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Network Governance of Biofuels

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16.1 INTRODUCTION

16.1.1 Mapping Regulation and Governance Networks

In many countries around the world, the biofuels industry has been almost universally dependent on government support policies.[1] Market interventions include policies designed to stimulate domestic production through subsidies to producers, investment in biofuels research and development (R&D) and import tariffs on biofuels, as well as regulations to create demand by mandating biofuel use. As a result of such laws, regulations and policies, existing biofuels markets are heavily price-distorted. Forward and backward linkages with other markets that are highly volatile (for example, oil) and also price-distorted (for example, agriculture) make the economics of the biofuels industry exceedingly complex.[2]

The biofuels sector is a textbook example of network governance in operation, where an unlimited number of intersecting government and non-government actors carry out specific tasks in a flexible, unsystematic process of collaboration and competition.[3] Authority over policy decisions

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[1] Global Subsidies Initiative, 2011, "Biofuels Subsidies." Available at: http://www.globalsubsidies.org/biofuel-subsidies (last accessed 29 October 2015).

[2] Kojima, M. and D. Mitchell, 2007, "Considering Trade Policies for Liquid Biofuels." Energy Sector Management Assistance Program Special Report No: 004/007. Washington, DC: The World Bank.

[3] Hooghe, L. and G. Marks, 2003, "Unraveling the Central State, But How? Types of Multi-Level Governance." *The American Political Science Review*

and associated regulatory rule-making is dispersed among many different actors operating at different levels. Network (or multi-level, or multilateral, or global) governance involves "the upward diffusion of power to regional and international organizations as well as the downward diffusion of power to various sub-national governments".[4] Governance includes not only government measures, but also a wide range of regulatory or quasi-regulatory powers exercised by private actors, including firms, industry associations and third-party standard-setting organizations.[5]

Studies on the legal and policy aspects of the biofuels regulatory landscape have not yet characterized the issues in this way. The literature, all relatively new, fits within two broad categories: (i) detailed analyses of particular aspects of governance, for example the impacts of government support,[6] sustainability criteria,[7] or the application of international trade laws to those issues;[8] and (ii) general overviews

97:233–43; Rosenau, J.N., 1997, *Along the Domestic-Foreign Frontier: Exploring Governance in a Turbulent World*. New York: Cambridge University Press.

[4] Harmes, A., 2006, "Neoliberalism and Multilevel Governance." *Review of International Political Economy* 13:725. See also Peters, G.B. and P. Jon, 2001, "Developments in Intergovernmental Relations: Towards Multi-Level Governance." *Policy and Politics* 29:131–5; Rosenau, J.N. and E.-O. Czempiel, eds, 1992, *Governance Without Government: Order and Change in World Politics*. Cambridge: Cambridge University Press.

[5] For more details see de Beer, J. and S.J. Smyth, 2012, "International Trade in Biofuels: Legal and Regulatory Issues." *Estey Journal of International Law* 13(1):131–49.

[6] Steenblik, R., 2007, "Biofuels – At What Cost? Government Support for Ethanol and Biodiesel in Selected OECD Countries." International Institute for Sustainable Development. Global Subsidies Initiative. Available at: http://www.iisd.org/gsi/sites/default/files/oecdbiofuels.pdf (last accessed 27 September 2015).

[7] De Vera, E.R., 2008, "WTO and Biofuels: The Possibility of Unilateral Sustainability Requirements." *Chicago Journal of International Law* 8:661–79; Sheehan, J.J., 2009, "Biofuels and the conundrum of sustainability." *Current Opinion in Biotechnology* 20:318–24; Switzer, S. and J. McMahon, 2010, "EU Biofuels Policy – Raising the Question of WTO Compatibility." University College Dublin Working Papers in Law, Criminology and Socio-Legal Studies, Research Paper No. 26/2010; United Nations Conference on Trade and Development (UNCTAD), 2008, *Making Certification Work for Sustainable Development*. United Nations Conference on Trade and Development. http://www.unctad.org/en/docs/ditcted20081_en.pdf (last accessed 29 October 2015).

[8] Deshpande, R.S., 2006, "Biofuels and WTO: An Emerging Context." *Asian Biotechnology and Development Review* 7:1–20; Echols, M.A., 2009, "Biofuels Certification and the Law of the World Trade Organization." ICTSD Programme on Agricultural Trade and Sustainable Development. Available at: http://www.ictsd.org/downloads/2009/06/marsha-echols.pdf (last accessed 29 October 2015); Harmer, T., 2009, "Biofuels Subsidies and the Law of the WTO." ICTSD Programme

of biofuels policy issues and instruments worldwide, regionally or nationally.[9]

This chapter begins to connect cross-disciplinary literatures on biofuel policy issues with discussion of specific examples of laws, regulations and standards governing – formally and informally supporting and constraining – this sector. The central objective is to map the regulatory and governance structures around biofuels in order to reveal the entire emerging landscape, and to situate this landscape within the analytical framework of multi-level, network governance.

16.1.2 Public Policy Objectives for Biofuels

Humanity's reliance on fossil fuels such as petroleum and natural gas is causing potentially catastrophic changes to the Earth's climate. Fossil fuel formation takes millions or hundreds of millions of years. The Earth's fossil fuel reserves cannot sustain society's current rates of energy consumption. As importantly, the planet cannot absorb quickly enough the carbon dioxide emissions from burning fossil fuels at current levels. Carbon dioxide is one of several greenhouse gasses (GHG) in the atmosphere that among other things regulates the temperature of the Earth's surface. It is "95 % certain" that human actions such as this are responsible for "clear and growing . . . impacts observed across all continents and oceans. Many of the observed changes since the 1950s are unprecedented over decades to millennia".[10] Some environmentalists, though by no

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on Agricultural Trade and Sustainable Development. Available at: http://www.ictsd.org/downloads/2012/02/biofuels-subsidies-and-the-law-of-the-wto.pdf (last accessed 29 October 2015); Howse, R., P. van Bork and C. Hebebrand, 2006, "WTO Disciplines and Biofuels: Opportunities and Constraints in the Creation of a Global Marketplace." International Food and Agricultural Trade Policy Council. IPC Discussion Paper. Available at http://www.agritrade.org/Publications/DiscussionPapers/WTO_Disciplines_Biofuels.pdf (last accessed 29 October 2015); Kerr, W.A. and L. J. Loppacher, 2005, "Trading Biofuels – Will International Trade Law Be a Constraint?" *Current Agriculture, Food and Resource Issues* 6:50–62.

[9] Ngo, A.T., P. Halley and P. Calkins, 2008, "Biofuels in Canada: Normative Framework, Existing Regulations, and Politics of Intervention." *McGill International Journal of Sustainable Development Law and Policy* 4:19–50; Kaditi, E.A., 2009, "Bio-Energy Policies in a Global Context." *Journal of Cleaner Production* 17:4–8; Jull, C., P.C. Redondo, V. Mosoti and J. Vapnek, 2007, *Recent Trends in the Law and Policy of Bioenergy Production, Promotion and Use*. Rome: Food & Agriculture Organization; Sorda, G., M. Banse and C. Kemfert, 2010, "An Overview of Biofuel Policies Across the World." *Energy Policy* 38:6977–88.

[10] Intergovernmental Panel on Climate Change, 2014, "Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth

means all, are optimistic that advanced biofuels will eventually emerge as a viable, cleaner and more sustainable substitute for petroleum products.

But "biofuels policy" isn't just about energy or the environment. It is more complex than that. Some reasons for the complexity relate to the economic, social and political opportunities presented by the aforementioned environmental threat.

For one thing, Western countries, especially the United States, realize that industrial energy and national security issues (economic and physical security) are closely connected.

Strategies are being developed to reduce dependence on foreign energy supplies, and in particular on petroleum coming from some of the world's most volatile regions. Biofuels from crops such as corn or canola grown domestically or by stable trading partners, if produced and refined in sufficient quantities, could theoretically support security-related policy objectives. Although some experts have questioned the basic assumption underpinning these policies – that supply of biofuels is more secure than fossil fuels[11] – public perception and political strategizing tend to conflate ethanol production with greater energy security.

Procuring a more secure, as well as environmentally sustainable, supply of energy from crops instead of fossil fuels has the further putative benefit of strategically supporting agricultural industries. The agricultural policy aspects of biofuels are key not only in developed regions of the world, such as North America and Europe, but perhaps even more so in developing regions, such as south-east Asia, southern Africa and Latin America. The global economic geography of biofuels guarantees at least opportunities if not certain benefits for developing countries with relatively large landmasses, long growing seasons and low labour costs.

In recent years, agricultural policy issues have been among the most controversial surrounding biofuels. Critics have argued that a global biofuels trade could collapse food and energy markets by diverting food crops or land to the production of biofuels, in turn linking crop prices to variations in world oil markets.[12] However, analysts disagree on the extent to which the ongoing global food crisis that began with the 2008 spike in food

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Assessment Report of the Intergovernmental Panel on Climate Change." p. v. Available at: http://ar5-syr.ipcc.ch/ipcc/ipcc/resources/pdf/IPCC_SynthesisReport.pdf (last accessed 7 February 2016).

[11] Eaves, J. and S. Eaves, 2007, "Renewable corn-ethanol and energy security." *Energy Policy* 35:5958–63; *supra*, n. 6, pp. 44–5.

[12] Mitchell, D., 2008, "A Note on Rising Food Prices." World Bank Policy Research Working Paper No. 4682; Runge, C.F. and B. Senauer, 2007, "How Biofuels Could Starve the Poor." Council on Foreign Relations. Available at:

prices can be causally linked to biofuels production. The United Nations Conference on Trade and Development (UNCTAD) takes the position that biofuels production has been "a driver of food price inflation for certain crops, but not the dominant one".[13] Credible analysis from the United Kingdom's Department for Environment, Food and Rural Affairs (DEFRA) has similarly concluded that biofuels made a relatively small contribution to the 2008 spike in agricultural commodity prices.[14] In any case, throughout the world, biofuels are understood as an important part of agricultural policy.

Closely related to agricultural policy matters are efforts to facilitate job creation and economic development generally. Much of the published information about employment and economic activity comes from industry associations rather than independent analysis. Regardless of the source of data, however, there is general recognition that biofuels have the potential to become big business in the foreseeable future. Policy interventions are clearly premised, at least in part, on this expectation.

Underpinning all of the considerations just discussed is science and technology policy. The current state of science and technology allows for the commercial manufacture of two types of liquid biofuel: ethanol and biodiesel. Ethanol is an alcohol produced through fermentation of sugar sources, including starch. Biodiesel is made by reacting an alcohol with either "waste" oils, such as used cooking oils and fish oils, or "virgin" oils from crops such as canola. There is broad consensus among experts that biotechnological innovation will play a crucial role in achieving the goals of biofuels-related policy initiatives.[15] So-called "second-generation" biofuels, referring usually to ethanol derived from a variety of low-cost cellulosic feedstocks including wood, straw and grass, could become commercially viable within the next ten to twenty years, as more cost-effective technologies for converting cellulose into ethanol are discovered and

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htpp://www.foreignaffairs.com/articles/62609/c-ford-runge-and-benjamin-senauer/how-biofuels-could-starve-the-poor (last accessed 29 October 2015).

[13] United Nations Conference on Trade and Development (UNCTAD), 2011, "UNCTAD's position on biofuels policies and the global food crisis". Available at http://reliefweb.int/report/world/unctads-position-biofuels-policies-and-global-food-crisis (last accessed 2 November 2015).

[14] Department for Environment, Food and Rural Affairs (DEFRA), 2009, "The Role of Demand for Biofuel in the Agricultural Commodity Price Spikes of 2007/08." Available at: http://www.ethanolrfa.org/reports/ethanol-foodfeed-market-impacts/ (last accessed 2 November 2015).

[15] Lynd, L.R., M.S. Laser, D. Bransby, B.E. Dale, B. Davison, R. Hamilton, M. Himmel, M. Keller, J.D. McMillan, J. Sheehan and C.E. Wyman, 2008, "How Biotech Can Transform Biofuels." *Nature Biotechnology* 26:16–172.

introduced. Industry observers also forecast the eventual commercialization of "third-generation" biofuels derived from transgenic, high-yield feedstocks engineered to partially self-process into biofuel post-harvest, as well as "fourth-generation" biofuels derived entirely from novel microbes engineered to produce hydrocarbons. The genomics of cellulosic biofuel will be vital to the process of realizing the potential of new technologies.[16]

To summarize, the global biofuels industry is being driven by a combination of public policy objectives related to environmental sustainability, energy security, agricultural productivity, socio-economic development and scientific and technological innovation.[17] Among these, the convergence of environment, energy and agricultural/food policies have thus far received the most attention among social scientists.[18] Indeed, those issues have been put forward as the biofuels policy "trilemma".[19] Other experts have warned about the "imminent collision" between the different policy drivers of biofuels: "not all these objectives can necessarily be pursued at the same time through policies supporting a pair of fuels. The political economy of public transfers is such that the risk of public policy being co-opted in support of private ends is and will remain great."[20] While this is no doubt true, the point of highlighting key policy considerations in this chapter is merely to introduce some of the reasons that regulation of this sector is so complex.

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16 Rubin, E.M., 2008, "Genomics of Cellulosic Biofuels." *Nature* 454:841–5.

17 For more detail see: de Beer and Smyth, *supra*, n. 5.

18 Charles, M.B, R. Ryan, N. Ryan and R. Oloruntoba, 2007, "Public Policy and Biofuels: The Way Forward?" *Energy Policy* 35:5737–46; De Gorter, H. and D.R. Just, 2010, "The Social Costs and Benefits of Biofuels: The Intersection of Environmental, Energy and Agricultural Policy." *Applied Economic Perspectives and Policy* 32:588–603; Rajjagopal, D. and D. Zilberman, 2008, *Environmental, Economic and Policy Aspects of Biofuels*. Now Publishers Inc.

19 Tilman, D., R. Socolow, J.A. Foley, J. Hill, E. Larson, L. Lynd, S. Pacala, J. Reilly, T. Searchinger, C. Somerville, R. Williams, 2009, "Beneficial Biofuels – The Food, Energy, and Environment Trilemma." *Science* 325:270–71.

20 *Supra*, n. 6.

16.2 DOMESTIC POLICIES AND REGULATIONS

16.2.1 Supply-side Measures

(a) Legal regulation of production and distribution

The Canadian system provides an excellent example of multi-level governance. Biofuels producers and distributors in Canada must comply with a collection of rules promulgated by federal, provincial and municipal governments, as well as an array of technical standards set by certification bodies or other non-governmental entities, relating to almost all aspects of production and distribution.

Constitutional authority over "the environment" is not specified by Canada's Constitution Act, 1867,[21] which divides regulatory powers between federal and provincial governments. It has come to be an area of shared or overlapping jurisdiction.[22] Therefore, every Canadian province also has its own, unique environmental assessment requirements. Biofuels production facilities are typically considered to be local undertakings, which fall within the regulatory jurisdiction of provincial or municipal governments. The exception is when producers receive federal funding (which, as discussed below, is almost always the case). Then they can become subject to federal laws and regulatory requirements, including for example the Canadian Environmental Assessment Act (CEAA).[23]

Provinces such as Alberta and Ontario treat biofuels producers like chemical producers or other product manufacturers. In Alberta, for instance, that means they must comply with statutes including the provincial Environmental Protection and Enhancement Act,[24] obtain approvals from the Energy Resources Conservation Board pursuant to the Energy Resources Conservation Act[25] and Oil and Gas Conservation Act[26] and permits pursuant to the Water Act,[27] as well as other laws and regulations.[28] Manitoba has enacted a biofuels-specific statute, the Biofuels Act[29] and related regulations. But that has not really simplified

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21 *The Constitution Act, 1867* (UK), 30 & 31 Victoria, c. 3.
22 Hogg, P., 2007, Constitutional Law of Canada. 5th ed. Toronto: Carswell.
23 S.C. 2012, c. 19.
24 RSA 2000, c. E-12.
25 RSA 2000, c. E-10.
26 RSA 2000, c. O-6.
27 RSA 2000, c. W-3.
28 Willms, J., 2010, "The Growing Regulatory Landscape for Biofuels." Paper presented at The Canadian Institute Biofuel Symposium (unpublished).
29 CCSM 2003, c. B40.

matters, because its licensing requirements are separate from and additional to the Environment Act.[30]

These kinds of provincial regulations are in addition to municipal bylaws that govern matters from zoning to emissions. Willms also points out how private citizens may even play a role in the governance and regulation of biofuels through the power to take legal action over nuisances from noise, odour or other interferences that may come from biofuels production facilities.[31]

Following production, there are regulatory issues about distribution, including storage, of biofuels.[32] Again, governance is divided among federal, provincial and municipal levels, but with the added complexity here of mandatory compliance with third party standards. These standards might be cross-referenced by formal regulations, or adopted pursuant to industry best practices or even contractual requirements. Good examples are the Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations,[33] enacted pursuant to the federal Canadian Environmental Protection Act[34] (not to be confused with the Canadian Environmental Assessment Act, 2012 mentioned above) and requiring tanks to be approved by the Underwriters Laboratories of Canada (ULC). Standards established by other organizations, such as the American Petroleum Institute (API) and the Technical Standards and Safety Authority (TSSA), are also integrated into provincial regulatory requirements.

(b) Subsidies, tax preferences and related supports

Subsidies and other government supports are not regulations per se, but they are very much a part of the biofuels governance picture. Indeed, these supports play a determinative role in the structure and success of the industry. In 2006, Steenblik calculated the total value of support for biofuels through hundreds of OECD government programs covering virtually every stage of production and consumption at US$11 billion.[35] The OECD itself put the figure at US$15 billion in 2007.[36]

In OECD countries, at least, import tariffs on foreign biofuels help

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30 CCSM 2003, c. E125.
31 *Supra*, n. 28.
32 *Ibid.*
33 SOR/2008-197.
34 RSC 1999, c. 33.
35 *Supra*, n. 6, pp. 2–6.
36 Cited in Sorda, *supra*, n. 9.

to support domestic production.[37] Tariffs are typically much higher for ethanol than biodiesel, due to quirky customs classification schemes governing the international biofuels trade, discussed later in this chapter. Various exemptions for biofuels producers in countries with free trade agreements (FTAs) or beneficiaries of a generalized system of preferences (GSP) make generalizations difficult. Nevertheless, it has been argued in principle[38] and proven empirically[39] that supporting domestic producers by erecting barriers to cheaper imports of foreign biofuels through tariffs and discriminatory taxes is an incoherent policy, particularly in light of simultaneous mandates to increase consumption through renewable fuel standards. Le Roy et al. put it bluntly:

> The results of the analysis show conclusively that import barriers favour domestic suppliers of ethanol at the expense of consumers. Import barriers injure Canadian consumers by limiting their access to supplies offered for sale at lower prices by more efficient producers, particularly those that are located in subtropical regions that face lower costs of land and labour. With freer trade, the domestic ethanol price would fall while the world price would rise as a consequence of the higher demand for ethanol in Canada.

But, they continue, "eliminating import barriers would be costly for ethanol producers in Canada. In response to the lower prices they would receive, the quantities of ethanol they would offer for sale would decrease."[40] Tariffs are a strategy (albeit inefficient and possibly illegal) to counter the competitive advantage that several developing countries have for biofuels production.

Though complex and controversial, tariff support measures can be relatively easily evaluated because they are normally applied only at the federal level. The same is not true of another sort of support, excise tax preferences or exemptions. Steenblik notes: "Almost all OECD countries in which biofuels are consumed have used that form of tax concession at some point, whether the tax being exempted was relatively small or large."[41] The analytical challenge, however, is to understand the

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[37] For more detail see: de Beer and Smyth, *supra*, n. 5.

[38] *Supra*, n. 6, p. 6.

[39] Le Roy, D., A. Elobeid and K.K. Klein, 2009, "The Impact of Trade Barriers on Mandated Biofuel Consumption in Canada." Canadian Agricultural Trade Policy and Competitiveness Research Network. Available at: http://scholar.ulethbridge.ca/dannyleroy/publications/impact-trade-barriers-mandated-biofuel-consumption-canada (last accessed 2 November 2015).

[40] *Ibid.*, pp. 15–16.

[41] *Supra*, n. 6, p. 2.

interconnections among federal and sub-national taxation policies, which operate in tandem to determine levels of effective support in any particular jurisdiction. These rates can be highly variable throughout multi-level governance systems, for example between US states,[42] or Canadian provinces, territories and even some municipalities.[43] In the EU, there is no Community-wide excise tax policy for biofuels; most Member States have their own, different policies.[44] What remains mostly undocumented is the extent to which there is even further variability in taxation policies *within* EU Member States. In most jurisdictions, particular tax preferences also vary with the composition of the biofuel in question, such as the blending ratio of ethanol to gasoline.

Steenblik has noted a general trend away from fuel-tax preferences towards volumetric production subsidies and/or consumption mandates, possibly to avoid trade disputes, or to safeguard the highway infrastructure funding that comes largely from excise taxes.[45] Regardless of the reason, the pattern is unmistakable: there are a growing number of direct or indirect subsidies and operator incentives available to biofuels producers, blenders and distributors. As a result, it is becoming more difficult not only for governments or observers to manage and evaluate these programs, but also for industry actors themselves to identify and capitalize on an increasingly bewildering array of support measures. These challenges are compounded because so many of the programs, especially at the state/provincial level, are in tremendous flux.[46]

The programs just described relate essentially to *outputs* from the biofuels production process. There is an equally if not even more complex

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[42] Koplow, D., 2007, "Biofuels – At What Cost? Government Support for Ethanol and Biodiesel in the United States: 2007 Update." International Institute for Sustainable Development. Global Subsidies Initiative, pp. 17–18. Available at: http://www.iisd.org/gsi/sites/default/files/brochure_-_us_update.pdf (last accessed 29 October 2015).

[43] Laan, T., T. Litman and R. Steenblik, 2009, "Biofuels – At What Cost? Government Support for Ethanol and Biodiesel in Canada." International Institute for Sustainable Development. Global Subsidies Initiative, pp. 29–31, 54–6. Available at: http://www.iisd.org/pdf/2009/biofuels_subsidies_canada.pdf (last accessed 29 October 2015).

[44] Jung, A., P. Dörrenberg, A. Rauch and M. Thöne, 2010, "Biofuels – At What Cost? Government Support for Ethanol and Biodiesel in the European Union – 2010 Update." International Institute for Sustainable Development. Global Subsidies Initiative, pp. 42–50. Available at: http://www.iisd.org/gsi/sites/default/files/bf_eunion_2010update.pdf (last accessed 29 October 2015).

[45] *Supra*, n. 6, p. 25.

[46] *Supra*, n. 42, p. 5.

collection of policies and instruments that impact *inputs* for biofuels, such as biomass and feedstocks, factors of production such as labour and capital, and scientific research and development.

The biofuels governance framework has included a number of important support measures stemming from specific and general agricultural policies. In the EU, for example, a special system of setting aside land for industrial and energy (that is, non-food) crops had existed since 1993, allowing for roughly 10% of total farmland in the EU to be used for producing crops for biofuels, heat and electricity. Farmers received compensation for setting aside this land, as well as separate per-hectare payments for growing energy crops. Although these support programs have been discontinued as a result of reforms to the EU's Common Agricultural Policy (CAP), there are still intervention price mechanisms that guarantee a minimum price for most cereals, including some feedstocks used for biofuels.[47]

Interestingly, analysis of US data has shown that state excise tax exemptions *do not* influence the development of biofuels production capacity, but direct funding and subsidies *do* have a noticeable impact.[48] In light of that finding, it may be surprising that "the subsidy-equivalent values of support for capital have probably been much less than the value of production-related incentives".[49] The word "probably" is key because, as Steenblik notes, tracking *actual* support for production factors such as plant capital, as opposed to government budgetary allocations for such expenditures, is very difficult.[50]

This support comes in various forms, including outright grants, contingent loans (repayable depending on market conditions) or loan guarantees. Support may be offered for large-scale production infrastructure or to encourage farmer participation in small and medium-sized operations. In federal (that is, multi-level) governance systems, "subsidy stacking" from municipal, state/provincial and federal sources is common.[51] The Canadian system provides a good example of this phenomenon.[52]

As mentioned above, biofuels may require storage and distribution

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47 *Supra*, n. 42, pp. 50–53.

48 Mabee, W.E., 2007, "Policy Options to Support Biofuel Production." *Advances in Biochemical Engineering/Biotechnology* 108:329–57.

49 *Supra*, n. 6, p. 34.

50 *Ibid.*, p. 32.

51 *Ibid.*, p. 33.

52 *Supra*, n. 43, pp. 36–45, 57–60; Ngo, *supra*, n. 9, pp. 39–40. For a summary of overlapping federal and provincial policy programs, see http://greenfuels.org (last accessed 29 October 2015).

systems that are different from systems designed for liquid fossil fuels. Compliance with these technical standards and legal regulations requires costly investments. Steenblik reports that it is common for 30% of these costs to be underwritten by governments.[53]

Because scientific research and technological development is essential to realizing public policy objectives for the biofuels sector, financial and other support for R&D must be viewed as part of the landscape for biofuels governance. Governments around the world are pouring huge sums of money into this endeavour, especially to support the commercialization of next-generation biofuels. Examples include C$145 million that was available through Canada's Agricultural Bioproducts Innovation Program (ABIP), €68 million under a similar EU program and US$150 million from the US Biofuels Initiative.[54]

(c) Intellectual property rights

In recent decades, the laws, policies and practices around intellectual property rights (IPRs) have become increasingly recognized as a major part, indeed among the most important parts, of global business governance and regulation.[55] IPRs play a role not only in regulating commercial activities, but also in regulating scientific research prior to commercialization.[56]

There are several interesting observations to make about the growing relevance of IPRs as a form of governance and regulation. One is that IPRs pose challenges that are beyond the scope of national sovereignty, so both national and inter-governmental institutions inevitably play a role in the globalization of regulation. Another is that ever expanding protection for IPRs, particularly through international trade agreements, has contributed toward a dramatic shift in control over knowledge.[57] Private power exercised through ownership of IPRs has become as or more relevant than many other public laws regulating knowledge-intensive industries.

The technologically advanced and innovation-driven character of biofuels research and product development virtually guarantees that IPRs

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[53] *Supra*, n. 6, p. 34.

[54] *Ibid*., p. 36.

[55] Braithwaite, J. and P. Drahos, P., 2000, *Global Business Regulation*. 1st ed., Cambridge: Cambridge University Press.

[56] Rai, A.K., 1999, "Regulating Scientific Research: Intellectual Property Rights and the Norms of Science." *Northwestern University Law Review* 94:77–152.

[57] Sell, S.K., 2003, *Private Power, Public Law: The Globalization of Intellectual Property Rights*. Cambridge: Cambridge University Press; May, C., 2010, *The Global Political Economy of Intellectual Property Rights*. New York: Routledge.

will be a major component of biofuels governance in particular. Public IPR policies and private IPR strategies have the potential to induce investment in and facilitate transfer of innovative technologies, but at the same time could conceivably restrict knowledge and technology flows in the sector. Only very recently has international attention been directed at this topic in the particular context of biofuels,[58] as compared for example with the biomedical context.

So-called patent thickets – multiple upstream patents where overlapping rights may impede the development or commercialization of technology – are an issue of some concern,[59] for which cross-licensing and patent pooling have been suggested as a possible solution.[60] According to a study by Cahoy and Glenna, the United States issued over four times more patents relating to ethanol – a first-generation biofuel – in 2008 than in 2005.[61] Despite this surge, considerable opportunities for growing patent portfolios apparently still remain open, especially for next-generation fuels.[62] And patents are not the only relevant form of protection available; it may also be possible to protect innovations such as engineered DNA through copyright.[63] That could be worrisome because copyrights, unlike patents, require no formal application to receive protection, can easily last for a century or more, and have no registry or database through which to monitor ownership. All of this

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[58] United Nations Environment Programme (UNEP), 2010, "Launch of UNEP-EPO-ICTSD Joint Study on Patents and Environmentally Sound Technologies."

[59] Heller, M., 2008, *The Gridlock Economy: How Too Much Ownership Wrecks Markets, Stops Innovation and Costs Lives*. New York: Basic Books; Jaffe, A. and J. Lerner, 2004, *Innovation and Its Discontents: How Our Broken Patent System is Endangering Innovation and Progress, and What to Do About It*. Princeton: Princeton University Press.

[60] Clark, L.F., 2010, "Risk, Regulation and the Governance of Innovative Technologies: A Literature Analysis." VALGEN Working Paper. (Unpublished).

[61] Cahoy, D, and L. Glenna, 2009, "Private Ordering and Public Enemy Innovation Policy." *Florida State University Law Review* 36:415–58.

[62] Mannan, R., 2010, "Intellectual Property Landscape and Patenting Opportunity in Biofuels." *Journal of Commercial Biotechnology* 16:33–46.

[63] Hogle, D., 1990, "Copyright for Innovative Biotechnological Research: An Attractive Alternative to Patent or Trade Secret Protection." *High Technology Law Journal* 5:75; Silva, J., 2000, "Copyright Protection of Biotechnology Works: Into the Dustbin of History?" *Boston College Intellectual Property & Technology Forum* 012801; Smith, D., 1987, "Copyright Protection for the Intellectual Property Rights to Recombinant Deoxyribonucleic Acid: A Proposal" *St. Mary's Law Journal* 19:1083; Holman, C., 2010, "Copyright for Engineered DNA: An Idea Whose Time Has Come?" Available at: http://works.bepress.com/christopher_holman/6 (last accessed 29 October 2015).

taken together lends credibility to the premonition of an incipient thicket of various different IPRs.

Cross-licensing and patent pooling are one way that private ordering may resolve this challenge. Cahoy and Glenna point also to another possibility for private ordering. They suggest that ownership of biofuels-related patents is likely to become more concentrated over time, as happened with agricultural biotechnology patents during the past few decades.[64] If this prediction comes true, the distribution of economic benefits from the biofuel industry will likely be limited. And in any event, ostensibly "private" IPR transactions should be factored into any analysis of biofuels public policy, regulation and governance.

Relevant to this discussion of the concentration of market power and governance through private ordering, Lemley makes a key point about the intersection of IPRs and standard-setting organizations in general: "How [standard-setting organizations] respond to those who assert intellectual property rights against a proposed standard is critically important. Whether or not a private company retains intellectual property rights in a group standard will determine whether the standard is 'open' or 'closed'. It will determine who can sell compliant products, and it may well influence whether the standard adopted in the market is one chosen by a group or one offered by a single company."[65] Depending on how biofuels standards – on everything from technical regulations regarding storage or transport to new sustainability standards for production methods – emerge over the coming years, Lemley's comments may become very relevant.

Early commentators on the IPR landscape around biofuels are raising other issues as well. There have been calls for modifications to the current governance system, ranging from imposition of compulsory licensing for climate-change-related inventions, relaxation of non-obviousness and novelty requirements to incentivize incremental technological advances and speed technology transfer, and the creation of a new species of "green" patents with shortened periods of exclusivity.[66] The appropriate regulatory response to these global issues will vary with local circumstances, particularly between developed and

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[64] *Supra*, n. 61.

[65] Lemley, M.A., 2002, "Intellectual Property Rights and Standard-Setting Organizations." *California Law Review* 90:1889–2002.

[66] Behles, D., 2009, "The New Race: Speeding up Climate Change Innovation." *North Carolina Journal of Law and Technology* 11:1–50; Burleson, E., 2009, "Energy Policy, Intellectual Property, and Technology Transfer to Address Climate Change." *Transnational Law and Contemporary Problems* 18:69–93.

less developed countries;[67] thereby further complicating governance of biofuels through IPRs.

16.2.2 Demand-side Measures

(a) The blend wall

Ethanol fuel blends are typically described according to the percentage of ethanol in the mixture by volume. For example, E85 is 85% anhydrous ethanol and 15% gasoline. The use of ethanol blends in conventional vehicles is typically restricted to lower mixtures (E10–E25), since ethanol is corrosive and can potentially degrade some of the materials in the gasoline engine and fuel system. However, flex-fuel engines in alternative fuel vehicles are capable of burning any proportion of ethanol fuel, including E100 or pure ethanol, which is widely used in many countries. As a result, there is no technological constraint on ethanol fuel production and exploitation per se.

However, legal limits have been established and imposed with regard to ethanol fuel blends, which create what is known as a "blend wall". Rather than leave the blend wall in the hands of the free market, some government regulators have opted to constrain biofuel demand by setting (or adopting or cross-referencing third party) standards that limit the ethanol content of gasoline.

The blend wall is partially a consequence of a variety of commercial factors. All gasoline vehicles built in Brazil to run with blends from E20 to E25 and over half of all cars in the country are of the flex-fuel variety.[68]

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[67] Barton, J.H., 2007, "Intellectual Property and Access to Clean Energy Technologies in Developing Countries: An Analysis of Solar Photovoltaic, Biofuel and Wind Technologies." ICTSD Programme on Trade and Environment. Trade and Sustainable Energy Series. Available at: http://www.ictsd.org/downloads/2008/11/intellectual-property-and-access-to-clean-energy-technologies-in-developing-countries_barton_ictsd-2007.pdf (last accessed 2 November 2015); Copenhagen Economics and the IPR Company, 2009, "Are IPR a Barrier to the Transfer of Climate Change Technology?" Produced for the European Commission (DG Trade). Available at: http://trade.ec.europa.eu/doclib/docs/2009/february/tradoc_142371.pdf (last accessed 29 October 2015); Cannady, C., 2009, "Access to Climate Change Technology by Developing Countries." ICTSD Programme on IPRs and Sustainable Development. Intellectual Property and Sustainable Development Series. Available at: http://ictsd.org/downloads/2009/11/access-to-climate-change-technology-by-developing-countries-cannady.pdf (last accessed 29 October 2015).

[68] See Eisenthal, J., "Building the Blend: How Brazil Grew its Ethanol Industry," available at http://www.ethanoltoday.com/index.php?option=com_content&task=view&id=5&fid=36&Itemid=6 (last accessed 2 November 2015).

As a direct result, Brazil produced 24.9 billion litres of ethanol in 2009, most of which went to meet domestic fuel demand.[69] Alternatively, no American manufacturer warrants its vehicles to use gasoline with higher than 10% ethanol and most existing infrastructure is designed and certified to deliver an E10 mixture. The end result is a comparably lower ethanol blend wall. On 12 October 2010, the United States Environment Protection Agency (EPA) raised the upper limit for the blend of ethanol in gasoline from 10% (E10) to 15% (E15) for use in newer vehicles. The EPA claimed the waiver would not only cut down petroleum consumption, but also help reduce fuel prices.[70]

Lacking a national regulatory regime similar to the United States, some of the Canadian provinces have elected to adopt the Canadian General Standards Board's (CGSB's) "Standard for Oxygenated Unleaded Automotive Gasoline Containing Ethanol", thus limiting the ethanol content of gasoline to 10% by volume.[71] The CGSB standards are not automatically binding, but can become legally relevant if they are incorporated into federal or provincial laws. Such is the case for the Ontario and British Columbia regulations, which specify that blended gasoline must meet the CGSB's standards and specifications. In 2013 the CGSB adopted a new standard, raising the upper standard for gasoline containing 50% to 85% ethanol for use in flexible fuel vehicles.[72]

The whole notion of a blend wall that effectively caps demand for biofuels through regulations created or sanctioned by governments is somewhat bizarre when one realises the considerable effort that governments simultaneously make to mandate a minimum level of demand for

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[69] Renewable Fuels Association, 2010, "Climate of Opportunity," available at: http://ethanolrfa.3cdn.net/32b7ed69bd366321cb_r1m626lb0.pdf (last accessed 2 November 2015).

[70] Milbourn, C., "Obama Announces Steps to Boost Biofuels, Clean Coal." EPA (3 February 2010). Available at: http://yosemite.epa.gov/opa/admpress.nsf/bd4379a92ceceeac8525735900400c27/3a91 d20f44b4b2d2852576bf00711782!OpenDocument (last accessed 2 November 2015). Response to the decision was divided. The ethanol industry welcomed the move as a significant step in the right direction, towards energy independence and away from the blend wall. However, others were left dissatisfied, including American food producers, the oil industry, and select environmentalists. Unsurprisingly, American vehicle manufacturers also voiced concerns regarding the EPA's move, particularly because the increase could impact warranties on hundreds of millions of vehicles, and urged the Government to re-examine the situation.

[71] *Supra*, n. 28, p. 6.

[72] Standard CAN/CGSB-3.512-2013. See http://www.tpsgc-pwgsc.gc.ca/ongc-cgsb/publications/nouvelles-news/e50-e85-eng.html (last accessed 30 September 2015).

biofuels through other measures, specifically renewable fuel mandates. In practice, the blend wall is the ceiling for biofuels demand, while renewable fuel mandates are the floor.

(b) Renewable fuel mandates

The most strategically valuable measures for the biofuels industry may be regulatory standards, known as "renewable fuel standards" (RFSs), which require a proportion of transportation or other fuels to come from renewable sources. Almost all jurisdictions seriously trying to drive demand for biofuels have an RFS in place. The following discussion focuses mainly on ethanol in gasoline, though similar (but usually lower) requirements typically exist for biodiesel as well.

Sorda surveys RFSs in many key jurisdictions around the world, observing ranges between 2.5% to 25%, with 5% or 10% seeming to be normal.[73] Steenblik's analysis of several members of the OECD confirms this impression, as well as noting that blending requirements for ethanol tend to be higher than for biodiesel.[74] In those and other analyses, two places – the United States and European Union – stand out, not because of unusually high or low proportional mandates, but because the quantity of fuel demanded in these jurisdictions is so high that their mandates will have tremendous impact on the entire global biofuels industry. It is also worthwhile to examine the approach in Canada and several of its provinces, which through multi-level governance have created overlapping but generally uncoordinated systems.

Canada's national mandate for a minimum market share of renewable fuels derives from amendments in 2008 to the Canadian Environmental Protection Act, which allowed for the promulgation of regulations creating an RFS. Those regulations, titled Renewable Fuels Regulations, came into force on 15 December 2010.[75] They mandate an average of 5% renewable content in fuel, based on the volume of gasoline produced and imported in Canada (and 2% renewable content in diesel, coming into force subject to technical feasibility). Renewable content can be produced from any feedstock. The regulations apply on average, so that renewable content can be used more where it is economical and less where it is not. They do not apply to small producers and importers, or fuel used in Canada's northern and relatively remote areas. It is also possible to trade "compliance units" among biofuels producers and importers.

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73 Sorda, *supra*, n. 9.
74 *Supra*, n. 6, pp. 27–30.
75 SOR/2010-189.

Several Canadian provinces have mandates that predate the federal RFS, or that have been subsequently developed. Provincial mandates, however, are not well coordinated with, let alone integrated into, the federal policy. For example, mandatory proportions of renewable fuels apply based on volumes used or sold, not volumes produced or imported. Nor are provincial mandates coordinated with each other. All of this makes it difficult, for example, to establish truly integrated markets for compliance unit trading, as envisioned by the federal regulation.

Manitoba's RFS dates back to 2003, when 85% of gasoline sold had to contain 10% ethanol, a requirement that was never enforced because of a lack of production capacity.[76] Manitoba's Ethanol General Regulation, enabled by its aforementioned Biofuels Act, calls for an 8.5% blend.[77] Saskatchewan's RFS, the Ethanol Fuel (General) Regulations, is perhaps the simplest RFS in the country, containing seven straightforward sections, the effect of which is to set the blending mandate at 7.5%.[78] That is up from the 1% that had been previously mandated in Saskatchewan.[79] While Manitoba and Saskatchewan created their RFS in order to promote local industry, Ontario and British Columbia state their prime objectives to be GHG reductions.[80]

British Columbia's mandate is derived from regulations accompanying the Greenhouse Gas Reduction (Renewable and Low Carbon Fuel Requirements) Act.[81] These regulations require 5% renewable content in gasoline.[82] As of 2007, the Ethanol in Gasoline Regulation[83] in Ontario, enacted pursuant to the Environmental Protection Act,[84] requires 5% ethanol by volume of gasoline sold in the province. Interestingly, only in Ontario are differences ascribed to cellulosic and non-cellulosic ethanol, with the former counting for 2.5 times the latter. Ontario's RFS had also been unique because it specifically cross-referenced quality controls through third-party standards.

Alberta also adopted an RFS, and through the Renewable Fuels Standard Regulation[85] accompanying the Climate Change and Emissions

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76 *Supra*, n. 43, p. 28.
77 Man Reg 165/2007.
78 SR. 1/2015, E-11.1 Reg. 1.
79 Ngo, *supra*, n. 9, p. 30.
80 *Supra*, n. 28, p. 7.
81 SBC 2008, c. 16.
82 B.C. Reg. 394/2008.
83 O Reg 535/05.
84 R.S.O. 1990. C.E. 19.
85 Alta Reg 29/201.

Management Act,[86] imposed a 5% mandate effective in 2011, along the lines of Canada's federal RFS. A key difference, however, is that Alberta will not count content as renewable unless a minimum 25% reduction in GHG emissions intensity relative to gasoline can be demonstrated over the life cycle of production and consumption. Compliance with that standard is measured in accordance with yet another separate instrument, Alberta's Renewable Fuels Greenhouse Gas Emissions Eligibility Standard,[87] which, it should be noted, uses different formulas and methods than the many other instruments used in different jurisdictions around the world.

The United States' RFS stems from regulations promulgated under the Energy Policy Act of 2005[88] and the Energy Security and Independence Act of 2007.[89] In July 2010, the second version, RFS2 (further updated in December 2010), replaced the first version, RFS1, which had been in place since May 2007. The mandate requires that by 2022 a total of 36 billion gallons of renewables be blended into transport fuels per year. For 2010, the requirement was 12.95 billion gallons, which equalled 8.25% of the volume of gasoline and diesel refined and imported in the United States. Interestingly, volume standards are imposed for particular categories of renewable fuels, including cellulosic biofuel, biomass-based diesel and advanced biofuel. To qualify within these categories, fuels must meet certain criteria for reductions in GHG emissions determined through life cycle analysis. With the exception of grandfathered facilities constructed before 2007, all renewable fuels must reduce GHG emissions by at least 20% compared with the 2005 baseline average gasoline or diesel fuel it replaces. To fall under the "advanced" and "biomass-based diesel" categories, reductions must be 50%, and for the "cellulosic" category, 60%. Obviously, the methodology used by the Environmental Protection Agency (EPA) to arrive at these calculations is extremely important, although it is not the same as methods used in other jurisdictions.[90]

The European Union's Renewable Energy Directive of 2009[91] and associated regulations rely on a different method to determine minimum GHG

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[86] S.A. 2003, c. C-16.7.

[87] See http://www.energy.alberta.ca/BioEnergy/pdfs/GHGEmissionsStandard.pdf (last accessed 2 November 2015).

[88] P.L. 109-58.

[89] P.L. 110-140.

[90] On the USA, see Chapters 5 and 6 in this volume.

[91] See<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32009L0028:EN:NOT> (last accessed 2 November 2015).

reductions from biofuels as part of broader "sustainability" standards.[92] Like all EU directives, this is a supranational law that requires EU Member States to take direct action to ensure minimum proportionate use of renewable versus non-renewable energy. It replaces an earlier directive, the Biofuels Directive of 2003, which had adopted as an indicative target a 5.75% market share for biofuels by 2010. Jung et al. point out that most Member States would fail to achieve this target.[93] Nevertheless, the 2009 Directive raised the bar to require by 2020 a 20% share of all energy consumed in the EU. The transport sector specifically must meet a 10% mandate, though this includes not just biofuels but all renewables, including, for example, electricity for rail or auto transportation.

Second-generation biofuels count double towards the 10% minimum, but some putatively renewable sources of energy that do not meet certain sustainability criteria will not count at all. While the US RFS2 calls for a minimum GHG reduction of 20% for ordinary biofuels (and more for certain types of biofuels), the EU Directive requires for all biofuels a reduction of 35% immediately, and 50% from 2017; new installations starting production after 1 January 2017 are required to achieve a 60% reduction from 2018. Moreover, qualifying biofuels cannot be produced on lands with high biodiversity value, high carbon stock or peatland.[94]

Sustainability standards could also be considered for adoption, in Canada. Amendments to the Canadian Environmental Protection Act give the federal government the power to not only create regulations on the blending of biofuels but also to create classes of regulated entities, which would allow specific regulations targeted by feedstock type or production capacity, and to inquire into environmental and health impacts of biofuels production.[95]

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[92] Swinbank, A., 2009, "EU Support for Biofuels and Bioenergy, Environmental Sustainability Criteria, and Trade Policy." ICTSD Programme on Agricultural Trade and Sustainable Development. Available at: http://www.ictsd.org/downloads/2012/03/eu-support-for-biofuels-and-bioenergy-environmental-sustainability-criteria-and-trade-policy.pdf (last accessed 2 November 2015).

[93] *Supra*, n. 44, p. 25.

[94] On the EU regime, see Chapter 7 in this volume.

[95] *Supra*, n. 289, p. 9. For more detail see de Beer and Smyth, *supra*, n. 5.

16.3 SUSTAINABILITY CERTIFICATION AND LABELLING INITIATIVES

Sustainability standards are emerging in the biofuels policy literature as a discrete topic of inquiry.[96] Reports are, unfortunately, somewhat discouraging. Van Dam et al. updated their earlier work (van Dam et al., 2008) with a survey of 67 different ongoing certification initiatives – a "strong increase" in the number of initiatives since 2007, which, despite proliferation, still fail to adequately address key issues.[97]

Some key initiatives are, of course, the result of national, supra-national or sub-national policies formulated by governments. The sustainability criteria in the EC's Renewable Energy Directive, discussed above, is a good example. While EU Member States are obliged to adhere to these criteria, various countries, such as the Netherlands, the United Kingdom, Germany and others, have introduced sustainability standards on a national level. This phenomenon is replicated in the United States, with minimum GHG reductions imposed federally through RFS2 and various other criteria applying at the state level in places such as Massachusetts and California. In Canada, a working group was formed and began developing and consulting on guiding principles for sustainable biofuels.

Consistent with the analytical focus in this chapter on governance,

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[96] See, for example: Buchholz, T., V.A. Luzadis and T.A. Volk, 2009, "Sustainability Criteria for Bioenergy Systems: Results from an Expert Survey." *Journal of Cleaner Production* 17:S86–S98; Charnovitz, S., J. Earley and R. Earley, 2008, "An Examination of Social Standards in Biofuels Sustainability Criteria." International Food and Agricultural Trade Policy Council. IPC Discussion Paper-Standards Series, available at: http://www.agritrade.org/documents/SocialStnds_Biofuels_FINAL.pdf (last accessed 2 November 2015); Lewandowski, I., and A. Faaij, 2006, "Steps Towards the Development of a Certification System for Sustainable Bio-Energy Trade." *Biomass and Bioenergy* 30:83–104; Markevičius, A., V. Katinas, E. Perednis and M. Tamašauskienė, 2010, "Trends and Sustainability Criteria of the Production and Use of Liquid Biofuels." *Renewable and Sustainable Energy Reviews* 14:3226–31; Scarlat, N. and J.-F. Dallemand, 2011, "Recent Developments of Biofuels/Bioenergy Sustainability Certification: A Global Overview." *Energy Policy* (In Press); United Nations Conference on Trade and Development (UNCTAD), 2008, "Making Certification Work for Sustainable Development," available at: http://www.unctad.org/en/docs/ditcted20081_en.pdf (last accessed 2 November 2015); van Dam, J., M. Junginger, A. Faaij, I. Jurgens, G. Best and U. Fritsche, 2008, "Overview of Recent Developments in Sustainable Biomass Certification." *Biomass and Bioenergy* 32:749–80; van Dam, J., M. Junginger and A. Faaij, 2010, "From the Global Efforts on Certification of Bioenergy Towards an Integrated Approach Based on Sustainable Land Use Planning." *Renewable Sustainable Energy Reviews* 14:2445–72.

[97] van Dam (2010), *ibid.*

it is crucial to note the role of governments and also the influence of a wide variety of inter- and non-governmental actors on sustainability criteria. Several international organizations, for example, are active on this issue. Van Dam et al. mention initiatives by the International Organization for Standardization (ISO), the European Committee for Standardization (CEN), the Global Bioenergy Partnership (GBEP), the Roundtable on Sustainable Biofuels (RSB), Inter-American Development Bank (IDB), United Nations Environmental Program (UNEP) and UN-Energy, a United Nations interagency coordination mechanism.[98]

Leading articles and reports also describe the role of private companies, industry associations and civil society in governing sustainability.[99] Groups such as the Council on Sustainable Biomass Production, in North America, and the World Wildlife Fund, worldwide, are attempting multi-stakeholder engagement. Meanwhile, several private sector organizations are branding market signals to drive consumer demand for relatively more sustainable goods and services. Select examples include "Ecologo" in North America and "EUGENE" in Europe. Some schemes brand for end consumers, while others are used for business-to-business marketing. Several private firms and consultancies have created their own systems, such as the "Green Gold Label"[100] and the "International Sustainability and Carbon Certification".[101]

Cumulatively, these various certification schemes address a very wide range of matters. Scarlat and Dallemand analyse how some systems deal with a specific sector, such as agriculture or forestry, while some have specific purposes, such as fair trade or organic agriculture.[102] The same authors suggest that the primary motivation is health and safety through agricultural certification schemes, resource management through forestry standards, and energy security and climate change through bioenergy policies. This is a challenge, because it means in practice that agriculture and forestry certification schemes rarely (but sometimes) address issues such as carbon conservation and GHG emissions, while bioenergy policy initiatives rarely (but sometimes) tackle health and safety concerns. Socio-economic considerations such as development, labour conditions or property and human rights are another matter altogether. Few if any

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98 *Ibid*., pp. 2448–9.
99 *Ibid*., pp. 2449–50.
100 See http://www.greengoldcertified.org/site/pagina.php? (last accessed 1 October 2015).
101 http://iscc-system.org/en/ (last accessed 1 October 2015).
102 Scarlat and Dallemand, *supra*, n. 96.

organizations take a coordinated view of the deep and complex interconnections amongst all of these biofuels-related issues.

In sum, governance of biofuels' sustainability through multiple certification systems could lead to competition and improvement, or proliferation could undermine confidence and manageability and lead to standard-shopping. Options to address this problem include establishing an overarching meta-standard, a new comprehensive standard or linking across existing standards. Where and how this will play out remains to be seen.

One key question going forward, however, is whether sustainability criteria will be applied only to biofuels or more broadly. The weight of expert and scholarly opinion, including this author's opinion, suggests it would be unfair, ineffective and possibly illegal to impose sustainability criteria on the biofuels industry while leaving its competitors, such as fossil fuels producers, subject to lower standards, or none at all. Another issue worth mentioning is how the costs of compliance with sustainability standards will be distributed. UNCTAD has done a particularly good job thinking about whether and how certification criteria might disproportionately burden biofuels producers from developing and least developed countries compared with industrialized countries, and smallholders compared with large-scale enterprises.[103] The corollary to that enquiry is whether and how such criteria are compatible, or incompatible, with international law. That is the next major piece of the biofuels governance puzzle addressed in this chapter.

16.4 INTERNATIONAL TRADE GOVERNANCE ISSUES

International trade law and policy regarding the production and trade of biofuels have numerous implications. This section examines the role and impact of tariffs, subsidies and standards that fall within the purview of the WTO.

16.4.1 Tariffs

Starting the discussion with tariffs is logically sound given the issue of product classification. The classification of biofuels also affects the treatment of other key issues, such as subsidies and agricultural commitments.

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[103] UNCTAD (2008), *supra*, n. 7.

That is, biofuels would be treated differently under all of these rules depending on whether they were deemed to be industrial, agricultural or environmental products, and also differently depending on the category within those rubrics in which biofuels were to fall.

Classification is initially most important for the determination of the "bound rate", which is the maximum tariff that can be legally applied to a category of goods, pursuant to Article II of the General Agreement on Tariffs and Trade (GATT).[104] The bound rate applies on a "most favoured nation" basis, which means that the rate offered by any particular jurisdiction can be lower than the cap committed to, but the same lower rate must be applied to goods from all members of the WTO, regardless of each other member's particular tariffs or policies.

Not surprisingly, international trade law is slightly more complex than that, because there are numerous exceptions, for example for bilateral and regional free trade agreements or the systems of preferences for developing countries under certain circumstances. The European Community may allow, and does allow, under WTO rules preferential, duty-free imports of biofuels from African, Caribbean and Pacific countries, and the US does the same under its Caribbean Basin Initiative. Biofuels are not included in the US "Generalized System of Preferences" for developing countries, but they are included in the EC scheme.[105] Such systems are very complex; the point of mentioning them here is merely to express the caveat that the following discussion necessarily oversimplifies the legal and economic issues.

Governance of the classification system that determines the legality of tariffs under WTO rules is actually driven by another organization altogether, the World Customs Organization (WCO). The processes and structures of the WCO determine the "Harmonized Commodity Description and Coding System", or Harmonized System (HS). Tariffs for products within the top-level category, as well as all "like" products, cannot exceed the bound rate for the category.

Howse et al. provide a concrete example of how US ethanol tariffs in the 1980s ran afoul of this rule by applying a 50% per gallon tariff to fuel ethanol, but not all ethanol falling under the HS headings that existed (and still exist) for ethanol generally.[106] It is a problem, according to those authors, that there are not separate categories for ethanol based on its end uses, such as fuel or beverages or medical supplies, but rather categories

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[104] See https://www.wto.org/english/docs_e/legal_e/06-gatt_e.htm (last accessed 2 November 2015).

[105] Howse, *supra*, n. 8, p. 14.

[106] *Ibid.*

defined on chemical composition, differentiating undenatured and denatured ethanol. Differentiation according to end use, though difficult but not impossible to administer and enforce in practice, would enable countries to better align their tariffs with biofuel policy objectives, making the measurement of international trade of biofuels simpler.

As international law stood prior to the removal of the US import tariff, Steenblik observes, "Border protection, mainly in the form of tariffs on ethanol, has provided a protective barrier behind which domestic producers have thrived. Brazilian exporters, in particular, face tariffs that add at least 25% to the price of their product in the US, and over 50% in the European Union."[107] In contrast, petroleum faces no or very low tariffs, at least in North America, which has a distorting effect on global energy markets.[108]

As well as determining the bound rate for tariffs on classes of like products under the GATT, the WCO's HS headings also impact classification schemes adopted in other legal agreements, such as the WTO Agreement on Agriculture (AoA).[109] The AoA applies to agricultural products, which are defined to include, among other things, products falling under HS Chapter 1–24. That includes ethanol, but not biodiesel, which falls under Chapter 38. So, ethanol is legally classified as an agricultural good while biodiesel is an industrial good, even though both are commonly produced from agricultural feedstocks. That has significant consequences for, among other things, the legalities of the many biofuels subsidies and supports, pursuant to other agreements discussed below. Further complicating matters, note Howse et al., is the possibility that either or both kinds of biofuels might alternatively be classified as environmental goods, which are the subject of other, separate negotiations in the WTO Committee on Trade and Environment.[110] Even if all biofuels were classified as agricultural products, distortions might still occur on the basis of differential treatment of feedstocks, as there are considerable differences in the tariff rates, for example, for oils produced from sunflowers, soybeans, sugar cane and canola.[111]

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[107] *Supra*, n. 6, p. 2.
[108] Kerr and Loppacher, *supra*, n. 8.
[109] See https://www.wto.org/english/docs_e/legal_e/14-ag_01_e.htm (last accessed 2 November 2015).
[110] Howse, *supra*, n. 8.
[111] Kerr and Loppacher, *supra*, n. 8.

16.4.2 Subsidies

Trade-distorting measures within the WTO are defined by three "boxes" or categories. Green-box subsidies are allowed, but only if there is minimal trade distortion. These are typically government-funded programs that support production. Allowances are also provided for environmental protection. Amber-box subsidies are those that distort trade and are targeted for reduction. In agriculture, developed nations are allowed support up to 5% of agricultural production and developing countries 10%. The final category is the red box, which consists of subsidies that are allowed in agriculture; however, the size of the export subsidies was capped in the AoA. Red-box export subsidies are not allowed at all for industrial goods. Virtually all of the allowable trade-distorting measures are government-funded production subsidies.

Subsidies are one of the particular issues within international trade law receiving specific recent attention from researchers.[112] One problem regarding a WTO challenge of a subsidy is that there is no ability to consider secondary market impacts. While the subsidy may distort one particular sector of any supply chain, there is no ability to claim damages to other sectors of the supply chain, either upstream or downstream. The classification of biofuels under the WCO's HS determines the legal obligations related to many government support programs under the aforementioned WTO AoA, as well as the WTO Subsidies and Countervailing Measures (SCM) Agreement. Because ethanol and biodiesel are classified differently under the HS, their treatment under these other legal agreements is also different.

The SCM Agreement distinguishes among three categories of subsidies that are either prohibited, actionable or for agriculture. Subsidies offered for exporting products are prohibited, and so are subsidies contingent on the use of domestic instead of foreign products. Subsidies that have adverse trade effects are actionable, meaning other WTO member countries can make a complaint or impose countervailing duties. Subsidies that do not have adverse trade effects are not actionable. Adverse effects include injury to domestic competitors with products like the foreign subsidized product, and a range of other harms such as product displacement, price or market share distortions, or general impairment of benefits to a WTO member. Agricultural export subsidies that comply with the AoA are not actionable but they may be subject to countervailing measures. Significantly complicating this determination is the fact that subsidies

[112] See for example: Harmer, *supra*, n. 8.

may have adverse effects not on the subsidized product directly, but on co-products, by-products or upstream or downstream products – a real issue in the context of biofuels feedstocks and by-products.

But the question preceding all that is whether a particular government support is, according to legal definitions, a subsidy or something else. This depends on whether there is a financial contribution by the government (including cash payments, tax concessions, revenues foregone or other contributions) and a benefit giving a specific recipient or recipients a competitive advantage. Numerous experts point out that this issue is also often difficult to determine, especially in an industry such as biofuels where pervasive government intervention has eroded any meaningful benchmark of what the market might otherwise look like.[113]

While the SCM deals with several aspects of subsidies, other aspects are addressed by the AoA. Broadly speaking, WTO members agreed to reduce over time, from various baselines, each government's "Total Aggregate Measure of Support" for agricultural industries, in order to level the playing field for world markets. Supports are classified in the three coloured boxes, as discussed above, depending on how much they are deemed to distort production and trade. Green-box supports do not count towards the total aggregate measure of government support. Amber-box supports are subject to various governments' cap and reduction commitments.

Here is the problem with the AoA system as applied to biofuels, as alluded to in a report from the United States Department of Agriculture (USDA): "The AoA measures the sum of supports for various products by basically adopting the products' WCO HS classification."[114] But government supports for biofuels usually apply to the industry, not the product, that is, feedstocks such as corn or canola or sugarcane or soybeans. The question, therefore, is do supports for the industry operate at least in part to confer support on such agricultural products?

Government support for domestic biofuels industries also often comes in the form of large-scale investment in R&D. Such investments would not run afoul of international trade laws (and would belong in the green box under the AoA system) unless the knowledge and technology generated is largely proprietary to domestic firms, as opposed to openly accessible to the general public, including foreigners. Howse et al. point out that this assumption is difficult to substantiate; in fact, those authors are correct to be suspicious, because R&D supporters normally expect to see exclusive

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[113] See for example: Howse, *supra*, n. 8. See Chapter 8 in this volume.

[114] United States Department of Agriculture, 2006, 2007. Farm Bill Theme Paper: Energy and Agriculture.

intellectual property rights accruing to domestic firms as a result of their investment.[115]

Subsidies are an issue that have already attracted some sabre-rattling in international trade law.[116] For instance, when American refiners developed a practice called the "splash-and-dash" – import foreign diesel, add a splash of biodiesel, claim a tax credit and then re-export the end product – the EU complained and levelled additional duties on biodiesel imports from the US. More recently, as detailed in another chapter in this volume, Argentina argued that a number of European national implementing measures on biofuels were contrary to WTO law.[117] These kinds of issues are likely to arise much more frequently in the future.

16.4.3 Standards

Tariffs and subsidies are not the only measures governments might use that constrain liberalization of the multilateral trading system. Increasingly, variable technical standards and regulations governing matters such as product specifications, labelling requirements or health and safety concerns act as significant barriers to trade. These kinds of issues are addressed through two WTO agreements, the Technical Barriers to Trade (TBT) Agreement[118] and the Sanitary and Phytosanitary Measures (SPS) Agreement.[119] The fundamental principle underlying these agreements is the principle of non-discrimination.

For many internal measures, the requirement is not to discriminate between foreign and domestic products that are "like" each other. Whether products are like or not depends on their physical characteristics, end uses and consumer habits. The rules stipulate that foreign products cannot be treated less favourably than like domestic products (national treatment) or products from other WTO members. This means that like products can be treated differently, as long as neither product is treated more favourably. Discrimination is either formally enshrined in law (de jure) or circumstantially manifested in practice (de facto), the latter being more prevalent. For example, de facto discrimination may exist when it becomes more costly for foreign producers than domestic producers to comply with particular regulatory or technical standards.

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[115] Howse, *supra*, n. 8.
[116] Harmer, *supra*, n. 8.
[117] See Chapter 8 in this volume.
[118] See https://www.wto.org/english/tratop_e/tbt_e/tbt_e.htm (last accessed 1 October 2015).
[119] https://www.wto.org/english/tratop_e/sps_e/spsagr_e.htm (last accessed 1 October 2015).

In that context, Kerr and Loppacher reference standards adopted pursuant to, for example, the ASTM, which apply to a variety of characteristics such as viscosity, flash point, cetane levels, sulphur levels and carbon residues. They also allude to the possibility of differentiating biofuels based on inputs so that governments could claim, for example, that biodiesel made from soybeans is non-compliant with regulations tailored to biodiesel from canola, thus creating a technical barrier to trade.[120] Howse et al. list similar issues that might arise in respect of biofuels standards:

- mandates to use particular percentages or quantities of biofuel either in fuel blends or for specific purposes (such as bus or taxi fleets)
- restrictions or limits on the amount or kind of biofuel that can be contained in a blend with conventional fuel
- specifications of the properties or performance characteristics of particular biofuels or the materials they must be derived from
- labelling for consumer protection and information purposes
- health and safety regulations concerning the handling and transportation of particular biofuels or inputs required for the processing of biofuels, and related specifications for processing plants, and
- broad environmental performance requirements related to the entire life cycle of the product, including the sustainability of the agriculture used to produce the feedstock from which the biofuel is processed.[121]

The bulk of expert attention lately has focused most on this last issue, in relation to sustainability standards. That is because several jurisdictions have recently adopted relatively more or less onerous (and almost always different if not inconsistent) standards governing all kinds of environmental sustainability matters from life cycle GHG emissions to land-use restrictions.[122] Howse et al. summarize the likely legality of a spectrum of sustainability measures. At one end of the spectrum, measures that differentiate based on products' environmental impacts in the country of import and consumption are probably permitted. Measures that differentiate based on methods of production, including life cycle GHG emissions, are slightly more controversial but, in the opinion of several leading experts, also most likely legal.[123] The argument that sustainability

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120 Kerr and Loppacher, *supra*, n. 8, pp. 58–9.
121 Howse, *supra*, n. 8, p. 24.
122 For more detail see: de Beer and Smyth, *supra*, n. 5.
123 Howse, *supra*, n. 8.

criteria differentiating based on life cycle GHG emissions might constitute an illegal trade barrier boils down to what is known as the product/process distinction. Under the GATT, that distinction is not normally allowed on the basis of processing and production methods, leading some scholars to argue that standards governing emission levels, cultivation practices, labour standards and any other production factors that do not change the end product would contravene WTO rules.[124]

However, Howse et al., have come to a different conclusion. They emphasise that the same rules do not necessarily apply in all other WTO contexts, and that the underlying rationale for sustainability criteria referencing life cycle GHG emissions is very different from the motivations that led to the initial development of the product/process distinction.[125]

At the other end of the spectrum are measures that ostensibly judge other governments' public policy priorities by addressing, for instance, labour, property or human rights and other social standards. A general consensus seems to exist that these are relatively more difficult to justify and uphold than other kinds of sustainability standards. Charnovitz et al. point out that "the prescription by one country or customs union of the social standards to be followed by producers of another country as a condition for access to the prescribing country or customs union's markets" raises extraordinarily complex questions that implicate not only biofuels, but also the broader debates linking trade and social issues.[126]

One of the keys to upholding the legality of any sustainability standards under the WTO would be that the criteria used to differentiate products are objectively verifiable, developed consultatively by the international community and validated by stakeholders. For example, Swinbank concludes that the EU's sustainability standards can be defended successfully only if "they are non-discriminatory and scientifically based and . . . they have been imposed only after meaningful negotiations, with the [jurisdiction's] main suppliers, to develop international standards."[127] The more that systems for certification proliferate, and the more conflict and confusion that results, the less likely it becomes that any particular approach can withstand legal scrutiny. Similar concerns could be raised under the TBT Agreement, which requires WTO members to adhere to international

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[124] Isaac, G. and W. Kerr, 2003, "GMOs at the WTO – A harvest of trouble." *Journal of World Trade* 37(6):1083–95.

[125] Howse, *supra*, n. 8, p. 26.

[126] Charnovitz, *supra*, n. 96.

[127] *Supra*, n. 92.

standards where possible, and in any case to use technical standards that do not create unnecessary trade barriers.

An issue that has so far not received enough attention is the use of biotechnology, particularly genetic engineering, in the production of feedstocks for biofuels. Many scholars frame this issue through the lens of WTO law alone, but as Kerr and Loppacher observe, the Cartagena Protocol on Biosafety (CPB)[128] is also important in the global biofuels governance picture.[129] The WTO and the CPB approach the issue of trade in biotechnology products from different perspectives and with different objectives, with trade liberalization being the WTO's primary goal and precaution over risks threatening biodiversity being the driving principle behind the CPB. There is no clear way to resolve potential conflicts between these governance instruments.[130]

The preceding discussion is by no means exhaustive of the many WTO-related issues triggered by international trade in biofuels. Furthermore, the WTO is not the only forum where the governance frameworks of multiple jurisdictions converge. Scholars have also cross-referenced the relevance for biofuels of the Kyoto Protocol[131] and, by extension, all recent developments in respect to the United Nations Framework Convention on Climate Change.[132] The global governance of biofuels is, or could be, impacted by the patchwork of bilateral trade agreements and ongoing negotiations.

16.5 CONCLUSION

The literature on biofuels law and policy is large and growing. The issues are complex, and becoming more so. Framing them through the lens of multi-level governance helps to put key priorities into perspective. It also enables further consideration of the best ways to manage and ideally improve the biofuels regulatory landscape.

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[128] See https://bch.cbd.int/protocol (last accessed 2 November 2015).

[129] Kerr and Loppacher, *supra*, n. 8.

[130] Smyth, S.J., P.W.B. Phillips and W.A. Kerr, 2009, "Global Governance Quandaries Regarding Transformative Technologies for Bioproducts, Crops, and Foods." *Journal of World Trade* 43(6):1299–1323; Smyth, S.J., W.A. Kerr and P.W.B. Phillips, 2011, "Recent Trends in the Scientific Basis of Sanitary and Phytosanitary Trade Rules and Their Potential Impact on Investment." *Journal of World Investment and Trade* 12(1):5–26.

[131] See http://unfccc.int/kyoto_protocol/items/2830.php (last accessed 2 November 2015). See also Deshpande, *supra*, n. 8.

[132] See http://unfccc.int/2860.php (last accessed 2 November 2015).