be regulated, labelled, or taxed differently, or whether the likeness of the product prohibits doing so in international trade law relating to production and process methods (PPMs). In doing so, the paper mainly focuses on the production of electricity from fossil fuels (coal, oil, and gas), atomic energy, and renewable energy (hydropower, thermal power, wind, solar and tidal energy, and biomass) (IPCC 2011: 17). It concludes by suggesting a number of policy options, which could inform future negotiations on the subject.

Today energy production principally derives from fossil fuels and only secondarily from renewable energy resources (IPCC 2011: 175). Unlike fossil fuels, most forms of renewable energy resources produce little to no carbon dioxide (CO₂) emissions (IPCC 2011: 164). Deriving electricity from renewable resources is crucial to mitigating climate change. Renewable energy has the potential of providing major parts of future energy supplies and end-use systems, particularly for electricity. Electricity is expected to reach higher shares of renewable energy in the energy supply mix and at an earlier stage than other heat or transport fuel sectors at the global level (IPCC 2011).

This process of transformation implies a necessary shift in the production process of energy. This shift entails enhanced domestic production of renewables, but also increased international trade as renewable energy resources depend on favourable climatic conditions. The world is likely to see increased interlinkages of regional and interregional grids, supported by new technology facilitating long-distance transportation of electricity or biogas. Currently the transition from fuel-based electricity production to renewable energy production is mainly driven by domestic regulations and policies seeking the introduction and promotion of renewable energy targets in 138 states (Cottier 2014).

LIKE PRODUCTS

Energy produced from fossil fuel or renewable energy may sometimes be distinguished as products. For example, biofuels from biological processes, such as methanol, is physically different from the fossil fuel used for fuelling engines or heating systems. More frequently, however, such distinctions cannot be made. This is true of electricity. It is also true of biomass to the extent that it is mixed with fossil fuel-based products and fed into the same transportation grid.

ELECTRICITY

Electricity is a key component on which modern life, social and economic development, and globalization is fully dependent. It forms part of the basic infrastructure of society, and is essential both for domestic and international trade in goods and services. The sector is highly regulated in all countries as the system needs to provide a stable base-load, largely independent of market forces. The production of electricity is based on various sources, both fossil and renewable energy. The bulk of global production today relies on fossil fuels. Decarbonisation of the world economy thus essentially depends on the shift from fossil fuel-based electricity (oil, natural gas, and coal) to renewable energy-based electricity (hydro-power, solar, wind, tidal, thermal, biomass, and, controversially, atomic energy). Whatever the source, electricity is fed into the same grid. Electricity as a product cannot be physically distinguished on the basis of the type of energy used to produce it. The physical properties of electricity do not vary and do not depend on the mode of production used. CO₂-based electricity cannot be physically distinguished from electricity produced from renewable energy. The atomic structure and electrons of all electricity are the same. Fossil- and renewable-based electricity are clearly like products.

Electricity in contemporary international law is defined as a good.¹ It is subject to the disciplines of World Trade Organization (WTO) law, in particular the General Agreement on Tariffs and Trade (GATT) 1994 and related international agreements.² Thus, the basic principle of treating like products alike applies to all electricity produced in accordance with Article III GATT 1947. In particular, taxation, technical regulations, and other rules need to treat imported electricity no less favourably than domestic

1 | Code 2716 of the Harmonized Commodity Description and Coding System. For an explanation of the classification of electricity as a good, see Cottier et al. (2011: 211–44).

2 | WTO, Energy Services, Background Note by the Secretariat, S/C/W/52, 9 Sep 1998, para. 36.

electricity, irrespective of the mode of production used, under the principle of national treatment.³ Likewise, producers from different jurisdictions enjoy the privilege of most-favoured nation (MFN) treatment,⁴ that is, imported electricity enjoys standards of treatment no less favourable than that best treatment accorded to any other country.

The law addressing the provision of electricity-related services is more complex. While MFN applies across the board,⁵ national treatment and market access depends on Member-specific commitments in their schedules under the General Agreement on Trade in Services (GATS) or preferential trade agreements.⁶ However, to the extent that such commitments exist and do not distinguish on the basis of particular production methods, all services relating to engineering, distribution services, interconnection and competition, and the relationship of grid operators enjoy the right to favourable treatment, independent of the source and method of production of the electricity traded.

BIOMASS

The same applies to biomass produced and fed into the pipelines also carrying fossil fuel based products. Even if physically different and distinguishable as such from fossil fuel or natural gas, the resulting product is a blend and no longer allows distinguishing on the basis of physical properties. Both components amount to a like product entitled to treatment no less favourable. The same as in electricity applies to biomass-related services to the extent they are scheduled under the GATS or preferential agreements.

PRODUCTION AND PROCESS METHODS

Given the principles of MFN and national treatment under the GATT 1994, the question arises to what extent differential treatment may be based on the modes of production of energy. This question relates to PPMs. These methods define "the way in which products are manufactured or processed and natural resources harvested or extracted" (OECD 1997: 33). There are two basic types—product-related PPMs (PR-PPMs); and non-product-related PPMs (NPR-PPMs) (Conrad 2011: 28).

PR-PPMs have an impact on the quality of a product (Holzer 2014: 93). Ways and means of production are induced to secure a particular quality of the product. For example, prescriptions relating to the production of food seek to secure

hygienic standards and thus a safe quality of the product itself. As a consequence, products produced by different processes and methods also show a different physical quality of the final product, at least potentially and in traces. A PPM is closely related to the product. It therefore allows distinguishing products produced by different means, and treating them differently in law under the like-product provision.

NPR-PPMs do not show any trace in the quality of the product itself (Conrad 2011: 12). The use or not of a particular method has no consequence or bearing on the final quality of the product. No traces of the processes and methods employed can be found (Conrad 2011: 28). Apart from electricity production, NPR-PPMs can be found in methods for extracting natural resources, in particular methods employed in fishing or hunting, or in the composition of the workforce and machinery employed. Most of the linkages of trade and the environment, and trade and human rights or labour standards are defined in terms of NPR-PPMs. Whether or not a football is produced by child or adult labour does not normally show in the quality of the product (albeit it is argued, for example, that this is not true in the case of handmade carpets depending on children for nimble work).

The analysis needs to distinguish between the GATT and the Technical Barriers to Trade (TBT) Agreement. Both are relevant, but do not show an identical approach. We briefly turn to PR-PPMs and then to NPR-PPMs. The latter are of prime interest to E15 on energy and climate change.

PRODUCT-RELATED PRODUCTION AND PROCESS METHODS

PR-PPMs under the GATT essentially follow the characteristics of the product (Holzer 2014: 94; Conrad 2011: 27). To the extent that they influence the quality or the perception of the product, they can be taken into account in distinguishing the product on the basis of border tax adjustment criteria.⁷ These criteria include not only the physical properties of goods,

3 | Appellate Body Report, *Japan – Taxes on Alcoholic Beverages*, WT/DS8/AB/R, WT/DS10/AB/R, WT/DS11/AB/R, adopted 1 Nov 1996, pp. 16–17.

4 | Appellate Body Report, *Canada – Certain Measures Affecting the Automotive Industry*, WT/DS139/AB/R, WT/DS142/AB/R, adopted 19 June 2000 [84].

5 | Appellate Body Report, *European Communities – Regime for the Importation, Sale and Distribution of Bananas*, WT/DS27/AB/R, adopted 25 Sep 1997 [220].

6 | See Article XVI (National Treatment) and Article XVII (Market Access) of the GATS), 1869 UNTS 183.

7 | The criteria for defining permissible internal tax adjustments applicable to like products crossing national borders was initially developed by the Border Tax Adjustment Working Party, see Working Party Report, *Border Tax Adjustments*, L/3464, adopted 2 Dec 1970, BISD 18S/97 [18]. Since then these criteria have been essential for determining likeness under Article 3 GATT, see Cottier and Oesch (2005: 390).

but also different perceptions on their quality and end use among consumers (consumer tastes and habits).⁸ Differential treatment can thus be based on different physical properties in analysing likeness, or on different subjective consumer perceptions; for example, on the health risk of particular products.

Such differences allow for differential treatment of non-like products within the basic principles of MFN in Article I and national treatment in Article III GATT 1994.⁹ The provision details specific rules on taxation and on regulation. Article III: 2 GATT essentially requires the same taxation of like products and comparable taxes for un-like, but still competing products.¹⁰ Article III:4 GATT essentially relies on the protection of equal conditions of competition for like products with a view to avoiding economic protection for domestic products.¹¹

Under the TBT Agreement, technical regulations are not limited to the quality of the product itself, but also entail PR-PPMs.¹² They are included in the definition of technical regulations and standards.

For the purpose of this Agreement, however, the following definitions shall apply:

1. Technical regulation

Document which lays down product characteristics or their related processes and production methods, including the applicable administrative provisions, with which compliance is mandatory. It may also include or deal exclusively with terminology, symbols, packaging, marking or labelling requirements as they apply to a product, process or production method.

2. Standard

Document approved by a recognized body, that provides, for common and repeated use, rules, guidelines or characteristics for products or related processes and production methods, with which compliance is not mandatory. It may also include or deal exclusively with terminology, symbols, packaging, marking or labelling requirements as they apply to a product, process or production method.

The definitions entail product characteristics or their related PPMs. To the extent that the PPMs are translated into quality and characteristics of products, they may be part of a regulation or standard and thus allow for product differentiation.¹³ The distinction between the quality of a product, PR-PPMs, and NPR-PPMs is not always easy to make. It strongly depends on the facts and particular circumstances of the case.

NON-PRODUCT-RELATED PRODUCTION AND PROCESS METHODS

General Agreement on Tariffs and Trade

NPR-PPMs raise a number of issues for international trade since they can have extraterritorial effects (Moisé and Steenblik 2011). Importing countries essentially define how products in exporting countries need to be processed. It is generally agreed that NPR-PPMs do not allow distinguishing like products on the basis of methods of production and processes under the GATT as they do not influence the quality of the product itself (Conrad 2011: 13).¹⁴ This means that even if like products are produced on a different carbon footprint, they will not be subject to differential treatment if it does not have any impact on their quality. A minority view in the literature adopts a more comprehensive approach to the notion of product quality and allows for differential treatment (Regan 2009; Conrad 2011: 486–90). Today, this view may be supported by the controversial finding of the Appellate Body in the context of subsidisation that conventional and renewable energy production does not pertain to the same market.¹⁵ In particular, it may be argued that consumer tastes and habits strongly depend on modes of production and thus give rise to differential treatment (Howse 2012: 446). The problem lies in proving the point, which strongly depends on subjective assessment.

Yet, it is safe to say that current GATT law reverts to the law of exceptions under Article XX GATT. According to the Appellate Body, Article XX GATT may cover not only measures to

⁸ Working Party Report (1970: [18]); see note 18.

⁹ General Agreement on Tariffs and Trade (GATT 1947), 55 UNTS 194.

¹⁰ Appellate Body Report, Japan – Taxes on Alcoholic Beverages, WT/DS8/AB/R, WT/DS10/AB/R, WT/DS11/AB/R, adopted, 1 Nov 1996, p. 25.

¹¹ Appellate Body Report, European Communities – Measures Affecting Asbestos and Asbestos-Containing Products, WT/DS135/AB/R, adopted 5 April 2001 [98].

¹² Agreement on TBT, 1868 UNTS 120.

¹³ Appellate Body Reports, *European Communities – Measures Prohibiting the Importation and Marketing of Seal Products (EC-Seal Products)*, WT/DS400/AB/R / WT/DS401/AB/R, adopted 18 June 2014, [5.12], Panel Report, *United States – Measures Concerning the Importation, Marketing and Sale of Tuna and Tuna Products (US-Tuna II (Mexico))*, WT/DS381/R, adopted 13 June 2012, as modified by Appellate Body Report WT/DS381/AB/R [7.370].

¹⁴ See Appellate Body Reports *EC-Seal Products*; note 24.

¹⁵ Appellate Body Reports, *Canada – Certain Measures Affecting the Renewable Energy Generation Sector /Canada – Measures Relating to the Feed-in Tariff Program (Canada – Renewable Energy /Canada – Feed-in Tariff Program)*, WT/DS412/AB/R / WT/DS426/AB/R, adopted 24 May 2013, [5.167]–[5.178].

facilitate a domestic policy in the importing country, but also measures that condition imports on the existence of certain policies in the exporting country.¹⁶ Hence measures related to NPR-PPMs need to comply with the conditions expounded under Article XX GATT.¹⁷

In the context of Article XX, there are mainly two provisions under which environmental concerns can be addressed, under Article XX (b) concerning measures “necessary to protect human, animal and plant life or health” and under Article XX (g) concerning measures “relating to the conservation of exhaustible resources if such measures are made effective in conjunction with restrictions on domestic production or consumption.” Differential treatment of energy production may take recourse to the protection of exhaustible natural resources, given that clean air and climate are considered to pertain to these types of resources.¹⁸ Efforts at decarbonisation and addressing climate change mitigation may be defended under the provision, provided that the measure is sufficiently related to these goals.¹⁹

The main obstacles today lie in the conditions of the chapeau of Article XX GATT, which requires failed efforts at negotiated solutions before unilateral measures are taken. Also it imposes equal treatment on all competitors and does not allow measures that go beyond what is necessary to achieve the goal. So far, regulations have failed to pass these tests and had to go back to drawing board, however without being excluded in principle.²⁰ The measure adopted therefore needs to be tailor-made. In addition, the proliferation of such measures by developed countries needs to take into account that they will painfully affect exports, which will be unlikely to comply with the conditions set out in regulations due to their limited financial and technical capacity. This further increases the danger of indirect protectionism.

To overcome this obstacle, such regulations need to be balanced with supporting policies relating to the principle of special and differential treatment of developing countries, discussed below. Finally, WTO case law has so far recognised labelling programmes, but has not addressed otherwise differential treatment on the basis of NPR-PPMs.²¹

TBT Agreement

Other than under the GATT, it is controversial whether the disciplines of the TBT Agreement apply to NPR-PPMs.²² The definitions indicated above can be read to closely relate to the physical properties and the quality of the product itself (“product characteristics or their *related* processes and production methods” (emphasis added)). Such a narrow reading of the term, however, is not necessarily compelling, as the same definition continues to include technical regulations and non-binding standards relating to the labelling of products. Labels may relate to the physical property of the product. They may, however, also relate to PPMs, both PR and NPR in a physical sense, such as the carbon footprint of a product. Whereas voluntary labelling schemes for a wide range of consumer products have existed for some time, mandatory

carbon footprint labels have only recently been elaborated (Moisé and Steenblik 2011: 26–33). Finally, it is difficult to see why the TBT Agreement should exclude NPR-PPMs from its definition as this would paradoxically remove all disciplines on the subject and states would be free to adopt measures that are generally considered to be outside the TBT Agreement (similar to the issue of private product standards). WTO Panels and the Appellate Body have recognised the relevance of the Agreement for labelling fisheries on the basis of fishing methods, irrespective of the likeness of the edible product.²³

NPR-PPMs, laid down in mandatory technical regulations, are thus subject to the principles of national treatment and Article

¹⁶ Appellate Body Report, *US-Tuna II (Mexico)*, [222-223]; note 24; see also Appellate Body Report, *United States – Import Prohibition of Certain Shrimp and Shrimp Products (US-Shrimp Turtle)*, WT/DS58/AB/R, adopted 6 Nov 1998 [121].

¹⁷ In the *Seals* case, the Panel found two NPR-PPMs contained in the so-called “EC Seal Regime” Regulation (EC) No 1007/2009 of the Parliament and of the Council of 16 Sep on trade in seal products (L 286/36-39) to be in breach of Articles I and II:4 GATT, but that they could be justified by the exception under Article XX (a) GATT. See Panel reports, *European Communities – Measures Prohibiting the Importation and Marketing of Seal Products*, WT/DS400/R / WT/DS401/R / and Add.1, adopted 18 June 2014 [7.639]. The application of the test under the chapeau of Article XX GATT was modified by the Appellate Body, see [5.313].

¹⁸ In the case *US- Reformulated Gasoline*, the Appellate Body confirmed that panel’s conclusion that “clean air” is a natural exhaustible resource and that a policy to reduce the depletion of clean air is a policy covered under the general exhaustible Article XX(g) GATT, 14-22, see Appellate Body Report, *United States –Standards for Reformulated and Conventional Gasoline (US-Reformulated Gasoline)*, WT/DS2/AB/R, adopted 20 May 1996.

¹⁹ Appellate Body Report, *US-Shrimp Turtle* [135]-[142]; note 30; Appellate Body Report, *US- Reformulated Gasoline* 19; note 32.

²⁰ Although such restrictions are not per se excluded, they have so far only once been accepted to qualify as one of the general exceptions enumerated under Article XX GATT. In the *US-Shrimp (Article 21.5 Malaysia)* case, the Appellate Body upheld the Panel’s compliance report that had found the unilateral trade restrictions taken by the US to conserve natural resources to be justified under Article XX (g) GATT. See Appellate Body Report, *United States–Import Prohibition of Certain Shrimp and Shrimp Products–Recourse to Article 21.5 of the DSU by Malaysia*, WT/DS58/AB/RW, adopted 21 Nov 2001.

²¹ See Appellate Body Report, *US–Tuna II (Mexico)*; note 24.

²² This question so far has not been addressed by the WTO Dispute Settlement Bodies. In the *EC–Seals* case, the Appellate Body also refrained from completing its legal analysis as to whether the EU Seal Regime prescribes PPMs or not on the grounds that the Panel had made no findings on the issue and not further explored the question. See Appellate Body Reports, *EC–Seal Products* [5.61]–[5.69]; note 24.

²³ Under the TBT Agreement differential treatment for products is not based on the criteria of the “likeness of products” under Articles I and III GATT, it is based on whether the differential treatment of the product suffices the conditions of a “technical regulation” as set out under Annex 1.1 of the TBT Agreement. In the case *US-Tuna II (Mexico)* the “dolphin-safe labelling scheme,” which consisted of three joint measures and was enacted to prevent the killing of dolphins by prescribing the adequate fishing techniques, qualified as a “technical regulation” within the meaning of Annex 1.1 TBT Agreement, see Appellate Body Report, *US-Tuna II (Mexico)* [183]–[199], note 24.

2 of the TBT Agreement. Taking into account the case of law panels and the Appellate Body, these principles imply inherent restrictions to likeness and national treatment informed by the exceptions to Article XX GATT.²⁴ Depending on the legitimacy of its goals, the measure must be properly calibrated, avoiding all unnecessary discrimination. In essence, panels and the Appellate Body apply a test of proportionality, assessing the need, suitability, and appropriateness of the measure at hand.²⁵

THE WAY FORWARD

Incentives to bring about electricity production and trade on the basis on renewable energy (hydro, wind, solar, tidal, thermal, possibly atomic energy) or the promotion of biomass in the decarbonisation process requires full recognition of NPR-PPMs. Currently, incentives mainly consist of labelling schemes, such as guarantees of origin (GOs) and green certificates.²⁶ However, this kind of incentive alone is not able to induce the necessary shift in energy production processes. The problem with labelling schemes is that they merely require the disclosure of specific information whereas other technical norms and regulations demand that the good in question be produced according to a required standard (Conrad 2011: 387). No experience so far exists with differential tariff rates applied on the basis of NPR-PPMs. Applying higher rates to products made by means of polluting processes can provide appropriate incentives. Such measures, however, are subject to compensation. They may attract retaliatory measures and may result in carbon leakage (Cottier et al. 2014b).²⁷ Carbon leakage results in displacement effects regarding the place of production, investments, and the consumption of energy (DFID 2012).

PRODUCTION AND PROCESS METHODS AND DIFFERENTIAL TAXATION

Appropriate incentives mainly consist of introducing differential taxation of electrical energy, commensurate with methods of production used, which would amount to a key instrument in the context of carbon taxation and replacing feed-in tariffs in due course.²⁸ These systems operate on the basis of certificates of origin (COs), which may be limited, but may also be traded in their own right. The present state of WTO law allows doing so only under conditions set out in Article XX GATT. Yet, there is no legal security and case law to this effect and much depends on the particularities and modalities of a measure adopted. The Appellate Body has not yet recognised NPR-PPMs relating to measures other than labelling of products.²⁹

LINKING PRODUCTION AND PROCESS METHODS AND TRANSFER OF TECHNOLOGY

Members of the WTO depending on fossil fuel production will oppose import restrictions, differential taxation, and other incentives if treatment less favourable is not compensated by incentives to bring about new technologies for renewables to their country. The massive support for renewable energy by industrialised countries has greatly increased the gap in technology. Recourse to additional incentives beyond subsidies will further this gap and thus the resistance to the divide. Closing the gap requires additional efforts in combining the law on NPR-PPMs and transfer of technology to developing countries.

WTO law does not address the problem of transfer of technology to developing countries and its linkages to emission trading under the United Nations Framework Convention on Climate Change (UNFCCC), and to the present and future Clean Development Mechanism (CDM). Linkages between the WTO and the newly formed Technology Mechanism (TM) are also missing. These UN instruments play a key role in supporting the diffusion of climate change mitigation technologies (see De Coninck and Puig 2015 for a thorough assessment). They should be linked to the operation of PPMs in WTO law.

Article 66.2 of the TRIPS Agreement provides a positive obligation for developed countries to provide incentives to their enterprises and institutions for promoting and encouraging technology transfer to least developed countries (LDCs) (Moon 2008: 2).³⁰ The very wording of the article shows where the fundamental problem of technology transfer lies. On the one hand, legal obligations only extend to LDCs. On the other hand, it shows that technology transfer itself

24 | Appellate Body Report *US-Tuna II (Mexico)* [317], note 24.

25 | Appellate Body Report *US-Tuna II (Mexico)* [317], note 24.

26 | In the EU, GOs have a function of informing end-users about the share of energy produced from renewable energy resources and are currently traded on a voluntary market. See Cottier et al. (2014: 8–9). In Europe, Green Certificates, also often referred to as Renewable (ROCs), are a tradable commodity, proving that electricity is generated using renewable energy resources. So far these schemes are of national character and have not yet been used for intra- EU transfer. See Cottier et al. (2014).

27 | The article combines a legal and economic analysis of the potential of tariff policy for climate change mitigation.

28 | For a detailed analysis of such systems, see Cottier et al. (2015).

29 | See Appellate Body report *US-Tuna II (Mexico)*; note 24.

30 | TRIPS Agreement, Annex 1C to the Marrakesh Agreement (WTO Agreement), 1869 UNTS 299; 33 ILM 1197 (1994).

lies in the hands of the private sector. The state is essentially confined to the limited, but very important, function of creating appropriate incentives for the private sector to engage in the transfer of technology. Today, few such incentives exist, and additional options need to be developed.

Incentives could be created by the home state granting tax breaks to companies engaging in transfer of technology to developing countries and LCDs, and supporting private-public partnerships (PPPs) to promote this in return for accepting the operation of NPR-PPMs in energy production.

Tax incentives

Tax breaks are an important tool for encouraging investment by the private sector in research and development (R&D) technologies.³¹ Bilateral investment treaties (BITs) and double taxation treaties (DTTs) for the avoidance of double taxation provide incentives to stimulate investments.³² BITs seek to create favourable conditions for investment and transfer of technology by excluding formal and regulatory taking without expropriation, including excessive taxation and abuse of the tax law.³³ Like trade regulation, incentives are created by legally requiring equal conditions of competition by means of fair and equitable treatment of foreign direct investment. Foreign direct investment, often based on BITs, may eventually benefit from tax rebates granted to new settled companies for a certain period of time.

Measures are more targeted in avoiding double taxation. There are two principal forms of tax breaks in DTTs that can be used for encouraging technology transfer—the tax exemption method³⁴ and the credit method.³⁵ With the tax exemption method, the home state exempts income and capital from taxation, irrespective of whether the tax is levied in the host country where the income is generated (country of source).³⁶ With the tax credit method, the home state grants a relief from its own tax on the income or capital equal to the tax paid in the host country.³⁷ The problem with the latter method is that tax payers may be exempted from taxation in host countries due to temporary tax reliefs. But tax is levied by home states, and the incentive offered by the host country is in effect denied.³⁸ To avoid such negative effects, some countries have agreed to integrate “tax-sparing” provisions in treaties with developing countries.³⁹ Such provisions enable the investor to receive a foreign tax credit that would not be neutralised by the company’s home state. The tax is not paid and thus “spared.”⁴⁰ Although tax sparing has been viewed by many countries as a part of their foreign aid policy, Organisation for Economic Co-operation and Development (OECD) countries have been reluctant to grant tax sparing in treaties because they provide potential for abuse (such as tax avoidance) and often have not been beneficial to social and economic development of the country.⁴¹ Tax sparing, however, could be linked more closely, and even limited, to transfer of technology that allows host countries to adjust and adopt modern PPMs and thus avoid trade barriers that may otherwise result.

Other forms of possible tax incentives consist of tax reductions granted contingent on the export of technology and know-how, and of investment based on such technology. Tax reductions contingent on exported goods related to know-how raises the issue whether this amounts to an export subsidy inconsistent with Article 3 of the WTO Agreement on Subsidies and Countervailing Measures (SCM).⁴² The agreement does not apply to services, or to products made in host countries after foreign direct investment. The interest to incentivise access to advanced technologies, especially in the field of energy, may need reviewing the suspension of the category of non-actionable subsidies in Article 8 of the SCM Agreement. It may also need renegotiating the terms of excluding action against measures taken in support of exporting technology for advanced PPMs, thus allowing for climate-friendly energy production.

In addition to the traditional methods of tax sparing and tax exemptions, other tax incentives for encouraging technology transfer exist. There are various types of fiscal incentives that governments can use, such as investor tax incentives, capital expenditure tax incentives, or loan guarantee schemes.⁴³

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- 31 Ewa Bienkowska, 'R&D incentives in selected EU member states' in Włodzimierz Nykiel and Adam Zalasinski (eds), *Tax Aspects of research and development within the European Union* (Wolters Kluwer SA 2014) 287, 288.
- 32 Tom Coupé, Irina Orlova and Alexandre Skiba, 'The effect if tax and investment treaties on bilateral FDI flows to transition economies' in Karl P Sauvart and Lisa E Sachs, *The Effect of Treaties on Foreign Direct Investments: Bilateral Investment Treaties, Double Taxation Treaties, and Investment Flows* (Oxford University Press 2009) 687, 687-691.
- 33 See Krista Nadavukaren Schefer, *International Investment Law: Text Cases and Materials* (Edward Elgar 2013) 223/224.
- 34 Article 23 A, OECD Model Convention with Respect to Taxes on Income and on Capital (Condensed Version 2014) <<http://www.oecd.org/ctp/treaties/oecd-model-tax-convention-available-products.htm>> accessed 2 July 2015.
- 35 Article 23, B OECD Model Convention, note 56.
- 36 Commentaries on the Articles of the OECD Model Tax Convention (2010) < www.oecd.org/berlin/publikationen/43324465.pdf> accessed 2 July 2014, 317.
- 37 Commentaries on the Articles of the OECD Model Convention (2010) (n 55) 324.
- 38 Jeffery Owens and Torsten Fensby, 'Is There a Need to Re-evaluate Tax Sparing?' (1998) 26 *Intertax*, 274, 274.
- 39 Owens and Fensby (n 57) 274.
- 40 Owens and Fensby (n 57) 275.
- 41 Owens and Fensby (n 57) 275.
- 42 SCM Agreement: https://www.wto.org/english/docs_e/legal_e/24-scm_01_e.htm
- 43 IPCC, 'Fiscal Measures and Tax Incentives'(Methodological and Technological Issues in Technology Transfer) available at <<http://www.ipcc.ch/ipccreports/sres/tectran/index.php?idp=113>> accessed 10 July 2015.

Further, the public sector can encourage the financial sector to become involved in partnering and sponsoring new financial initiatives.⁴⁴ Their relationship to fostering access to, and distribution of, state-to-the-art PPMs should be further explored.

Private-public partnerships

Access to, and distribution of, state-to-the art PPMs in energy production and beyond can also be fostered by means of PPPs. The potential is widely unexplored in the field of renewable energy. Typically, a partnership entails the participation of donors, compensating for market failure, producers, and the government. A clear legal framework for PPMs has neither evolved in public international law nor in domestic law in the developing world where such schemes are mainly used. These partnerships currently face various challenges such as a “lack of uniform practice, difficulty of moving from the development of a partnership to its implementation stage, and lack of monitoring or assessment of these initiatives” (Morgera and Kulovesi 2013: 139).⁴⁵ A case study of Nigeria on access to essential medicines gives a good demonstration of the challenges facing the development and implementation of PPPs for enacting public policy goals. It also highlights the importance of having well-developed systems to protect and enforce intellectual property rights to stimulate technology transfer and attract investment.⁴⁶ Further work needs to be undertaken on framing appropriate rules in international trade and investment law with a view to facilitating PPMs in the energy sector and beyond.

PRODUCTION AND PROCESS METHODS AND GRADUATION

Finally, WTO law does not yet take into account special and differential (S&D) treatment or graduation. Whether or not NPR-PPMs can be used in relation to a WTO Member should depend on the overall contribution of the country to CO₂ emissions and on the level of social and economic development. Appropriate factors and indicators should be developed to this effect (see Cottier 2006: 779–821). For example, the import of electricity from small developing countries with overall low CO₂ emissions should not distinguish on the basis of NPR-PPMs, but treat electricity irrespective of the source of generation on an equal footing. On the other hand, imports from emerging economies strongly contributing to global CO₂ emissions are eligible for differential treatment on the basis of NPR-PPMs privileging electricity generated from renewable resources.

CONCLUSION

The established concept of likeness in WTO law does not readily allow for product differentiation on the basis of PPMs and thus of differing PPMs. Such schemes, except for the purposes of labelling under the TBT Agreement, essentially depend on qualifications contained in the exceptions to Article XX GATT. Much depends on the precise modalities of implementing a scheme; the law does not offer adequate predictability and legal security. Moreover, current WTO law may allow for unilateral imposition of PPMs, but does not provide for compensatory mechanisms in transferring know-how and technology relating to PPMs. Parameters allowing for PPMs without invoking exceptions thus need to be developed in conjunction with facilitating investment and trade in PPMs. Access to technology for exporting countries will be a key component in accepting a shift in likeness of products and increasingly allowing for taking sustainable manners of production into account.

While there is room for a general body of law to be further developed on PPMs beyond the case law of panels and the Appellate Body, each sector needs assessing particular needs and whether special provisions should be included in particular sectoral agreements relating to different forms of energy production. PPMs may thus amount to an important component of sectoral agreements on trade in electricity, mainly focusing on interconnection and competition, and on trade in fossil fuels, mainly focusing on PPMs relating to sustainable extraction and use of these resources.

44 IPCC, 'Partnering and Sponsorship for New Financial Initiatives' (Methodological and Technological Issues in Technology Transfer) <<http://www.ipcc.ch/ipccreports/sres/tectran/index.php?idp=114>> accessed 10 July 2015.

45 Elisa Morgera and Kati Kulovesi, 'Public – private partnerships for wider and equitable access to climate technologies' in Abbe E.L. Brown, *Environmental Technologies, Intellectual Property and Climate Change, Accessing, Obtaining and Protecting* (Edward Elgar 2013) 139.

46 Adamu A Pam, 'Access to medicines in developing countries and public-private partnerships, the case of Nigeria' PhD, University of Bern (forthcoming 2015).

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