VALGEN WORKING PAPER SERIES

FEBRUARY 28, 2011

NETWORK GOVERNANCE OF BIOFUELS

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INTRODUCTION

MAPPING REGULATION AND GOVERNANCE NETWORKS

The global biofuels industry is, at present, almost universally dependant on government support policies (Global Subsidies Initiative 2011). Market interventions include policies designed to stimulate domestic production through subsidies to producers, investment in biofuels 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 (e.g., oil) and also price-distorted (e.g., agriculture) make the economics of the biofuels industry exceedingly complex (Kojima and Mitchell 2007). This economic complexity manifests in a lack of consensus on the opportunity costs of aggressive biofuels policy goals, as well as the appropriate framework for foresight into the future of biofuels.

Political complexity poses further challenges. In Western democracies, at least, diffused decision-making and policy implementation is the modern political reality in respect of almost any important issue. Command and control by central governments is all but obsolete. Hooghe and Marks (2003) review how scholars in different disciplines have different terms (or the same terms with different meanings) to describe this phenomenon, including "multi-level," "network," "multilateral," "global," and "polycentric" governance, to name just a few. Flexibility is the basic, shared postulate: Decision-making institutions and processes in such systems can be adjusted to promote efficiency or recognize heterogeneity, as circumstances require (Hooghe and Marks 2003, 235-6). That is not to presume, of course, that the design of multi-level governance systems is always deliberate. Often it is accidental or even uncontrollable.

Globally, "multilevel governance has come to be seen as a much broader trend, one which includes the upward diffusion of power to regional and international organizations as well as the downward diffusion of power to various sub-national governments" (Harmes 2006). This process of diffusion is not just vertical or jurisdictional, however. Negotiations are non-hierarchical between institutions (Peters and Pierre 2001), including non-governmental actors who have taken up crucial roles in new systems of governance (Rosenau 1992; 1997).

Which actors should govern the global biofuels industry, and whether governance of biofuels should be relatively centralized or decentralized are questions beyond the scope of this paper. The pragmatic fact of the matter is that, in the realm of biofuels, authority over policy decisions and associated regulatory rule making *is* dispersed among many different actors operating at different levels. Biofuels is a textbook example of one type of multi-level 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 (Hooghe and Marks 2003; Rosenau 1997).

Studies on the legal and policy aspects of the biofuels regulatory landscape, however, have not yet characterized the issues in this way. The literature, all relatively new, fits within two broad categories: (a) detailed analyses of particular aspects of governance, for example the impacts of government support (Steenblik 2007) or sustainability criteria (de Vera 2007; Sheehan 2009; Switzer 2007; UNCTAD 2008) or the application of international trade laws to those issues (Desphande 2006; Echols 2009; Harmer 2009; Howse *et al.* 2006; Kerr and Loppacher 2005), and (b) general overviews of biofuels policy issues and instruments worldwide, regionally or nationally (Ngo *et al.* 2008; Kaditi 2009; Jull 2007; Sorda *et al.* 2010).

One observation about the existing literature is that there are few if any analyses of the complete biofuels governance landscape. The literature mostly focuses on (and typically critiques) policy instruments, like renewable fuel mandates or government subsidies designed to *support* biofuels, neglecting to note at the same time the plethora of laws, regulatory instruments and technical standards that *constrain* biofuels. Policy supports are in addition to standards and rules that constrain the production, blending, distribution, storage and trade of biofuels.

The literature on biofuels is, in that sense, almost the inverse of the literature on the regulation of biotechnology generally, which tends to focus much more on constraints than supports. Perhaps this is because the regulation of biofuels is in fact primarily supportive of the new industries and technologies, unlike the regulations governing biotechnology generally (Clark 2010; Phillips *et. al.* 2006), or any regulations for that matter, which seem motived more by precaution concerning risks (Shapiro 1990; Sunstein 2005). Similarly, most of the existing policy literature focuses on *government* not *governance*. Governance includes 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.

A holistic view of biofuels governance must, however, include all kinds of relevant measures. This paper, therefore, begins to connect cross-disciplinary literatures on biofuels policy issues with discussion of specific examples of laws, regulations and standards governing—formally and informally supporting and constraining—this sector. The central objective here 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.

Presuming that a global governance system for bioenergy is needed (or inevitable), some scholars have already started exploring generic models as possibilities (Verdonk *et al.* 2007). This paper, in contrast, does not recommend or even consider specific governance alternatives. Rather, it takes the position that better surveying the current situation is a prerequisite for normative debate about the likely or appropriate governance models for biofuels in the future. The ultimate vision to which this work contributes is a regulation and governance framework for biofuels that, while not necessarily simpler, let alone harmonized, is more coordinated and better rationalized.

The analysis is presented in two major sections, following a more detailed discussion in this introduction of key policy objectives for biofuels. First is an overview of typical domestic policies and regulations. These include supply-side measures, like subsidies and regulations regarding biofuels production and distribution, and demand-side measures, such as standards regulating minimum (and maximum) uses of renewable fuels. For typical illustrations of biofuels regulation and governance in advanced economies, this paper refers often to the landscape in OECD member states, but also discusses the unique perspectives of developing countries. Second, given the inevitably global nature of the economic, environmental and other policy objectives related to biofuels, domestic regulations are addressed in light of international law and policy, especially related to trade. The most relevant regulations are promulgated and administered through the World Trade Organization (WTO), but bi/plurilateral relations are becoming increasingly important. This paper looks at two of the United States' major trading partners that both have large stakes in, or influence on, the global biofuels regulatory debate—the European Union (EU) and Canada—for a potentially path-breaking template for bilateral cooperation between large, developed countries. A conclusion summarizes the analysis and suggests directions for future research in this field.

PUBLIC POLICY OBJECTIVES FOR BIOFUELS

Biofuels have been around basically forever. Ancient ancestors burned their first fires with grass and wood, so-called biomass to use contemporary jargon. As society's energy needs evolved from cooking and heating to transportation and manufacturing, sources of that energy also evolved. The industrial revolution drove unprecedented demand for fossil fuel, especially coal. Over time, technology enabled exploitation of other fossil fuels such as petroleum and natural gas to meet the world's growing demand for energy.

The fundamental problem in this recent historical pattern is that, although fossil fuels are essentially just organic matter made from the remains of plants and animals through the earth's geological processes, their 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. Human actions such as this are "very likely" responsible for "most of the observed increase in global average temperatures since the mid-20th century." (Intergovernmental Panel on Climate Change 2007, 39).

Put bluntly, humans are causing potentially catastrophic changes to the earth's climate and our unsustainable use of fossil fuels is part of the problem. This physical threat to our existence is perhaps the most urgent impetus for change. Some environmentalists, though by no means all, are optimistic that advanced biofuels will eventually emerge as a viable, cleaner and more sustainable substitute for petroleum products.

The most widely cited terms of reference for environmental debate about the use of biofuels unfortunately centre on "net energy" balance, which attempts to compare fossil energy used during production to energy delivered during consumption (Farrell *et al* 2006; Pimentel and Patzek 2005). Many leading scholars have called for new metrics to supplement or, better, supplant (Dale 2007) the current analytical framework, because the most important issue is not the net energy impact of biofuels themselves, but a comparison between biofuels and the dominant alternative: petroleum. That is, or at least should be, the energy and environmental policy at the heart of the biofuels industry.

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 -- (Eaves and Eaves 2007; Steenblik 2007, 44-45), public perception and political strategizing tend to conflate ethanol production with greater energy security. That key legislation introducing new renewable energy policies in the U.S. was rebranded from the

"CLEAN Energy Act" to the "Energy Independence and Security Act"[1] speaks loudly about the way in which biofuels policies are often perceived and promoted.

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 agriculture industries. The agricultural policy aspects of biofuels are key not only in developed regions of the world, like 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. A growing number of studies therefore explore biofuels' potential for poverty reduction and sustainable international development (for example: Cadenas and Cabezudo 1998; Dufey 2007; Dufey 2006; Kojima and Johnson 2006; Peskett *et al.* 2007; Sims 2004; von Braun and Pachauri 2006).

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 (Mitchell 2008; Runge and Senauer 2007). Despite early suggestions that these phenomena have already occurred, even in the absence of liberalized international biofuels markets, analysts disagree on the extent to which the ongoing global food crisis that began with the 2007 spike in food prices can be causally linked to biofuels production. The United Nations Conference on Trade and Development (UNCTAD 2011) takes the position that biofuels production has been "a driver of food price inflation for certain crops, but not the dominant one." Credible analysis from the United Kingdom's Department for Environment Food and Rural Affairs has similarly concluded that biofuels made a relatively small contribution to the 2008 spike in agricultural commodity prices (DEFRA 2009). 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 biofuels-related employment and economic activity comes from industry associations rather than independent, peer reviewed analysis (for example: Canadian Renewable Fuels Association 2010; Renewable Fuels Association 2010). Regardless of the source of data, however, there is general recognition that biofuels have the potential to become big business in the

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[1] Energy Security and Independence Act of 2007. H.R. 6. 110th Cong. Pub. L. 110-140. http://hdl.loc.gov/loc.uscongress/legislation.110hr6.

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. Brazil and the United States are the world leaders, together accounting for 70% of world ethanol production. Sugarcane is the main ethanol feedstock used in Brazil, whereas in the U.S. ethanol is derived mainly from industrial corn. In Canada, ethanol is derived from wheat in the Western provinces, and from corn in Ontario and Quebec. 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. Most biodiesel production is in Europe, where Germany is the single largest producer. Canada's first large-scale biodiesel production facility opened in 2005, using production methods that allow for the use of multiple feedstocks (Forge 2007). In 2009, annual domestic production capacity in Canada was estimated at 1000 million L for ethanol and 200 million L for biodiesel, and growing (Litman 2009). A report commissioned by Canada's leading industry association states that 28 commercial production facilities are either in operation or under construction (Doyletech 2010).

There is broad consensus among experts that biotechnological innovation will play a crucial role in achieving the goals of biofuels-related policy initiatives (Lynd *et al*. 2008). 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 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 (Rubin 2008).

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. Among these, the convergence of environment, energy and agricultural/food policies have thus far received the most attention among social scientists (Charles *et al.* 2007; De Gorter and Just 2010; Rajjagopal and Zilberman 2008). Indeed, those issues have been put forward as the biofuels policy "trilemma" (Tilman *et al.* 2009). 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 (Steenblik 2007)." While this is no doubt true, the point of highlighting key policy considerations is this paper is merely to introduce some of the reasons that regulation of this sector is so complex. The following discussion explores the regulatory complexity in more detail.

DOMESTIC POLICIES AND REGULATIONS

SUPPLY-SIDE MEASURES

LEGAL REGULATION OF PRODUCTION AND DISTRIBUTION

At the outset of this paper, it was explained that most of the existing social scientific literature on biofuels focuses on policy supports. Consideration of regulatory constraints is relatively rare (however see Willms 2010). It makes sense to begin discussion of these regulations with a review of laws governing production and distribution of biofuels. The Canadian system provides an excellent example of multi-level governance in this respect. 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.

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 become subject to federal laws and regulatory requirements, including for example the *Canadian Environmental Assessment Act* (*CEAA*).[2] Assessments involving ethanol or biodiesel production in particular are coordinated by Agriculture and Agri-Food Canada (AAFC), which liaises with various other relevant federal government departments and agencies. Detailed guidelines demonstrate how complex this process is already (AAFC, 2007a; 2007b). Willms (2010, 2) points out that it may be further complicated in the near future by stricter rules that consider production facilities' environmental impacts on air, water and human health within a geographic radius larger than considered previously.

Those are just the federal regulations. Constitutional authority over "the environment" is not specified by Canada's *Constitution Act, 1867*,[3] which divides regulatory powers between

[2] http://laws.justice.gc.ca/en/C-15.2/.

[3] http://laws.justice.gc.ca/en/const/Const_index.html, Part VI.

federal and provincial governments. It has come to be an area of shared or overlapping jurisdiction (Hogg 2010). Therefore, every Canadian province also has its own, unique environmental assessment requirements. Fortunately, these are to some extent coordinated with federal rules through an "Operational Policy Statement"[4] on environmental assessment cooperation mechanisms to avoid redundancy or, worse, inconsistency.

Nevertheless, 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*,[5] obtain approvals from the Energy Resources Conservation Board pursuant to the *Energy Resources Conservation Act*[6] and *Oil and Gas Conservation Act*[7] and permits pursuant to the *Water Act*,[8] as well as other laws and regulations (Willms 2010, 3). Manitoba is the only Canadian province to have enacted a biofuels-specific statute, the *Biofuels Act*[9] and related regulations.[10] But that has not really simplified matters, because its licensing requirements are separate from and additional to the *Environment Act*.[11]

These kinds of provincial regulations are in addition to municipal bylaws that govern matters from zoning to emissions. Willms (2010, 4) 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.

Following production, there are regulatory issues about distribution, including storage, of biofuels (Willms, 2010, 4-5). 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

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4 http://www.ceaa.gc.ca/default.asp?lang=En&n=34BB758F-1.

5 http://www.qp.alberta.ca/574.cfm?page=E12.cfm&leg_type=Acts&isbncln=9780779735495.

6 http://www.canlii.org/en/ab/laws/stat/rsa-2000-c-e-10/latest/rsa-2000-c-e-10.html.

7 http://www.canlii.org/en/ab/laws/stat/rsa-2000-c-o-6/latest/rsa-2000-c-o-6.html.

8 http://www.canlii.org/en/ab/laws/stat/rsa-2000-c-w-3/latest/rsa-2000-c-w-3.html.

9 http://web2.gov.mb.ca/laws/statutes/ccsm/b040e.php.

10 http://web2.gov.mb.ca/laws/regs/b040e.php.

11 http://web2.gov.mb.ca/laws/statutes/ccsm/e125e.php.

examples are the *Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations*,[12] enacted pursuant to the federal *Canadian Environmental Protection Act*,[13] (not to be confused with the *Environmental Assessment Act* 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 relevant in this regard.

API and TSSA standards are integrated into provincial regulatory requirements. Ontario's *Technical Standards and Safety Act*[14] and *Fire Protection and Prevention Act*, including the *Fire Code*,[15] illustrate how. Willms (2010, 5) gives the example of standards for fuel storage tanks, which if manufactured before 1986, may not be suitable for ethanol-blended biofuels.

It might be easier for biofuels producers and distributors to know that compliance with *all* of these laws, regulations and standards were mandatory. But, in fact, their task is to determine *which* measures govern their particular activities.

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. Steenblik (2007, 2-6) calculates the total value of support for biofuels through hundreds of OECD government programs stacked to cover virtually every stage of production and consumption of ethanol and biodiesel as at least US$ 11 billion in 2006. The OECD itself put the figure at US$ 15 billion in 2007 (cited in Sorda *et al.* 2010, 6977).

Mapping, let alone understanding, these support programs is a major undertaking that has been attempted by few researchers, and only recently (in Canada see, for example: Ngo *et al.* 2008, 34-42). An analysis is aided somewhat by visual representation of the biofuels value chain.

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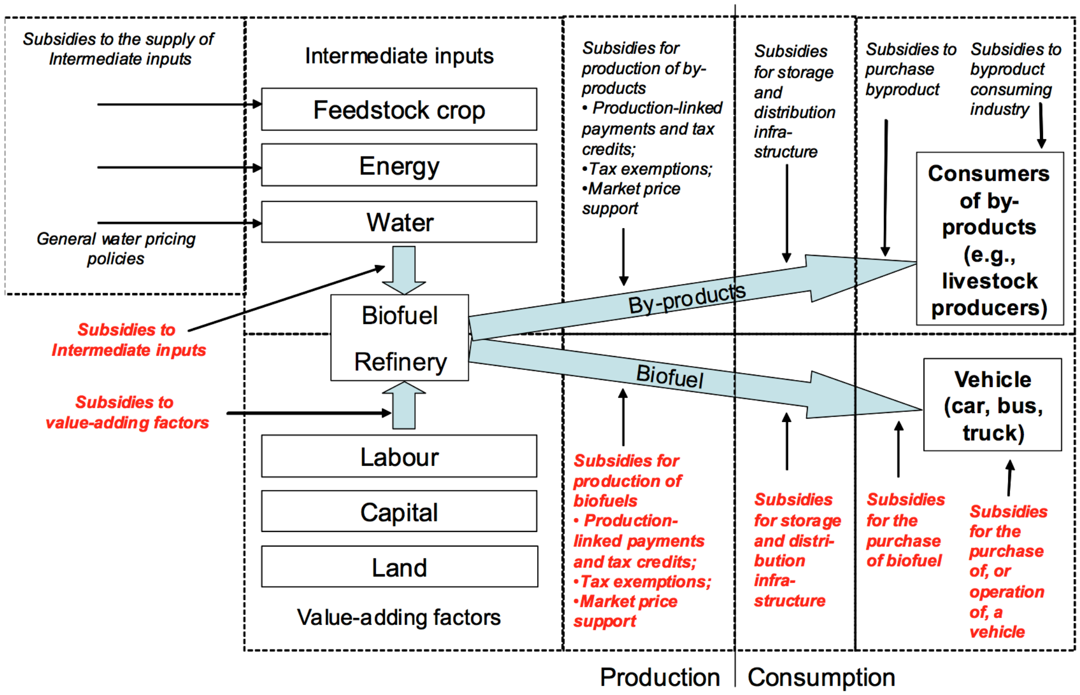
[12] http://canadagazette.gc.ca/rp-pr/p2/2008/2008-06-25/html/sor-dors197-eng.html.

[13] http://laws.justice.gc.ca/en/c-15.31/.

[14] http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_00t16_e.htm.

[15] http://www.e-laws.gov.on.ca/html/source/regs/english/2007/elaws_src_regs_r07213_e.htm.

Figure 1: Subsidies provided at different points in the biofuels supply chain



Source: Steenblik 2007, 2.

It would be impossible within the scope of this paper to describe all of these support measures in detail. Fortunately, that exercise has already been done through the International Institute for Sustainable Development's (IISD) Global Subsidies Initiative, which coordinated in-depth studies of government programs in a number of major biofuels-producing jurisdictions. These studies cover selected OECD members together (Steenblik 2007), and separately including Australia (Quirke *et al.* 2009), Canada (Laan *et al.* 2009), the European Union (Kutas *et al.* 2007; Jung *et al.* 2010), Switzerland (Steeblik and Simón 2007) and the United States (Koplow 2006; 2007), as well as developing countries such as China (Global Subsidies Initiative 2008), Indonesia (Dillon *et al.* 2008) and Malaysia (Lopez *et al.* 2008). Several other researchers have provided complementary analyses, although these tend to be either focused on one country individually rather than several comparatively (in Canada see, for example: Ngo *et al.* 2008, 34-42), or less detailed overviews of global policies (for example: Sorda *et al.* 2010).

In OECD countries, at least, import tariffs on foreign biofuels help to support domestic production. Tariffs are typically much higher for ethanol than biodiesel, due to quirky customs classification schemes governing the international biofuels trade, discussed later in this paper. Various exemptions for biofuels producers in countries with free trade agreements (FTA) or beneficiaries of a generalized system of preferences (GSP) make generalizations difficult. Nevertheless, it has been argued in principle (Steenblik 2007, 6) and proven empirically (Le Roy et al. 2009) 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. (2009, 15-16) put it very 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." So, apparently, 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, at least 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. "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 (Steenblik 2007, 2)." The analytical challenge, however, is to understand the 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 U.S. states (Koplow 2007, 17-18) or Canadian provinces, territories and even some municipalities (Laan *et al.* 2009, 29-31, 54-56). In the EU, there is no Community-wide excise tax policy for biofuels; most Member States have their own, different policies (Jung *et al.* 2010, 42-50). What remains mostly undocumented is the extent to which there is even further variability in taxation policies *within* E.U. Member States. In most jurisdictions, particular tax preferences also vary with the composition of the biofuel in question, such the blending ratio of ethanol to gasoline.

Steenblik (2007, 25) has noted a general trend away from fuel-tax preferences toward 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. 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 the 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 (Koplow 2007, 5).

The programs just described relate essentially to *outputs* from the biofuels production process. There is an equally if not even more complex collection of policies and instruments that impact *inputs* for biofuels, such as biomass and feedstocks, factors of production like 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 (i.e. non-food) crops existed since 1993, allowing for roughly 10% of total farmland in the EU to 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 (Jung *et al.* 2010, 50-53).

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 (Mabee 2007). 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. (Steenblik 2007, 34)." The word "probably" is key in that passage because, as Steenblik (2007, 32) notes, tracking *actual* support for production factors like plant capital, as opposed to government budgetary allocations for such expenditures, is very difficult.

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 (*i.e.* multi-level) governance systems, "subsidy stacking" from municipal, state/provincial and federal sources is common (Steenblik 2007, 33). The Canadian system provides a good example of this phenomenon (Laan *et al.* 2009, 36-45, 57-60; Ngo 2008, 39-40); For details, Canada's leading industry association provides a concise and convenient summary of overlapping federal and provincial public policy programs on its website.[16]

As mentioned above, biofuels may require storage and distribution systems that are different from systems designed for liquid fossil fuels. Compliance with these technical

[16] www.greenfuels.org

standards and legal regulations requires costly investments. Steeblik (2007 34) reports that it is common for 30% of these costs to be underwritten by governments.

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 endeavor, especially to support the commercialization of next-generation biofuels. Examples include C$ 145 million 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 (Steenblik 2007, 36). To the extent that R&D supports are generalizable, supporting society as a whole, these are less controversial from both an economic and legal perspective. That issue of achieving an acceptable balance of public/private benefits from investment into R&D segues well into the final aspect of supply-side governance of biofuels discussed in this part of the paper—intellectual property rights.

INTELLECTUAL PROPERTY RIGHTS

In the past, intellectual property rights (IPRs) were not well understood as a key form of industrial regulation or public policy, but rather were viewed as essentially a private matter governing relations within or among a small number of firms. In recent decades, however, the laws, policies and practices around IPRs have become increasingly recognized as a major part, indeed among the most important parts, of global business governance and regulation (Braithwaite and Drahos, 2000). And IPRs play a role not only in regulating commercial activities, but also in regulating scientific research prior to commercialization (Rai 1999).

There are several interesting observations to make about the growing relevance of IPRs as a form of governance and regulation, noted widely, but especially well articulated by, for example, political scientists such as Sell (2003) and political economists like May (2010). 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. 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 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 (UNEP 2010), as compared for example to 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 (Heller 2008; Jaffe and Lerner 2004, 59; Shapiro 2001) for which cross-licensing and patent pooling have been suggested as a possible solution (Clark *et al.* 2010). According to a recent study by Cahoy and Glenna (2009, 425), the United States issued over four times more patents relating to ethanol—a first-generation biofuel—in 2008 than in 2005. Despite this surge, considerable opportunities for growing patent portfolios apparently still remain open, especially for next-generation fuels (Mannan 2010). And patents are not the only relevant form of protection available; it may also be possible to protect innovations like engineered DNA through copyright (Hogle 1990; Silva 2000; Smith 1987; Holman 2010). 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 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 (2009) point also to another possibility for private ordering: Empirical evidence and theoretical insights 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. Precisely how IPRs influence the mechanisms of governance in general has been explained by, for example, Oxley (1999). Suffice it to say that if Cahoy and Glenna's 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 (2002) makes a key point about the intersection of IPRs and standard-setting organizations in general. Although these are two key drivers of change in the governance of biofuels specifically, there is no discussion in the biofuels literature about how actions of biofuels standard-setting organizations could also have a substantial impact on ways that the biofuels patent landscape factors into the governance of the industry and associated technologies. 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 (2002, 1893) comments may become very relevant:

"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."

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 (Berleson 2009; Behles 2009). The appropriate regulatory response to these global issues will vary with local circumstances, particularly between developed and less developed countries (Barton 2007; Copenhagen Economics 2009; Cannady 2009), thereby further complicating governance of biofuels through IPRs.

DEMAND-SIDE MEASURES

Up to this point in the paper, discussion has concentrated on the governance of biofuels production, including storage and distribution.

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. For example, legislation in Australia has imposed a 10 percent cap on the concentration of ethanol blends (Australian Government 2005).

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.[17] As a direct result, Brazil produced 24.9 billion liters of ethanol in 2009, most of which went to meet domestic fuel demand (Renewable Fuels Association 2010). Alternatively, no American manufacturer warrants its vehicles to use gasoline with higher than 10 percent 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 October 12, 2010 the United States Environment Protection Agency (EPA) raised the upper limit for the blend of ethanol in gasoline from 10 percent (E10) to 15 percent (E15) for use in newer vehicles. The EPA claimed the waiver would not only cut-down petroleum consumption, but also help reduce fuel prices (Milbourn 2010). 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 (Growth Energy 2009). 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 (Auto Alliance 2010). On February 21, 2011, in a 283-to-165 vote in the House of Representatives, the lower chamber of Congress voted to block the funding necessary for the EPA to roll out the waiver. Even if the waiver finds approval from the House, it is unclear whether fuel suppliers and/or retailers would be willing to sell the fuel without industry assurance that it will not damage their existing systems or lead to future liability issues (Yaccobuci 2010).

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 percent by volume (Wilms 2010, 6). The CGSB is a federal organization and a branch of the Department of Public Works and Government Services that creates standards for public and/or private sector clients. The CBSB 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. The CGSB is currently considering significantly raising the upper standard to gasoline containing 50 percent to 85 percent ethanol, although the organization has not yet taken any formal steps to do so (Wilms 2010, 6). The response from Canadian stakeholders to such a move remains to be seen.

[17] http://www.eia.doe.gov/emeu/cabs/Brazil/Oil.html.

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 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.

RENEWABLE FUEL MANDATES

The most strategically valuable measures for the biofuels industry may be regulatory standards that require a proportion of transportation or other fuels come from renewable sources. The term "renewable fuel standards" (RFS) has come to be most commonly adopted to describe these measures, but they could be more accurately described as mandates instead of standards. Regardless, almost all jurisdictions seriously trying to drive demand for biofuels have a RFS in place. To keep the analysis somewhat manageable, the following discussion focuses mainly on ethanol in gasoline, though similar (but usually lower) requirements typically exist for biodiesel as well.

Of renewable fuel initiatives around the world, Brazil's is the longest standing and most developed (Colares 2007; Nass *et al.* 2007; Sorda 2010). Many researchers trace its history to the 1970s' oil crisis, though some have pointed to biofuels policy measures developed in the 1930s. In addition to measures to promote use of ethanol-powered vehicles in Brazil, laws put in place in 1993 required that transport fuels contain at least 22% ethanol. A decade later, this regulatory requirement was increased to 25%.

Sorda (2010) surveys RFS in many key jurisdictions around the world, observing ranges between 2.5% to 25% with 5% or 10% seeming to be normal. Steenblik's analysis (2007, 27-30) 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. 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*,[18] which allowed for the promulgation of regulations creating an RFS. Those regulations, titled *Renewable Fuels*

[18] http://laws.justice.gc.ca/en/c-15.31/.

Regulations,[19] came into force on December 15, 2010. 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.

If this sounds straightforward, it is not. The published regulation occupies 109 printed pages of the *Canada Gazette*,[20] which includes the Regulatory Impact Analysis Statement and eight appended schedules, and 5 pages of definitions within the regulation's 40 sections and subsections. Here is an example of one of those sections, which happens to be the key to calculating compliance with the RFS:

> ***8.*** *(1) The volume of renewable fuel in a primary supplier's gasoline pool for a gasoline compliance period is to be determined in accordance with the equation*
>
> $RF_G = Cre_G + Rec_G - Tr_G - Can_G + CF_G + CB_G + DtG_{DG}$
>
> *where*
>
> RF_G *is the volume, expressed in litres, of renewable fuel in their gasoline pool;*
>
> Cre_G *is the volume, expressed in litres, that is equal to the number of gasoline compliance units that they created during the gasoline compliance period;*
>
> Rec_G *is the volume, expressed in litres, that is equal to the number of gasoline compliance units, in respect of the gasoline compliance period, that they received in trade;*
>
> Tr_G *is the volume, expressed in litres, that is equal to the number of gasoline compliance units, in respect of the gasoline compliance period, that they transferred in trade to another primary supplier;*

[19] http://www.gazette.gc.ca/rp-pr/p2/2010/2010-09-01/html/sor-dors189-eng.html.

[20] http://www.gazette.gc.ca/rp-pr/p2/2010/2010-09-01/pdf/g2-14418.pdf.

> *Can_G is the volume, expressed in litres, that is equal to the number of gasoline compliance units, in respect of the gasoline compliance period, that they are required to cancel;*
>
> *CF_G is the volume, expressed in litres, that is equal to the number of gasoline compliance units that they carried forward into the gasoline compliance period;*
>
> *CB_G is the volume, expressed in litres, that is equal to the number of gasoline compliance units that they carried back into the gasoline compliance period, minus the volume, expressed in litres, that is equal to the number of gasoline compliance units that they carried back from the gasoline compliance period into the preceding gasoline compliance period; and*
>
> *DtG_{DG} is the volume, expressed in litres, that is equal to the number, if any, of distillate compliance units that they assign as the value for DtG_{DG} for the gasoline compliance period.*

This provision is not at all atypical of the complexity found in the legal standards and regulations governing biofuels elsewhere in Canada, or around the world for that matter.

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 due to a lack of production capacity (Laan *et al.* 2009, 28). Currently, Manitoba's *Ethanol General Regulation*, enabled by its aforementioned *Biofuels Act*, calls for an 8.5% blend.[21] 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%. That is up from the 1% that had been previously mandated in Saskatchewan (Ahn-Thu *et al.* 2008, 30). While Manitoba and Saskatchewan have created their RFS in order to promote local industry,

[21] http://www.canlii.org/en/mb/laws/regu/man-reg-165-2007/64887/man-reg-165-2007.html.

Ontario and British Columbia state their prime objectives to be GhG reductions (Wilms 2010, 7).

British Columbia's mandate is derived from regulations accompanying the *Greenhouse Gas Reduction (Renewable and Low Carbon Fuel Requirements) Act*.[22] These regulations require 5% renewable content in gasoline. The initiative was 15 years in the making; a law was originally proposed in 1995 and reintroduced in 2004 (Ahn-Thu 2008, 32), before finally passing in 2008 and coming into force in 2010.

As of 2007, The *Ethanol in Gasoline*[23] regulation in Ontario, enacted pursuant to the *Environmental Protection Act*, 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-references quality controls through third-party standards: "No person shall distribute ethanol-blended gasoline for use or sale in Ontario unless the ethanol-blended gasoline meets the standards and specifications set out in Canadian General Standards Board (C.G.S.B.) document CAN/CGSB-3.511 or the American Society for Testing and Materials (A.S.T.M.) document ASTM/D5798-99."[24] Alberta's new RFS contains a similar provision.

Alberta is the province to most recently adopt a RFS, and through the *Renewable Fuels Standard Regulation* accompanying the *Climate Change and Emissions Management Act*,[25] has 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 lifecycle 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*,[26] which it should be noted uses different formulas and methods than the many other instruments used in different jurisdictions around the world.

[22] S.B.C. 2008, c. 16, http://www.canlii.org/en/bc/laws/stat/sbc-2008-c-16/latest/sbc-2008-c-16.html; http://www.canlii.org/en/bc/laws/regu/bc-reg-394-2008/52546/bc-reg-394-2008.html.

[23] http://www.e-laws.gov.on.ca/html/regs/english/elaws_regs_050535_e.htm.

[24] s. 2(1).

[25] http://www.canlii.org/en/ab/laws/regu/alta-reg-29-2010/latest/alta-reg-29-2010.html.

[26] http://www.energy.alberta.ca/BioEnergy/pdfs/GHGEmissionsStandard.pdf.

The United States' RFS stems from regulations promulgated under the *Energy Policy Act* of 2005[27] and the *Energy Security and Independence Act* of 2007.[28] These regulations are also among the world's most recently updated; in July 2010 the second version, RFS2, (further updated in December 2010) replaced the first version, RFS1, that had been in place since May 2007.[29] The current 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 lifecycle analysis. With the exception of grandfathered facilities constructed before 2007, all renewable fuels must reduce GhG emissions by at least 20% compared to 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.

The European Union's new *Renewable Energy Directive* of 2009[30] and associated regulations rely on a different method to determine minimum GhG reductions from biofuels as part of broader "sustainability" standards (Swinbank 2009). 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,[31] which had mandated a 5.75% market share for biofuels by 2010. Jung *et. al.* (2010, 25) point out that most Member States would fail to achieve this target. Nevertheless, the updated 2009 directive raises 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.

[27] Public Law 109-58, http://www.gpo.gov/fdsys/pkg/PLAW-109publ58/content-detail.html.

[28] Public Law 110-140, http://www.gpo.gov/fdsys/pkg/PLAW-110publ140/content-detail.html.

[29] See http://www.epa.gov/otaq/fuels/renewablefuels/regulations.htm.

[30] Directive 2009/28/EC, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32009L0028:EN:NOT.

[31] Directive 2003/30/EC, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:123:0042:0042:EN:PDF

Second-generation biofuels count double toward 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, 50% from 2017 and 60% from 2018. Moreover, qualifying biofuels cannot be produced on lands with high biodiversity value, high carbon stock or peatland. Ongoing reviews will consider whether to evaluate other issues as well, such as land-use change resulting from biofuels and, related to that, the impact of biofuels on food prices.

Sustainability standards do not currently exist, but could be considered for adoption, in Canada. The most recent 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 (Willms 2010, 9).

Sustainability certification and labelling initiatives

Renewable fuel standards seem to be the epicentre of debates about sustainability. Sheehan (2009) traces the recent history, growing complexity and increasing ambition of lifecycle analyses. He also notes that this tool touches on only one small aspect of the most common definition of sustainability (WCED 1987), and ignores other important questions like the impact of biofuels on water security, ecosystem health, biodiversity and social issues like labour and human rights.

The potential illegality of these latter aspects of such sustainability standards under international trade rules, discussed in detail later in this paper, is one explanation for the skewed emphasis. That is particularly true with respect to *social* sustainability standards (Charnovitz *et al.* 2008). Another possible explanation is simply the perception of importance. For example, one study asked experts to rank the relevance, practicality, reliability and importance of 35 of the many sustainability criteria being discussed by various organizations (Buchholz *et al.* 2009; see also Markevičius *et al.*2010). Energy and GhG balances came out as the top two most important considerations.

Sustainability standards are just beginning to emerge in the biofuels policy literature as a discrete topic of inquiry (see, for example, Lewandowski and Faaij 2006; Markevičius *et al.* 2010; Scarlat 2011; UNCTAD 2008; van Dam *et al.* 2008; van Dam *et al.* 2010). Reports on recent developments are, unfortunately, somewhat discouraging. Van Dam *et al.* (2010) have recently updated their earlier work (van Dam *et al.* 2008) with a survey 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.

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 like Massachusetts and California. In Canada, a working group has been formed and begun developing and consulting on guiding principles for sustainable biofuels. van Dam *et al.* (2010, 2448) report that New Brunswick is the only province that has forest management guidelines governing biomass removed for energy, which is interesting because that is one of the provinces that has *not* implemented a renewable fuel mandate to drive provincial demand for biofuels.

Consistent with the analytical focus in this paper on governance, not just governments, it is crucial to note the influence of a wide variety of inter- and non-governmental actors on sustainability criteria. Several international organizations, for example, are very active on this issue. van Dam *et al.* (2010, 2448-9) mention initiatives by International Organization for Standardization (ISO), European Committee for Standardization (CEN), the Global Bioenergy Partnership (GBEP), Roundtable on Sustainable Biofuels (RSB), Inter-American Development Bank (IDB), United Nations Environmental Program (UNEP) and UN-Energy, a United Nations interagency coordination mechanism.

Leading articles and reports also describe the role of private companies, industry associations and civil society in governing sustainability (van Dam *et al.* 2010, 2449-50). Groups like 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' and the 'International Sustainability and Carbon Certification.'

Though these are all ostensibly independent from any particular government, it is important to realize that they depend on appropriate intellectual property frameworks enabling private actors to protect their trademarks or certification marks. In other words, at least some of the standards vying to become the global default are proprietary, so there may be vested interests promoting their adoption as widely as possible.

Cumulatively, these various certification schemes address a very wide range of matters. Scarlat and Dallemand (2011) analyze how some systems deal with a specific sector, like agriculture or forestry, while some have specific purposes, like fair trade or organic agriculture. 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. Different organizations simply have different priorities (van Dam *et al.*, 2010, 2452).

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 like development, labour conditions, or property and human rights are another matter altogether. Few if any organizations take a coordinated view of the deep and complex interconnections amongst all of these biofuels-related issues.

van Dam *et al.* (2010, 2449) develop an interesting taxonomy of issue-focus by geographic region. Sustainability criteria in China, for example, tend to prioritize biofuels competition with food, while in South-East Asia the emphasis is on food and the environment. Brazilian standards focus on socio-economic impacts. In South Africa and Mozambique, food and socio-economic issues are addressed. North American sustainability policies cover concerns about the environment and food security. Only in Europe do van Dam *et al.* suggest there is a relatively comprehensive strategy to confront environmental, food and socio-economic issues.

Several initiatives directly set their own standards for biofuels feedstock or biofuels. Others adopt a meta-standard approach that attempts to endorse existing standards. Monitoring and compliance mechanisms also vary significantly, using one or more techniques including, for lifecycle GhG emission analysis as an example, 'track-and-trace,' 'mass balance' and 'book-and-claim.' These might operate internationally, regionally or nationally. Sometimes these cross-reference, or are cross-referenced by, formal laws and policies in different jurisdictions, like the *Convention on Biological Diversity* (CBD) or EU *Renewable Energy Directive*.

The list of topics covered by one or more certification systems includes carbon emissions, biodiversity conservation, soil management, water use, air quality, and much more. So what is the result of all this? According to Scarlat and Dallemand (2011, 13), GhG emissions, food security and land use change "are not satisfactorily address by all of the existing certification systems." Similarly, van Dam *et al.* (2010, 2468) point out: "despite ongoing efforts, a diversification between initiatives in methodologies and default values for calculating the GHG balance and carbon sinks continue to exist. These methodological differences are also visible in approaches to safeguard biodiversity conservation." They add that existing systems tend to have a micro-focus, meaning that "interation between factors and impacts on micro- and meso-level is currently hardly addressed."

In sum, governance of biofuels' sustainability though 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 a 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 subject to lower standards, or none at all. Scarlet and Dallemand (2011, 14), for example, point out that "a certification scheme established on the basis of the final use of a crop might be highly ineffective ... [, and] applying a double-standard policy between biofuel and food/feed/fibre production is very likely to lead to indirect displacement effects." That does not mean sustainability standards should not be developed and enforced; to the contrary, they should apply consistently across all related industries and sectors.

Another issue worth mentioning is how the costs of compliance with sustainability standards will be distributed. UNCTAD (2008) 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 to industrialized countries, and smallholders compared to large-scale enterprises. 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 paper.

INTERNATIONAL TRADE GOVERNANCE ISSUES

THE WTO

A collision between biofuels and international trade law has been foreseen. Experts such as Kerr and Loppacher (2005) have raised possible issues around subsidies, biotechnological innovation, tariffs and market access and technical barriers to trade, concluding that there is "considerable potential" for costly delays, suboptimal investment levels and stifled market potential. At the time of that prediction, just over five years ago, international trade in biofuels was small, but significant opportunities were identified for traditional agricultural product exporters like the United States and Canada (ibid., 52). Other scholars suggested around the same time that the most promising growth opportunities belong to developing countries that have large arable landmass, long growing seasons and low labour costs (Howse et. al. 2006, 5). The promise of biofuels exports from developing countries is compounded by the extremely ambitious renewable fuel demand mandates adopted by the world's largest energy consumers, the United States and European Union, which are likely impossible to satisfy through domestic production alone, regardless of biotechnological innovation.

Who benefits remains to be seen, but it is highly likely that the volume and economic value of international trade in biofuels will rise dramatically in the immediate future. As Howse et. al. (2006, 4) explain, "the simple logic of demand and supply is likely to lead to increased trade flows of bio- fuels and their feedstocks." And, they add (at page 6): "Even supposing that future trade in biofuels remains limited, the considerable increase in by-products, whether livestock feed or biobased products, may lead to protectionist pressures, the distortion of world markets, and the need to consider appropriate WTO disciplines." Zah and Ruddy (2009, S1) succinctly highlight the importance of this topic in their introduction to recent special issue of the Journal of Cleaner Production on the subject of international trade in biofuels: "This global trade in biofuels ... will have a major impact not only on other commodity markets like vegetable oils or animal fodder but also on the global land use change and on environmental impacts." This aspect of biofuels governance, therefore, is not simply a niche best left to lawyers or technocrats.

The literature on international trade law governing biofuels generally identifies more or less of the same core issues, though different scholars classify these issues differently. The taxonomy adopted in this paper distinguishes the main trade governance mechanisms related to: tariffs, subsidies and standards. In this discussion, however, cross-reference and overlap is unavoidable. Examining biofuels and trade law, write Howse *et. al.* (2006, 5), is therefore "a rather complex undertaking."

TARIFFS

It makes sense to start with the discussion of tariffs with reference to the issue of product classification, because the classification of biofuels also affects the treatment of other key issues, such as subsidies and agricultural commitments. That is, biofuels would be treated differently under all of these rules if they are deemed to be industrial, agricultural or environmental products, and also differently depending on the category within those rubrics in which biofuels 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). The bound rate applies on a "most favoured nation" basis, which means that the rate offered by any particular 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 members' 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 the group of 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 (Howse *et. al* 2006, 14). 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.

Outside of these exceptions, governance of the classification system that determines the legality of tariffs under WTO rules is actually driven by another organisation altogether, the World Customs Organisation (WCO). The process and structures of the WCO determine the "Harmonised Commodity Description and Coding System," or Harmonized System, or even just HS. Six-digit codes are created for each category of products, with the possibility left open to create sub-categories by appending two or four more digits. 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.* (2006, 10) provide a concrete example of how U.S. ethanol tariffs in the 1980s ran afoul of this rule by applying a 50 per cent per gallon tariff to *fuel* ethanol, but not *all* ethanol falling under the HS headings that existed (and still exist) for ethanol generally. That was clearly illegal, although the US could have done the opposite by applying a lower tariff to fuel ethanol than other ethanol as long that lower rate applied to fuel ethanol from all WTO members. 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 defined on chemical composition, differentiating undenatured and denatured ethanol, which are HS headings 2207.10 and 2207.20. 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, and make measuring the international trade of biofuels simpler.

As international law currently stands, Steenblik (2007, 2) 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 percent to the price of their product in the United States, and over 50 percent in the European Union." In contrast, petroleum faces no or very low tariffs, at least in North

America, which has a distorting effect on global energy markets (Kerr and Loppacher 2005, 56).

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). The AoA applies, naturally, to agricultural products, which are defined to include, among other things, products falling under HS Chapter 1-24. That includes ethanol. That does not, however, include 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.* (2006, 10), 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 (CTE). And 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 (Kerr and Loppacher 2005, 57).

Subsidies

Subsidies is one of the particular issues within international trade law receiving specific attention from researchers recently (see, for example, Harmer 2009). The classification of biofuels under the WCO's Harmonized System determines, in addition to the WTO GATT tariff issues just discussed, the legal obligations related to many government support programs under the also aforementioned WTO AoA, as well as the WTO Subsidies and Countervailing Measures (SCM) Agreement. So, because ethanol and biodiesel are classified so differently under the Harmonized System, 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 non-actionable. 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 members 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, subsidised product, and a range of other harms or serious prejudice such as product displacement or price or market share distortions. Significantly complicating this determination is the fact that subsidies may have adverse effects not on the subsidised 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 anteceding all that is whether a particular government support is, according to legal definitions, a subsidy or something else. That 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 like biofuels where pervasive government intervention has eroded any meaningful benchmark of what the market might otherwise look like (see, for example, Howse *et. al.* 2006, 17).

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 different colour "boxes" depending on how much they're deemed to distort production and trade. Supports that distort minimally or not at all, and meet specified criteria to prove that fact, go in the "green box." They do not count toward the total aggregate measure of government support. Supports that do distort trade go in the "amber box," which is then on aggregate subject to the 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 (2006, 18): The AoA measures the sum of supports for various products by basically adopting the products' WCO HS classification. But government supports for biofuels usually apply to the industry, not the product, *i.e.* feedstocks like 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 comes often in the form of large-scale investment in research and development. Such investments would not run afoul of international trade laws (and 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.* (2006, 15) 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 intellectual property rights accruing to domestic firms as a result of their investment. (Recall from the discussion earlier in this paper that intellectual property rights are changing biofuels governance quite significantly through private ordering.)

Howse *et. al.* (2006, 19-22) do excellent work illustrating legal implications of many kinds of biofuels support mechanisms discussed throughout this paper, including production and consumption subsidies for biofuels and their feedstocks and cross-subsidies for by/co-products. They show that, not surprisingly, there are many serious and complicated issues that could possibly if not certainly cause formal disputes to arise in the near future. Indeed, subsidies is an issue that has already attracted some sabre-rattling around international trade law (Harmer 2009, 12-13). 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. As another example, both Brazil and Canada have already asked the WTO to consider the legality of a range of supports provided by the United States to its domestic agricultural producers, especially corn producers. These kinds of issues are likely to arise much more frequently in the future.

STANDARDS

Tariffs and subsidies are not the only measures governments might use that constrain liberalisation of the multilateral trading system. In fact, these may no longer be the most important measures. 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. The challenge for international trade law is to balance the desire for world trade liberalization with respect for government's sovereign right to regulate internal affairs. These kinds of issues, therefore, are addressed through WTO agreements including the GATT as well as the Technical Barriers to Trade (TBT) Agreement and the Sanitary and Phytosanitary Measures (SPS) Agreement. The fundamental principle underlying these agreements is the principle of non-discrimination (Howse *et. al.* 2006, 22).

For many internal measures, the requirement is not to discriminate between foreign and domestic products that are "like" each other. Whether products are like each other not depends on their physical characteristics, end uses and consumer habits. The rule, then, is that foreign products cannot be treated less favourably than like domestic products. That doesn't mean that like products cannot be treated *differently*, as long as neither product is treated *favourably*. Products might be treated less favourably if, for instance, it is more costly for foreign producers than domestic producers to comply with particular regulatory or technical standards.

In that context, Kerr and Loppacher (2005, 58-59) reference standards adopted pursuant to, for example, the ASTM, which apply to a variety of characteristics such as viscosity, flash point, cetane levels, sulfur 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. Howse *et. al.* (2006, 24) 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;*
- *labeling [sic] 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.*

The bulk of expert attention lately has focussed 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. So far, the WTO compliance of the European Union's sustainability standards have received the most specific commentary (Swinbank 2009; Switzer and McMahon 2010), but there is also literature addressing the US position in particular (Early 2009), as well as the legality of these sorts of standards generally (Ackrill and Kay 2010; Charnovitz *et. al*. 2008, de Vera 2007; Switzer 2007).

Howse et. al. (2006, 25-26) summarise 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 methods of production, including life-cycle GhG emissions, are slightly more controversial but, in the opinion of several leading experts, also most likely legal (Howse et. al. 2006, 26). The argument that sustainability criteria differentiating based on life-cycle GhG emissions might constitute an illegal trade barrier boils down what is known as the product/process distinction. Under the GATT, that distinction isn't normally allowed on the basis of processing and production methods

(PPMs), 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 (Isaac and Kerr 2003, cited in Kerr and Loppacher 2006).

However, other experts, such as Howse et. al. (2006, 26) have come to a different conclusion. They emphasise that the same rules don't necessarily apply in all other WTO contexts, and that 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.

At the other end of the spectrum are measures that ostensibly judge other government's 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. (2008) devote an entire discussion paper to this specific topic. They point out (2008, 1) 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 the broader debates linking trade and social issues.

One of the keys to upholding the legality of any sustainability standards under the GATT would be that the criteria used to differentiate products is objectively verifiable, developed consultatively by the international community and validated by stakeholders. 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 international standards where possible, and in any case to use technical standards that do not create unnecessary trade barriers. For example, after substantial analysis, Swinbank (2009, x), draws the following concise conclusion about the legality EU's sustainability standards, though his remarks are equally applicable to sustainability standards more generally: They can be defended successfully only if "they are non-discriminatory and scientifically based and that they have been imposed only after meaningful negotiations, with the [jurisdiction's] main suppliers, to develop international standards." Switzer and McMahon (2010) go slightly further and suggest that if jurisdictions like the EU want to increase the chances of a successful defence, it should initiate the necessary international negotiations.

An issue that has *not* so-far received enough attention is the use of biotechnology, particularly genetic engineering, in the production of feedstocks for biofuels. These issues are probably covered by the GATT and the SPS Agreement, and perhaps the TBT

Agreement too, if standards and regulations deal with environmental, health and safety risks and other unrelated issues. The SPS Agreement goes beyond the TBT Agreement by requiring that measures not based on international standards be based on scientific evidence rationally related to risk assessment.

Many scholars frame this issue through the lens of WTO law alone, but as Kerr and Loppacher (2006) observe, the Cartegena Protocol on Biosafety (BSP), a Protocol to the Convention on Biological Diversity (CBD) is an also important of the global biofuels governance picture. The GATT and the BSP approach the issue of trade in biotechnology products from different perspectives and with different objectives, with trade liberalisation being the GATT's primary goal and precaution over risks threatening biodiversity being the driving principle behind the BSP. There is no clear way to resolve potential conflicts between these governance instruments.

When the GMO issue was raised at the WTO before, with respect to the EC's treatment of foreign biotech products, a dispute settlement panel held measures did not constitute less favourable treatment of foreign versus domestic products but rather biotech versus non-biotech products (*EC - Approval and Marketing of Biotech Products* 2006). While some measures have been determined to be inconsistent with WTO rules, a *de facto* moratorium still exists that makes it difficult for the products of agricultural biotechnology coming largely from North America to enter the European Union. This issue may erupt again when genetically modified energy crops are inevitably exported to Europe. The United States Department of Agriculture recently approved a genetically modified variety of corn, called "Enogen," which contains a microbial gene producing an enzyme that breaks down starch into sugar to make processing for biofuels more efficient (Pollack 2011). How will jurisdictions like the European Union react to such biotechnological innovations, and will their applicable technical regulations and related measures comply with WTO rules?

The preceding discussion is by no means exhaustive of the many WTO-related issues triggered by international trade in biofuels (it leaves out any mention of government procurement issues, GATT exceptions for public health and environmental protection, and many other matters), but it does provide a reasonable introductory overview. The WTO, however, 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 (Deshpande 2006), and by extension all recent developments in respect of the United Nations Framework Convention on Climate Change. And the global governance of biofuels is or could be impacted by the patchwork of bilateral trade agreements and ongoing negotiations. The following section uses discussions between Canada and the European Union toward a CETA as a concrete example of opportunities for regulatory cooperation.

BILATERAL TRADE AND REGULATORY COOPERATION

Howse et. al. (2006, 11-14) raise several possibilities for multilateral or negotiated solutions through the WTO to the international biofuels governance challenges described above. Several authors argue that unilateral solutions are also legally permitted as a stop-gap measure (de Vera 2007; Switzer 2007). A middle-ground between a full multilateral solution and the unilateral imposition of standards may be found in the context of bilateral trade relations, such as those currently being negotiated between Canada and the European Union.

The CETA could, in the short or long terms, have significant impacts on regulation and governance of biofuels. Though there are no indications from the Government of Canada and the European Commission that biofuels are a specific subject of negotiations in the context of this agreement, there is according to the public record, negotiations over technical barriers to trade and regulatory cooperation,[32] that could have a palpable impact on the issue of biofuels regulation. Speculation and leaked drafts of the CETA itself suggest that a possible chapter on environmental issues could also be relevant.[33]

Casting aside speculation about what Canada and the EU are actually doing, there are several possible modes of regulation that *could* be used to address the issue of regulatory complexity around biofuels (and regulatory complexity in general). Kstric (2010) has distilled from the literature on regulatory cooperation at least four viable options. Harmonisation involves different governments and levels of government adopted the same rules. Mutual recognition does not require governments to adopt the same rules or standards, but it does require that two or more jurisdictions will recognise each others'. Pursuing spontaneous harmonisation means that jurisdictions use rules and procedures expecting that, over time, regulatory objectives will organically align with substantive or procedural baselines. Least ambitiously but also usefully, governments can agree to share information about each others' regulations and standards in the hope that compliance can be made easier.

The first of these, total harmonisation, basically describes the system used to eliminate tariffs with the same rules deployed throughout the world trading system. The Member States of the EU often use mutual recognition as a tool for cooperation, as do Canada and the EU for several transatlantic trade issues. The last option mentioned, information sharing, is essential to the operation of the WTO's TBT Agreement and SPS Agreement. So which is best for CETA, and for beginning to simplify the governance of biofuels in Canada and the European Union? Krstic (2010, 31) ultimately recommends "enhanced (or

[32] http://www2.parl.gc.ca/Content/LOP/ResearchPublications/2010-58-e.htm, http://www.international.gc.ca/trade-agreements-accords-commerciaux/agr-acc/eu-ue/can-eu.aspx .
[33] See www.tradejustice.ca.

managed) mutual recognition which would pave the way for a spontaneous (or soft) regulatory harmonization, while benefiting from existing arrangements and seeking more coherence with the US (through national treatment provisions for certification, inspection procedures, testing, labelling etc.)."

Whether that occurs or not remains to be seen. But one thing is certain, which is that Canada and the EU have before them a significant opportunity to better rationalise biofuels governance, and at the same time, increase the likelihood that their mutually recognised standards and regulations could survive scrutiny under the rules of the WTO.

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, and enables further consideration of the best ways to manage and ideally improve the biofuels regulatory landscape.

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