

# Bio-fuels in Canada: Normative Framework, Existing Regulations, and Politics of Intervention

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Ngo Anh-Thu,<sup>\*</sup> Paule Halley<sup>\*\*</sup> and Peter Calkins<sup>\*\*\*</sup>

*In 1994, Canada became a signatory of the Kyoto Protocol. This international agreement commits each country to reducing its emissions of greenhouse gases in order to control global warming. At the national level, Canada is developing a policy of sustainable development based primarily on promoting the production and consumption of bio-fuels as a means to reducing greenhouse gases and meeting Canada's Kyoto targets. Canada has begun arming itself with laws at the national level and in some provinces. The purpose of this paper is to identify an appropriate legal framework that could promote the produc-*

*tion and consumption of bio-fuels in Canada. It seeks out an efficient GHG reduction strategy from among three approaches: mandatory (laws and regulations); economic incentives (taxes and subsidies); and voluntary (on the parts of both fuel refiners and consumers). The results of the study suggest that the legislative decision-making process is strongly influenced both by concern for the effective use of natural resources and by the priorities of economic development at the local and provincial levels. Government regulations at the provincial level tend therefore to reflect the socioeconomic characteristics of each province.*

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*En 1994, le Canada est devenu signataire du protocole de Kyoto. Cette entente internationale engage chaque pays à réduire les émissions de gaz à effet de serre afin de contrôler le réchauffement de la planète. Au niveau national, le Canada élabore une politique de développement durable qui se fonde notamment sur la promotion de la production et de la consommation des biocarburants, comme mesure de réduction des GES. C'est dans ce contexte que le fédéral et les provinces se dotent de nouveaux instruments et participent à la mise en oeuvre de moyens de production et de consommation durables à la réduction des gaz à effet de serre. Cette recherche fait état des développements touchant les biocarburants aux niveaux national et provincial pour ensuite dis-*

*cuter du choix des modes d'interventions s'offrant aux autorités publiques parmi les mesures réglementaires (lois et règlements), les instruments économiques (taxes et subventions), et les approches volontaires de la part des producteurs, des transformateurs et des consommateurs. Les résultats de l'étude suggèrent que le processus de prise de décisions des gouvernements quant à la manière d'intervenir est fortement influencé tant par un souci pour l'exploitation efficace des ressources naturelles que par les priorités du développement économique aux niveaux local et provincial. La réglementation provinciale a tendance donc à refléter les caractéristiques socioéconomiques de chaque province.*

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<sup>\*</sup> Centre de Recherche en Économie Agroalimentaire, Département d'Économie Agroalimentaire et des Sciences de la Consommation, Université Laval.

<sup>\*\*</sup> Professeur, titulaire de la Chaire de recherche du Canada en droit de l'environnement, Faculté de Droit, Université Laval.

<sup>\*\*\*</sup> Professor, Institute for Sufficiency Economy Research and Promotion, Faculty of Economics, Chiang Mai University, Thailand; and Chercheur associé, Centre de recherche en économie agro-alimentaire (CRÉA), Université Laval.

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The 180 years following the Industrial Revolution have witnessed great strides in producing goods with rising efficiency, but only recently has even passing attention been given to the external costs of that production on humans, animals and the physical environment. Human consumption has pushed not only non-renewable but also renewable resources to precarious extremes. The 21<sup>st</sup> century will therefore test humanity's willingness to achieve a balance between meeting the minimal needs and expanding desires of a growing population on the one hand, and the sustainable use of renewable and non-renewable resources on the other. Productive capacity is a technological question that may be solved through public investment if the private sector fails to respond to unsustainable natural resource use. Willingness, in contrast, has to do with human motivation. That motivation may be reinforced by government interventions in terms of mandatory, monetary, or voluntary measures. The theme of this article is to explore the roles of government in kindling those three types of interventions.

In 1992, the World Summit for Sustainable Development focused the world's attention on environmental protection. Through the language of the *Rio Declaration*,<sup>1</sup> new obligations in the *Convention on Biological Diversity*,<sup>2</sup> and the *Convention on Climate Change*,<sup>3</sup> and the plan of action *Agenda 21*,<sup>4</sup> it elicited commitments from the international community to adopt and

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<sup>1</sup> *Rio Declaration on Environment and Development*, UN Conference on Environment and Development, UN Doc. A/CONF.151/Rev. 1 (1992), 31 I.L.M. 874 (1992).

<sup>2</sup> *Convention on Biological Diversity*, 31 I.L.M. 822 (1992).

<sup>3</sup> *United Nations Framework Convention on Climate Change*, 31 I.L.M. 849 (1992).

<sup>4</sup> *United Nations Conference on Environment and Development, Agenda 21*, 14 June 1992.

implement the principles of sustainable development.<sup>5</sup> In 1997, a number of nations approved the *Kyoto Protocol*,<sup>6</sup> an addendum to the treaty on climate change, which embodies more powerful and legally binding measures to reduce global warming. In force since February 2005, the overall aims are to decrease carbon dioxide emissions per unit of energy used, the demand for energy services, and the inefficiency with which energy services are supplied and consumed.<sup>7</sup> Through the *Kyoto Protocol*, Canada has made an engagement to bring Canadian greenhouse gas (GHG) emissions down to 6 percent below emission levels in 1990.<sup>8</sup>

To respect this international commitment, Canadian governments will have to make every attempt to find and implement appropriate measures to reduce GHG emissions. At the moment, renewable bio-fuels are perceived as one such measure in the positive transformation of national energy matrices. Indeed, bio-fuels, such as ethanol and bio-diesel, have already been investigated and legislated in Canada at the federal and provincial levels. The challenge for sustainable energy matrix development will be to realize a fair balance among three dimensions of sustainable development: economic efficiency, environmental integrity, and social acceptability.<sup>9</sup>

### 1.1 World situation for renewable fuels

Throughout the world, renewable transportation fuels such as ethanol and bio-diesel have become an important component in regulations touching climate change and sustainable development in a wide range of countries. In the United States, Brazil, the European Union, Japan, and China, alternative transportation fuels have been considered as renewable components of the national energy system. To steer their economies toward a globally cleaner fossil scenario, governments across countries may first choose a mix of alternative energy sources; and second, select a combination of interventions to increase bio-fuels, renewable components, and alter-

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<sup>5</sup> Policy Research Initiative, *Advancing Sustainable Development in Canada: Policy Issues and Research Needs*, ed. by Stuart Slayten (Ottawa: Privy Council Office, 2003) at 3.

<sup>6</sup> *Kyoto Protocol to the United Nations Framework Convention on Climate Change*, 10 December 1997, 37 I.L.M. 22 (1998).

<sup>7</sup> *United Nations Framework Convention on Climate Change: The First Ten Years* (Bonn: UNFCCC, 2004).

<sup>8</sup> *Environment Canada's Sustainable Development Strategy 2004-2006* (Gatineau: Environment Canada, 2004) [*SD Strategy*].

<sup>9</sup> *Supra* note 1, principles 1, 3-4; World Commission on Environment and Development, *Our Common Future* (Oxford: Oxford University Press, 1987) at 43; The World Conservation Union, United Nations Environment Programme & World Wide Fund For Nature, *Caring for the Earth: A Strategy for Sustainable Living* (Gland, Switzerland: IUCN/UNEP/WWF, 1991); OECD, *OECD Work on Sustainable Development: A Discussion Paper on Work to be Undertaken Over the Period 1998-2001*, Doc. No. PAC/AFF(98)02 (Paris: OECD, 1998) at para. 22. On this theme, see Edith Brown Weiss, *In Fairness to Future Generations: International Law, Common Patrimony, and Intergenerational Law* (Tokyo: United Nations University and New York: Transnational, 1988); P.W. Birnie & A.E. Boyle, *International Law and the Environment*, 2d ed. (New York: Oxford University Press, 2002) at 40-52; Philippe Sands, *Principles of International Environmental Law*, 2d ed. (Cambridge, U.K.: Cambridge University Press, 2003) at 252-266; Jean-Maurice Arbour and Sophie Lavallée, *Droit international de l'environnement* (Cowansville, Qc: Yvon Blais/Bruylant, 2006) at 65-73.

native energy sources in the national energy matrix.<sup>10</sup> The general motivations of governments have been to: (1) meet international and national targets for the reduction of greenhouse gas emissions; (2) provide an independent, secure, diverse, sustainable, and competitive energy supply; (3) stimulate the economic development of the rural-agricultural sectors; and (4) assist renewable industries to become competitive in domestic and export markets.<sup>11</sup> In Canada, governments at different levels have adopted a strategy to expand the production and utilization of bio-fuels in the country's energy matrix.<sup>12</sup> This strategy calls for a national legislative framework to normatively conceptualize the issues related to promote energy efficiency, renewable energy, alternative fuels, and alternative forms of transportation.

An ethanol-based renewable fuel strategy can be developed in two directions: ethanol as an alternative automobile transportation fuel, as in Brazil; and ethanol as a gasoline additive, as in the United States and Japan. Since 1993, the government of Brazil has maintained a federal law to mandate 25 percent ethanol in gasoline sold across the country.<sup>13</sup> Brazilian drivers may choose among gasoline automatically blended by law with 25 percent ethanol (E25), alcohol gasoline with a much higher blend of ethanol (E85), and pure ethanol (E100). To motivate consumers, the Brazilian government has massively subsidized price to make pure ethanol at the pump 50 percent cheaper than E25. After 30 years, Brazil's renewable fuel strategy has created a unique chain effect of innovative technology in the related industrial sectors of automobile reconstructing and manufacturing, engine design for flexible fuel vehicles,<sup>14</sup> and a flexible system of fuel distribution.<sup>15</sup>

At the national scale, the costs of ethanol development programs are considerable. Most ethanol produced worldwide is subsidized by government.<sup>16</sup> In Brazil, subsidies have spurred the construction of large production units, which benefit from a situation whereby their total financial and fixed operating costs are defrayed by the domestic fuel subsidy programme. In 2002 alone, total Brazilian government direct subsidies for ethanol reached US\$300 million. Alcohol production accounted for US\$37 million, marketing US\$4 million, sugarcane produc-

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<sup>10</sup> Karin Ericsson *et al.*, "Bioenergy Policy and Market Development in Finland and Sweden" (2004) 32 *Energy Policy* 1707; Mark Diesendorf, "Energy Scenarios in Global Economic Models of Greenhouse Gas Reduction" (2000) 13 *International Journal of Global Energy Issues* 70.

<sup>11</sup> Bernd Kuemmel, "A Global Clean Fossil Scenario" (2000) 13 *International Journal of Global Energy Issues* 181; Catherine Mitchell & Peter Connor, "Renewable Energy Policy in the UK 1990-2003" (2004) 32 *Energy Policy* 1935; José Goldemberg *et al.*, "Ethanol Learning Curve – the Brazilian Experience" (2004) 26 *Biomass and Bioenergy* 301.

<sup>12</sup> Mazharul Islam, Amir Fartaj & David S.-K. Ting, "Current Utilization and Future Prospects of Emerging Renewable Energy Applications in Canada" (2004) 8 *Renewable and Sustainable Energy Reviews* 493.

<sup>13</sup> Joao Martinez-Filho, Heloisa L. Burquist & Carlos E.F. Vian, "Bioenergy and the Rise of Sugarcane-Based Ethanol in Brazil" (2006) 21 *Choices* 91 at 94.

<sup>14</sup> Flexible fuel vehicles can be fuelled with gasoline or with blended fuels containing 75 percent, 85 percent, or even 100 percent ethanol.

<sup>15</sup> Frank Rosillio-Calle & Luis A.B. Cortez, "Towards ProAlcool II – A Review of the Brazilian Bioethanol Program" (1998) 14 *Biomass and Bioenergy* 115.

<sup>16</sup> Association for Fair Trade in Ethanol, Ethyl Alcohol Group & European Union of Alcohol Producers, *The Ethyl Alcohol Sector's Position on the World Trade Organisation (WTO) Negotiations on Agriculture* (2002) at 3.

tion US\$106 million, alcohol stock funding US\$91 million, strategic stocks US\$53 million and tax exemptions US\$5 million. Indirect subsidies from the government of Brazil include Green Fleet tax exemptions of about US\$170 million per year. The total current debt financed through public loans or state-guaranteed private bank loans for ethanol producers stands at more than US\$5.6 billion. This includes an annual hidden subsidy of US\$1.17 billion per year, some 25 percent of the costs of alcohol production.<sup>17</sup> These government efforts address many public purposes, such as fostering local economic vitality, strengthening rural sector development, and contributing to farm income stabilization. Public investments, under many forms of government budgetary revenue recycling, redistribute the country’s financial resources back to households and strengthen the business sector. Thus, although total economic incentives to promote ethanol development in the United States in the year 2000 alone cost the government almost US\$800 million,<sup>18</sup> this should not be seen as a complete deadweight loss for society.

Beyond Brazil, the economic future of ethanol as a renewable fuel at the global level is increasingly promising. In 2006, when crude oil prices hit record highs, ethanol became a clear alternative for transportation fuel. Oil prices have doubled compared to the same period two years before this writing, while ethanol prices remain more or less unchanged in nominal terms and have even declined in real terms. Economic analysis shows that if ethanol production costs can remain at approximately US\$31 per barrel, it can economically compete with crude oil as an alternative transportation fuel.<sup>19</sup> Taken together, substantial rises in crude oil prices and advances in ethanol production technologies have made large-scale ethanol consumption a more feasible alternative.

**Table 1: Price comparisons: crude oil and ethanol**

|  | 11/2003 | 11/2004 | 11/2005 | 11/2006 | 11/2007 |
|--|---------|---------|---------|---------|---------|
| <b>Crude oil price * (US\$/barrel)</b> | 27      | 50      | 60      | 70      | 80      |
| <b>Ethanol Price ** (US\$/barrel)</b>  | 31      | 31      | 31      | 33      | 32      |

\* <http://futures.tradingcharts.com/chart/CO/M>, accessed 2008-04-14

\*\* UNICA, price as observed in Sao Paolo, Brazil

However, to introduce and promote renewable, sustainable technology and products to the general population requires both strong effort and commitment from the government to guide the diffusion and adoption process.<sup>20</sup> The problem is that the promotion of bio-fuels such

<sup>17</sup> *Ibid.* at 14.

<sup>18</sup> U.S., Department of Energy, *Cost of Ethanol Tax Incentives in 2000* by David Address (Washington, D.C.: Department of Energy, 2002) at 4.

<sup>19</sup> Arnaldo Walter & Luis Cortez, “An Historical Overview of the Brazilian Bioethanol Program” (1999) 12:1 *Renewable Energy for Development* 2 at 4.

<sup>20</sup> Paul C. Stern, “Information, Incentives, and Proenvironmental Consumer Behaviour” (1999) 22 *Journal of Consumer Policy* 461; Albert Borgmann, “The Moral Complexion of Consumption” (2000) 26

as ethanol by public authorities is currently under debate around the world, centering on the net environmental effects of ethanol use. To determine whether ethanol production for energy is a sustainable option both socio-economically and environmentally, both the defenders and detractors of ethanol promotion base their position upon ethanol life cycle reports. Ethanol life cycle analysis provides a close look at ethanol net energy value, net GHG emissions from different ethanol blends (such as E10, E85, and E100), and ethanol cost benefit analysis. These analyses permit the comparison of the environmental burden associated with the production and consumption of ethanol with other sources of energy such as conventional gasoline. This said, life cycle analyses performed to determine the environmental impact of E10 have yielded variable results, depending upon the assumptions, conditions of the study, and the feedstock (sugarcane, corn, corn stover, switchgrass, forest residues, cassava) employed by the studies.

## 1.2 The ethanol debate

The anti-ethanol camp cites studies pointing to the overwhelmingly negative impacts of ethanol use, and remains sceptical of the sustainability of ethanol production and consumption in the long term. For example, Patsek and Pimentel refer to large scale ethanol feedstock production in developing countries as “global problems created by industrial forestry and agriculture.”<sup>21</sup> In a detailed ethanol life cycle analysis which takes into account nutrient balance, fertilizer efficiency, pesticide use, volumetric and mass yield, wood density, heating value, moisture content, free energy, and wastewater cleanup in eucalyptus and acacia in Indonesia, as well as sugarcane in Brazil, the authors conclude that wood pellets from eucalyptus and acacia plantations are the most desirable energy feed stocks. Furthermore, the pellets should be converted into electricity, not ethanol, because ethanol purportedly has the worst environmental impacts of any bio-fuel. In terms of an ethanol feed stock, although anhydrous ethanol from sugarcane is less environmentally harmful than current ethanol, it is still unsustainable.<sup>22</sup>

The air quality impacts of ethanol utilization are mixed, with an increase in CO, NO<sub>x</sub> and SO<sub>x</sub> counter-balanced by a reduction in hydrocarbon ozone precursors.<sup>23</sup> In addition, the production of ethanol in general may increase the risk of soil and ground water contamination by increasing the risk of tank corrosion, increasing contaminant solubility, and inhibiting biodegradation. Acidification and toxicity impacts currently occur mainly during the harvesting and processing of bio-mass.<sup>24</sup> In addition, Sheehan *et al.* note that farming to produce ethanol

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Journal of Consumer Research 418; Gordon R. Foxall, “The Behavior Analysis of Consumer Choice: An Introduction to the Special Issue” (2003) 24 *Journal of Economic Psychology* 581.

<sup>21</sup> Tad W. Patsek & David Pimentel, “Thermodynamics of Energy Production from Biomass” (2005) 24 *Critical Reviews in Plant Sciences* 327 at 329. See also David Pimentel, Tad Patsek & Gerald Cecil, “Ethanol Production: Energy, Economic, and Environmental Losses” (2007) 189 *Reviews of Environmental Contamination and Toxicology* 25.

<sup>22</sup> Patsek & Pimentel, *ibid.*

<sup>23</sup> John Sheehan *et al.*, “Energy and Environmental Aspects of Using Corn Stover for Fuel Ethanol” (2004) 7:3-4 *Journal of Industrial Ecology* 117 at 117. See also Robert K. Niven, “Ethanol in Gasoline: Environmental Impacts and Sustainability Review Article” (2005) 9 *Renewable and Sustainable Energy Reviews* 535 at 550 [Niven].

<sup>24</sup> Harro von Blottnitz & Mary Ann Curran, “A Review of Assessments Conducted on Bio-Ethanol as a Transportation Fuel from a Net Energy, Greenhouse Gas, and Environmental Life Cycle Perspective”

feedstock is the largest source of GHG emissions.<sup>25</sup> The authors specify that current agricultural production creates soil erosion and nutrient runoff; the conversion of land to agriculture for ethanol production will not escape these environmental consequences. Progress toward attaining energy and environmental goals will therefore require new production technologies and agricultural practices, such as sustainable agriculture and cellulosic ethanol production, and particularly enzyme engineering for future feed stock.<sup>26</sup>

Meanwhile, the pro-ethanol camp also bases their promotion of ethanol as a bio-fuel upon life cycle studies. For instance, Blottnitz and Curran presented a peer-review of the results from 45 publications on ethanol life cycle assessment from 1996 to 2005. They summarized assessments performed with various types of feedstock (sugar beets, sugarcane, wheat straw, potatoes, corn, corn stover, molasses, lignocellulose), across countries worldwide including Canada, the United States, Brazil, several European nations, South Africa, China, India, and the Philippines. Their unbiased objective was to seek a clear pattern of ethanol net energy value and net GHG emissions compared to those of gasoline. Although there were results both pro and con, they concluded across all studies that the use of bio-ethanol in place of conventional fuels or as an additive leads to mildly beneficial effects in terms of both climate protection and fossil fuel conservation, with a net reduction in GHG emissions.<sup>27</sup> This is in line with results from other studies of net ethanol emissions of GHGs such as CO<sub>2</sub>, N<sub>2</sub>O, CH<sub>4</sub> or CO<sub>2</sub> equivalents. The net beneficial impact upon GHG reduction of the production, consumption and disposal of ethanol comes from avoiding fossil CO<sub>2</sub> and other GHG emissions associated with the gasoline life cycle and from any direct emissions of fossil CO<sub>2</sub>. For one kilometre traveled using E10 produced from corn stover, total GHG emissions drop by 17.25 grams compared to that of gasoline.<sup>28</sup>

In a second peer-review study, Niven estimates that E10 may yield a marginal 5 percent reduction in GHG emissions over gasoline.<sup>29</sup> The study concludes that E85 produced from lignocellulosics (corn, corn stover, switchgrass, wheat straw, or hay) is potentially a better transportation fuel for significantly reducing GHG emissions. Full lifecycle analysis performed in Canada reveals that ethanol produced from corn in Canada yields 4.5 percent lower GHG emissions.<sup>30</sup> It is estimated that if Canadian ethanol production can be expanded to 1.125 billion litres per year by 2010, Canadian GHGs can be reduced by 2.47 million tonnes annually. This represents 1.3 to 1.8 percent of the total reduction required to meet Canada's *Kyoto Protocol* commitment target.<sup>31</sup>

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(2007) 15 *Journal of Cleaner Production* 607 [Blottnitz & Curran].

<sup>25</sup> Sheehan *et al.*, *supra* note 23 at 141.

<sup>26</sup> *Ibid.*; A.E. Farrel *et al.*, "Ethanol Can Contribute to Energy and Environmental Goals" (2006) 311 *Science* 27.

<sup>27</sup> Blottnitz & Curran, *supra* note 24 at 616.

<sup>28</sup> Sheehan *et al.*, *supra* note 23 at 141; Niven, *supra* note 23 at 538.

<sup>29</sup> Niven, *ibid.* at 549.

<sup>30</sup> Agriculture and Agri-Food Canada, *Assessment of Net Emissions of Greenhouse Gases from Ethanol-Blended Gasolines in Canada: Lignocellulosic Feedstocks* by Levelton Engineering, ed. by Stephen Henderson (Ottawa: Agriculture and Agri-Food Canada, 2000) at 34.

<sup>31</sup> *Ibid.* at 40.

Technical studies also indicate that ethanol produced is energy efficient; that is, it has a positive net energy value (NEV). Total energy input to produce one unit of ethanol is smaller than output energy yielded by one unit of ethanol, using existing farming, refining and production practices in the United States. This energy ratio ranges from 1.34<sup>32</sup> to 1.37.<sup>33</sup> That is to say, for every unit of ethanol produced, there is an energy gain of more than one-third (34 percent to 37 percent). Life cycle economic analysis of cassava-ethanol in China estimates current production cost using existing farming, refining and production practices at about US\$1 per gallon, a figure not far from corn-ethanol produced in the United States,<sup>34</sup> although the pump price of ethanol is still somewhat higher than gasoline. These studies, based on various kinds of ethanol feedstock, and diverse agricultural production techniques, all support the economic viability and social sustainability of ethanol.

In the future, comparative life cycle analyses of bio-fuel and petroleum should be performed in a fairer manner. In any life cycle analysis of the larger environmental costs of producing and shipping fuels, not only ethanol but also petroleum and other alternative energies must be subjected to the same analysis. In the case of petroleum, such an analysis must include the unique fossil fuel costs of shipping petroleum, the danger of oil-spills, and the environmental and human costs of war to gain control of location-specific oilfields. Although the sustainability of ethanol production and utilization is still under debate at the time of this writing, a window of opportunity lies open for advancing technologies and improving practices in agriculture, forestry, refining, and automobile design for more effective sustainable development.

### 1.3 Objectives

In Canada, most of the discussion to date about ethanol as a bio-fuel has focused on its effectiveness in contributing to greenhouse gas emission reduction and its collateral impacts upon environmental quality. Very little attention has been given to the bio-fuel strategy of Canada, whether to chart its general direction, or to evaluate the interventions chosen by public authorities to promote bio-fuels and respond to the concerns raised by such promotion.

The overall purpose of this paper is therefore to present within a unified framework how Canadian public authorities at various levels have formulated and begun to implement policies to develop the production and consumption of bio-fuels. It is not the purpose of this paper to settle the debate between one camp which feels that ethanol can make a tangible net step in helping Canada to respect its *Kyoto* targets, and an opposing camp which feels that the net environmental implications may be negative. Moreover, we believe that the issues of quality and sustainability must be carefully studied.

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<sup>32</sup> United States Department of Agriculture, *The Energy Balance of Corn Ethanol: An Update* by Hosein Shapouri, James A. Duffield & Michael Wang (Washington, D.C.: United States Department of Agriculture, 2002) at 12.

<sup>33</sup> Seungdo Kim and Bruce E. Dale, "Allocation Procedure in Production System from Corn Grain" (2002) 7 *International Journal of Life Cycle Assessment* 237 at 243.

<sup>34</sup> Cheng Zhang *et al.*, "Life Cycle Economic Analysis of Fuel Ethanol Derived from Cassava in Southwest China" (2003) 7 *Renewable and Sustainable Energy Reviews* 353 at 359.

## 2. THE MANDATORY APPROACH

It is crucial to define and standardize our terminology for the three distinct types of public intervention that may be applied either separately or within a combined strategy to manage environmental problems. The first approach is *mandatory*, which refers to a situation where the consumer, the producer, or the refiner is given no choice by State law other than to reduce greenhouse gas production and emissions in explicit ways spelled out in officially adopted legislation. Many synonyms exist for this term in popular discourse, including but not limited to “command-control,” “legal,” “regulation,” “obligatory,” “governmental,” and “legislative”; but for the remainder of this paper we shall use the term “mandatory” to subsume all of the others. The traditional mandatory approach is one among various methods of intervention the government could exercise to establish a regulatory framework for alternative fuel promotion. This mechanism is normally set to achieve a specific goal in a given period.<sup>35</sup>

### 2.1 Federal framework

In Canada, a federalist system distributes power between the central and provincial governments.<sup>36</sup> Within this framework, ethanol-related laws and regulations to govern the transportation energy sector are drafted and implemented essentially under gasoline acts. Mandatory measures can be made at either national or provincial levels. Indeed, at the federal level, two regulations concern the mandatory utilization of alternative fuels: the *Alternative Fuels Act*<sup>37</sup> and the *Alternative Fuels Regulation*.<sup>38</sup> The *Alternative Fuels Act* aims to favour the utilization of alternative fuels in motor vehicles and to set a leadership example at the national level in promoting renewable non-petroleum-based fuels. More specifically, for the fiscal year commencing April 1, 2004 and every fiscal year thereafter “where it is cost effective and operationally feasible,” seventy-five per cent of motor vehicles operated by all federal fleets operate on alternative fuels, thereby promoting the replacement of petroleum-based fuels for transportation.<sup>39</sup> The *Alternative Fuels Regulation* serves to clarify key definitions. To be judged “alternative,” a fuel must be useable as the sole source of direct propulsion energy for a motor vehicle; these alternatives include ethanol, methanol, propane, natural gas, hydrogen or electricity, and fuels blended in varying proportions. Government “motor vehicles” subject to the utilization of alternative fuels are defined as public automobiles, passenger vans, buses, light duty trucks, and medium duty trucks.<sup>40</sup>

<sup>35</sup> Jérôme Foulon, Paul Lanoie & Benoît Laplante, “Incentives for Pollution Control: Regulation or Information?” (2002) 44 *Journal of Environmental Economics and Management* 169; Adam B. Jaffe & Robert N. Stavins, “Dynamic Incentives of Environmental Regulations: The Effects of Alternative Policy Instruments on Technology Diffusion” (1995) 29 *Journal of Environmental Economics and Management* S-43; Robert W. Hahn, “The Impact of Economics on Environmental Policy” (2000) 39 *Journal of Environmental Economics and Management* 375; see also Société de l’assurance automobile du Québec, *Répartir les normes: Le choix entre les formes d’action étatique* by Pierre Issalys with the collaboration of Michel Bourque (Québec: Société de l’assurance automobile du Québec) at 7-19.

<sup>36</sup> *Constitution Act, 1867* (U.K.), 30 & 31 *Vict.*, c. 3, ss. 91-92, reprinted in R.S.C. 1985, App. II, No.5.

<sup>37</sup> *Alternative Fuels Act*, S.C. 1995, c. 20.

<sup>38</sup> *Alternative Fuels Regulation*, S.O.R./96-453.

<sup>39</sup> *Supra* note 37 at s. 3.

<sup>40</sup> *Supra* note 38 at ss. 1, 3.

Environmental resource and energy-related regulations at different governmental levels are an important step in shaping the development of such innovative products as bio-fuels. Although the Canadian government has expressed its will to promote ethanol as an alternative sustainable transportation fuel due to its capacity to help reduce GHG emissions, ethanol blends at 5 percent (E5) to 10 percent (E10) are only available in certain provinces such as Saskatchewan, Manitoba, Quebec, and Ontario.<sup>41</sup> The genuinely high cost of ethanol production and distribution systems in Canada, due in part to as yet underdeveloped economies of scale, pits the interests of government against those of producers, retailers and consumers.<sup>42</sup> Tax incentives, subsidies, research, information campaigns, and a creative and transparent legal framework must be set to kick-start efforts by environmentalists, manufacturers, farmers, and consumers to make ethanol blends a complete or partial substitute for conventional fuel sources in Canada.<sup>43</sup> The choice of E10 may trigger a higher level of environmental consciousness on the part of virtually all consumer households across Canada. Legislative analysis should take into account the benefits of making E10 a green choice visible every day at the pump. Alternative transportation fuels should be available to every Canadian household that wishes to do its part in the environmental movement; as such it would constitute a social participation program.

## 2.2 Provincial framework

At the provincial level, as well, experience suggests that local economic development is one of various motivations for governments to establish a mandatory framework for bio-fuels. This argument is particularly pertinent in the agricultural sector, where the government may wish to improve farm prices, create employment, and draw in more local investment toward the establishment of an ethanol industry.<sup>44</sup> For example, Saskatchewan has set out to become a leading ethanol producer in Canada. Developing the ethanol industry could expand the incomes of grain producers by shifting out the demand curve through new market opportunities. The 400-million-litre-per-year industry scenario projects the generation of a demand for 1.08 million tonnes of wheat feedstock annually, the creation of up to 450 jobs, mostly in rural areas, the generation of \$272.8 million in construction, and a total economic yield of \$346 million per year, an increase of some \$139 million per year in Saskatchewan's GDP.<sup>45</sup>

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<sup>41</sup> *SD Strategy*, *supra* note 8 at 6-21.

<sup>42</sup> Transportation Systems Branch, Air Pollution Prevention Directorate, Environment Canada, *Use of Higher than 10 volume percent Ethanol/Gasoline Blends In Gasoline Powered Vehicles* by Chandra Prakash (Ottawa: Environment Canada, 1998).

<sup>43</sup> Mazharul Islam, Amir Fartaj & David S.-K. Ting, "Current Utilization and Future Prospects of Emerging Renewable Energy Applications in Canada" (2004) 8 *Renewable and Sustainable Energy Reviews* 493.

<sup>44</sup> Ministry of Environment, *Ontario's Clean Air Action Plan* (Ontario: Queen's Printer for Ontario, 2004) at 11-13.

<sup>45</sup> Government of Saskatchewan, *Greenprint for Ethanol Production in Saskatchewan* (Saskatchewan: Government of Saskatchewan, 2002) at 8.

**Table 2: Projected socio-economic impacts of ethanol production in Saskatchewan\***

| Activity             | Anticipated Annual Economic Outcome |                                 |                              |
|----------------------|-------------------------------------|---------------------------------|------------------------------|
|                      | Production of 130 M Litres/year     | Production of 400 M Litres/year | Production of 1B Litres/year |
| Primary Production   | \$ 9M                               | \$ 86M                          | \$ 395M                      |
| Operation and Output | \$ 74M                              | \$ 224M                         | \$ 568M                      |
| Construction         | \$ 12M                              | \$ 36M                          | \$ 74M                       |
| Total                | \$ 95M                              | \$ 346M                         | \$ 1,037M                    |

\* Source: *Greenprint, the Government of Saskatchewan, 2002*

Similar advantages have led the government of Manitoba to legislatively support ethanol development. Manitoba is one of three Canadian agricultural provinces with large surpluses of wheat and other grains, some of which are less profitable to export than to sell locally for ethanol. A local market for wheat used in a Manitoban ethanol facility could save Manitoban farmers as much as \$35 per ton in shipping costs. A domestic livestock industry that could benefit from economic alliances with the ethanol and co-product industries will potentially offer Manitoban farmers value-adding opportunities and improve farm incomes at virtually no additional cost.<sup>46</sup> Such local economic development opportunities have encouraged the governments of the Prairie Provinces to complete the regulatory framework necessary to promote ethanol as an alternative transportation fuel.<sup>47</sup> In marked contrast, the Canadian Maritime Provinces have felt scant motivation to pursue agriculture-based bio-fuel development strategies due to their fundamentally different natural conditions.

For these reasons, as of this writing, only three Canadian provinces have legislatively mandated a certain percentage of ethanol blend in unleaded automotive gasoline. In Saskatchewan, according to the *Ethanol Fuel Act*, “the use of ethanol-blended fuel is required”<sup>48</sup> beginning on November 1, 2005. In 2007, the percentage of ethanol blend in all gasoline distributed in Saskatchewan must be 7.5 percent, up from 1 percent during the preceding fourteen months.<sup>49</sup>

An ethanol mandate was first mentioned in Manitoba during 2002-2003 as the *Biofuels Act*.<sup>50</sup> This was the first legislative step in preparing a gasohol mandate for the entire province. By the end of 2003, the bill had passed and become *The Biofuels and Gasoline Tax Amendment*

<sup>46</sup> Government of Manitoba, *Developing Manitoba’s Ethanol Industry* (Manitoba, Government of Manitoba, 2002) at 2.

<sup>47</sup> Similar logics, ideas and experiences of climate change national framework reconstructions are shared by authors such as Kuemmel, *supra* note 11; Mitchell & Connor, *supra* note 11; and Goldemberg *et al.*, *supra* note 11.

<sup>48</sup> *Ethanol Fuel Act*, S.S. 2002, c. E-11.1., s. 4.

<sup>49</sup> *Ethanol Fuel (General) Regulations*, Sask. Reg. 1/2002, s. 5.

<sup>50</sup> Bill 11, *The Biofuels Act*, 4th Sess., 37th Leg., Manitoba, 2003.

*Act*,<sup>51</sup> which insists that “a fuel supplier whose gasohol sales for a reporting year beginning after August 31, 2005 do not meet the prescribed level must pay a penalty to the Minister of Finance.”<sup>52</sup> According to the mandate, beginning in September 2005, 85 percent of gasoline sold in Manitoba had to be blended to make E10. A valid license is also required to manufacture and blend denatured ethanol.<sup>53</sup> The Manitoba government has thus created a platform for gasohol quality control in the near future.

On 7 October, 2005, the Ontario government adopted the *Ethanol in Gasoline*<sup>54</sup> regulation, also known as the Renewable Fuel Standard (RFS),<sup>55</sup> which addresses gasoline distributors and suppliers in the province, to ensure that gasoline sold in the province will contain no less than 5 percent ethanol by volume by January 2007.<sup>56</sup> The fact that the *Ethanol in Gasoline* regulation was drafted under the *Environmental Protection Act*<sup>57</sup> reveals the Ontario legislature’s intention to connect ethanol utilization to GHG reductions. Moreover, Ontario’s *Ethanol in Gasoline* regulation is an innovative legislative model. Instead of being a blanket standard with a fixed percentage of ethanol blend, it is flexible enough to allow choices between ethanol-blend and non-ethanol-blend gasoline to Ontarian consumers. The provincial annual ethanol target percentage is calculated as the average content of ethanol-blended and non-ethanol-blended gasoline that the fuel supplier placed in the Ontario market in the compliance year. Also, the regulator gives different weights for ethanol derived from cellulosic and non-cellulosic sources. A calculation to determine whether a fuel supplier meets the required ethanol percentage in gasoline sold in the market is available for the distributors to consult.<sup>58</sup> In particular, quality control references for ethanol blended quality have been stated clearly in the regulation:

No person shall distribute ethanol-blended gasoline for use or sale in Ontario unless the ethanol-blended gasoline meets the standards and specification 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 [...] <sup>59</sup>

Besides the air quality benefits and the reduction of 800,000 tonnes of GHG emissions annually,<sup>60</sup> the regulation may potentially draw in substantial socio-economic benefits to the ethanol industry and farm incomes, particularly those of Ontario corn producers. However, the introduction of the ethanol mandate in Ontario does raise concerns of how Ontario will respond to the ethanol demand of the province. This context raises the question of whether the

<sup>51</sup> *Biofuels and Gasoline Tax Amendment Act*, S.M. 2003, c. 5.

<sup>52</sup> *Ibid.*, s. 7(1).

<sup>53</sup> *Ibid.*, s. 4(1).

<sup>54</sup> *Ethanol in Gasoline*, O. Reg. 535/05.

<sup>55</sup> Consumers Council of Canada, “Ethanol in Gasoline Regulation Under the Environment Protection Act” (Paper presented to the Ministry of Environment September 2005) [unpublished] at 2, 3 and 8.

<sup>56</sup> *Supra* note 54, s. 3.

<sup>57</sup> *Environmental Protection Act*, R.S.O. 1990, c. E.19.

<sup>58</sup> *Supra* note 54, s. 4.

<sup>59</sup> *Ibid.*, s. 2(1).

<sup>60</sup> Ontario, Ministry of Environment, *Notice of Proposal for Regulation: Ethanol in Gasoline Regulation under the Environmental Protection Act* (Ontario: Queen’s Printer for Ontario, 2005).

best way to act in concordance with environmental and other objectives is to build more corn-based ethanol plants and stretch feed-stock production to meet targets by domestic production, or whether importing is more efficient.<sup>61</sup> In the meantime, Ontario imports approximately one third of its current demand for ethanol, and the gap is expected to widen substantially unless ethanol production within the province is stimulated.<sup>62</sup>

Notably, Ontario's *Ethanol in Gasoline* is the only ethanol related regulation that mentions quality control of ethanol blends and states clear sources of ethanol-blend references.<sup>63</sup> Neither Saskatchewan nor Manitoba regulations mention specific measures to ensure the quality of ethanol blends in terms of energy efficiency and environmental-friendliness. Should Canada decide to mandate a minimum ethanol percentage in gasoline at the national level, we believe that selecting a respectable public body to be responsible for ethanol standards and quality control would be a necessary first step to guaranteeing the fundamental requirements of the new energy matrix and otherwise assisting in the implementation process.

Due to the large range of economic, social and political interests, bio-fuel related bills are not always passed easily across provinces. In British Columbia, *Bill M 209*,<sup>64</sup> given first reading in 1995, was once again resubmitted in September 2004, but has not yet been passed. The bill aims to mandate a minimum ethanol proportion for gasoline in British Columbia; to encourage the development and marketing of ethanol and bio-diesel made from biomass, given that ethanol and bio-diesel portions of fuels blended with gasoline and diesel will be exempt from the provincial motor fuel tax; and to respond to the environmental issues of GHG emissions and local air quality. This bill targets the transportation and gasoline sectors by proposing that "all persons selling or offering for sale motor vehicle fuels are required to ensure that all motor vehicle fuel sold conforms to the definition of gasohol under the act."<sup>65</sup>

The general concern of British Columbia ethanol mandates is the provision of adequate sources of ethanol supply to satisfy the rising ethanol demand inspired by the mandate. British Columbia parliamentarians worry that if ethanol-blended gasoline is mandated at the 10 percent level, ethanol demand in British Columbia will rise steeply, forcing the province to rely on ethanol imports. In the short term, British Columbia policy and law makers prefer to utilise economic incentives like tax reductions/exemptions to support provincial bio-fuel production and consumption. In the longer term, they will tend to phase out financial incentives for bio-fuel to avoid budget deficits, and allow market power to define gasoline tax rates.

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<sup>61</sup> "Update on Ethanol" *Ontario Corn Producer Magazine* (November 2001) 9, online: Ontario Corn Producer <<http://www.ontariocorn.org/magazine/Archives/archive1.html>>.

<sup>62</sup> "Why Expand Domestic Consumption of Ontario Corn?" *Ontario Corn Producer Magazine* (April 2003) 25, online: Ontario Corn Producer <<http://www.ontariocorn.org/magazine/Issues/pre%20Nov%202005/ocpmag/magh42003pg8.html>>.

<sup>63</sup> *Supra* note 54, s. 2.

<sup>64</sup> *Bill M 209, An Act to Introduce a Minimum Ethanol Component for Gasoline*, 4th Sess., 35th Leg., British Columbia, 1995.

<sup>65</sup> *Ibid.*, s. 2.

### 2.3 Observations

The Canadian system emphasizes a highly decentralized form of federalism whereby explicit concessions to individual provincial concerns are a prerequisite to any step by Cabinet or Parliament.<sup>66</sup> Exercising this authority, Canadian provinces and territories demand to be involved in the discussion and decision-making processes on critical issues. One such issue is climate change legislation, including ethanol mandates at the national level, national targets, and the setting of standards for quality control and implementation. Thus, setting national objectives for large scale ethanol utilisation does not merely involve establishing the most efficient percentage of ethanol blend, it also concerns the right over “property and civil rights in the province”<sup>67</sup> to choose whether and how to produce or utilise ethanol under the specific conditions of each province.

The most useful foreign model to inform a Canadian national ethanol mandate may well be the *Energy Policy Act of 2005*<sup>68</sup> of the United States, which mandates an obligatory ethanol blend in gasoline sold throughout the country. According to the Act, the annual applicable volume of ethanol blend across the country is the ratio of total gallons of ethanol fuels to the total gallons of gasoline consumed in a given year.<sup>69</sup> The national target can increase from year to year, depending upon the projected levels of ethanol production across the United States. This approach allows individual states to establish their own ethanol percentage mandates, if applicable, based on their own assessment of what is most appropriate to their socio-economic interests. This manner of setting mandates should be justified in the current Canadian situation, where several provinces have already established laws and regulations mandating ethanol blend percentages in gasoline,<sup>70</sup> while other provinces and territories have not. The approach is flexible enough for the Maritime Provinces and the Yukon to fix minimum - or even zero - proportions of ethanol blends, while allowing higher percentage blends in the Prairies.<sup>71</sup> Mandated targets must be accompanied by appropriate planning and coordination across agencies, policy instruments, and an adequate implementation strategy to assure that objectives are achieved on time.

Another issue in introducing a national ethanol mandate is how the country and/or province will respond to satisfy the increased ethanol demand. If ethanol blended gasoline is mandated at the federal level, ethanol demand will rise steeply. Should the government choose to assist a homegrown or made-in-Canada ethanol industry, locating a stable source of feedstock supply would be a critical issue. This is likely an engagement the Canadian government will take in the future, not only to develop a new industry but also to assist the sustainability of the agricultural sector. Canadian farm incomes have dropped dramatically over the three previous fiscal years, necessitating governmental interventions to maintain the level of Canadian

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<sup>66</sup> Barry G. Rabe, “Beyond Kyoto: Climate Change Policy in Multilevel Governance Systems” (2007) 20:3 *Governance: An International Journal of Policy, Administration, and Institutions* 423 at 428.

<sup>67</sup> *Supra* note 36, s. 92(13).

<sup>68</sup> U.S., Bill H.R. 6, *Energy Policy Act of 2005*, 109th Cong., 2005 (enacted).

<sup>69</sup> *Ibid.*, s. 1501.

<sup>70</sup> *Ethanol Fuel (General) Regulations*, Sask. Reg. 1/2002; *Ethanol Fuel Act*, S.S. 2002, c. E-11.1; and *supra* note 54.

<sup>71</sup> *Supra* note 38; *Ethanol Fuel Act*, S.S. 2002, c. E-11.1, and *supra* note 51.

grain production industry in any case. As such, government will have to take into account the impact of ethanol demand on the price and availability of grains used to feed humans and animals. Otherwise, an ethanol mandate at the national level may force the country and its non-agricultural provinces and territories to rely upon imports of ethanol and/or ethanol feedstock from other countries. From an environmental standpoint, the latter may reduce the energy efficiency of the new energy matrix.

The mandatory approach has other drawbacks. Command-control applications can be quite inflexible in that the state establishes not only the standards and objectives to be achieved, but also the means to reach them. Under a mandatory regime, if monitoring, enforcement, and legal penalties are lax, then non-compliance is a viable option. With the command-control approach, the state will have to bear the costs of policy design, implementation and enforcement, including costs of monitoring market performance. A mandatory approach should take into account the potential costs for public education in bringing public awareness to an adequate level. Compliance will be achieved only if the mandate is set when the market is ready.<sup>72</sup>

### 3. ECONOMIC INCENTIVES TO PROMOTE BIO-FUELS IN CANADA

Even once in place, the mandatory approach to fixing quantitative and qualitative norms may be inadequate to assure complete promotion of bio-fuels. The second critical approach considered in this paper is *economic incentives*, which refers to taxes on environmentally inappropriate behaviour or products, subsidies for desired appropriate behaviour or products, government grants for the discovery and application of appropriate technology, and so on. Synonyms of this term are “monetary incentives,” “taxes and subsidies,” “the market-based approach,” “pricing policies,” “economic self-interest,” and “budget allocation.” Once again, we shall use the sole term “economic incentives” throughout the remainder of this paper.

Such economic incentives are often essential to promoting new environmentally friendly products. They attempt to internalize the environmental costs within the calculation of economic decisions. In that light, economic measures use pricing systems and market forces to attain a given objective.<sup>73</sup> Since early studies on the concept of “externality,” estimation of the positive, and more often negative, external effects of individual decisions upon the larger collective have permitted the researcher or policy analyst to take account of non-market interdependencies among individual utility functions.<sup>74</sup> When the social (environmental, employment, aesthetic, health, gender) benefits of a given activity are greater than its sole private benefits, the externalities of that activity are said to be “positive.” When, in contrast, the social disadvantages or costs outweigh the private disadvantages or costs supported by the activity, the externalities are considered “negative.” The realm of the natural ecosystem is where many such externalities occur, but they are not always negative. A negative environmental external-

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<sup>72</sup> Anita Indira Anand, “Voluntary v. Mandatory Corporate Governance: Towards An Optimal Regulatory Framework” (2005) *bepress Legal Series* [Working Paper 566] at 8-9.

<sup>73</sup> Jaffe & Stavins, *supra* note 35.

<sup>74</sup> Alfred Marshall, *Principles of Economics: An Introductory Volume*, 8th ed. (Philadelphia: Porcupine Press, 1982) at 86-97; Arthur Cecil Pigou, *The Economics of Welfare*, 4th ed. (London: Macmillan and Co., Limited, 1932) at 3-22.

ity refers to such undesirable side effects as pollution, alteration of natural resources, disfigurement of landscapes, loss of biodiversity, various types of environmental nuisance, or any other situation causing a reduction in the well-being of individuals other than the polluter. These individuals should be compensated by the polluter. Since voluntary compensation of the victim by the polluter is still uncommon, government may apply the polluter-pays principle to make the polluter pay the true cost of his or her pollution. This normally involves legislating eco-taxes on polluting behaviour, or subsidies to incite individuals to adopt certain environmentally-responsible behaviours.

By this definition, economic incentives offer a way to encourage sustainable development practices and reduce the collective costs of restoring environmental quality. Consequently, economic instruments have two distinguished characteristics: they bias prices but leave decision-making to the enterprises. The use of cost-benefit analysis to evaluate government regulations can help to measure trade-offs among alternative policies, whether they be mandatory, market-based taxes and subsidies, or information-based voluntarism. Cost-benefit analysis may help make market instruments more politically acceptable, particularly where mandatory and voluntary approaches have failed.<sup>75</sup>

Similarly, the history of economic thought on the environment reflects two schools of economists who have developed theories on the various instruments that can be used to bring resource use to a sustainable level.<sup>76</sup> Certain economists believed that the free market would automatically increase the prices of endangered natural resources and solve environmental excess without government intervention; others would impose a mandatory limit on the scope of any economic activity that significantly endangers natural resources. This latter group argued that economic growth does not inevitably lead to a long-term reduction in pollution and environmental destruction.<sup>77</sup> Between the two schools of thought, Pigou, in his early works, explained how economic policies such as taxes and subsidies can internalize externalities to bring about optimal well-being to both consumers and producers.<sup>78</sup>

Rather than viewing these approaches as contradictory, we hold that economists over the past two centuries have developed a complex set of alternative policy tools, each appropriate to certain situations. Such tools may address both the consumer and producer sides of energy markets.<sup>79</sup> Economic incentives to promote the development of bio-fuels and bio-fuel related sectors in Canada such as agriculture production and alternative fuel vehicles are not always written as an independent act or regulation. Bio-fuel incentives could be written as part of the related subjects of federal and provincial laws in the fields of sale taxes or fuel taxes.

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<sup>75</sup> Robert N. Stavins, "L'approche économique de la protection de l'environnement" (2004) 2863 *Problèmes économiques* 3.

<sup>76</sup> Denis Clerc, "Economistes et écologistes : des rapports compliqués" (2005) 63 *hors-série 1er trimestre Alternatives économiques* 17.

<sup>77</sup> Nicholas Georgescu-Roegen, *La Décroissance*, 2e ed. (Paris: Éditions Sang de la terre, 1995).

<sup>78</sup> Pigou, *supra* note 74 at 229-242.

<sup>79</sup> Robert W. Hahn, "The Impact of Economics on Environmental Policy" (2000) 39 *Journal of Environmental Economics and Management* 375.

### 3.1 Tax rebates, reductions and exemptions to promote the utilization of bio-fuels

At the federal level, in the framework of the *Excise Tax Act*,<sup>80</sup> the term “alcohol” describes ethanol and methanol produced from biomass or renewable resources. When gasoline is blended with alcohol to produce an ethanol blended gasoline that contains at least 1.35 percent alcohol by volume, the gasoline excise tax of 10 cents per litre does not apply to the part of the blend that represents the percentage of alcohol by volume. Similarly, the diesel excise tax of 4 cents per litre does not apply to “bio-diesel,” defined as all combustible diesel produced from trash or original biologic materials rather than petroleum, natural gas, or coal.<sup>81</sup>

At the provincial level, depending on the state of development, local natural and economic conditions, and strategic intentions of the government, bio-fuel tax incentives can be written as separate, independent provincial acts or regulations. This is the case in Saskatchewan and Manitoba. In Saskatchewan, the *Ethanol Fuel (Grants) Regulations*<sup>82</sup> was set up to support bio-fuel distributors. To be eligible for governmental financial assistance, a distributor must carry on business in Saskatchewan and obtain the necessary licenses.<sup>83</sup> Eventually, the ethanol grant program offered by the government of Saskatchewan aims to offset the taxes paid. The effective elimination of the fuel tax on Saskatchewan-produced ethanol provides market-based incentives to expand current levels of ethanol production and consumption. While this initially results in forgone government revenues, it could stimulate economic activities in the longer term by increasing both consumer and producer surpluses.

Similarly, the Manitoba government established ethanol tax reduction through both the *Budget Implementation and Tax Statutes Amendment Act, 2004*<sup>84</sup> and the *Gasoline Tax Act*.<sup>85</sup> Compared to the conventional gasoline tax rate of 11.5 cents per litre, gasohol gets a reduction of 2.5 cents, for a net tax rate of only 9 cents per litre. If each litre of Manitoba E10 receives a 2.5 cents tax reduction, the effective financial incentive for pure ethanol is 25 cents per litre. This is the most generous level of provincial financial support toward the development of ethanol in Canada at the present time. However, the ethanol tax reduction in Manitoba will be gradually reduced. According to the *Biofuels Amendment Act, 2007*,<sup>86</sup> the gasohol tax reduction will drop to 2 cents per litre for a purchase made in the first two 12-month periods after the gasoline mandate;<sup>87</sup> 1.5 cents per litre for a purchase made in the next three 12-month periods, and 1 cent per litre, for the last three 12-month periods.<sup>88</sup>

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<sup>80</sup> *Excise Tax Act*, R.S.C. 1985, c. E-15.

<sup>81</sup> *Ibid.*, s. 23.

<sup>82</sup> *Ethanol Fuel (Grants) Regulations*, R.R.S., c. G-5.1 Reg. 107.

<sup>83</sup> *Fuel Tax Act 2000*, S.S. 2000, C. F-23.21 s. 9(2)(a)(c)(d)(e).

<sup>84</sup> *Budget Implementation and Tax Statutes Amendment Act, 2004*, S.M., c. 43.

<sup>85</sup> *Gasoline Tax Act*, C.C.S.M., c. G40.

<sup>86</sup> *The Biofuels Amendment Act*, S.M. 2007, c. 17.

<sup>87</sup> *Ibid.*, s. 6.4(2).

<sup>88</sup> *Ibid.*

The gradual decline of ethanol tax incentives may be seen as smart public policy and legislative strategy for three reasons: it gives enough time to nourish the provincial ethanol industry, it allows the gasoline market to adjust proportionally, and it sensitizes the consumer to ethanol blends as a new product.

In other provinces, a bio-fuel tax reduction or exemption is written as sections of related acts or regulations. In British Columbia, bio-fuels receive tax exemptions to encourage their use. According to the *Motor Fuel Tax Regulation*,<sup>89</sup> ethanol and bio-diesel portions of fuels blended with gasoline and diesel are exempted from the provincial motor fuel tax. Beginning in July 2004, blended fuel is eligible for tax exemption when: 1) the ethanol portion of ethanol/gasoline or ethanol/diesel blend lies between 5 percent and 25 percent; or 2) the bio-diesel portion of a blend of bio-diesel/diesel lies between 5 percent and 50 percent by volume. Legislatively, on-going incentives for alternative fuel will remain under the *Motor Fuel Tax Act*<sup>90</sup> until the bio-fuel share reaches 3.5 percent of British Columbia's motor fuel market. In the longer term, the British Columbia government aims to employ the economic approach, basing tax rates for alternative fuels on both market share and the fuels' environmental benefits.<sup>91</sup>

In Ontario, three acts directly reflect Ontario's bio-fuel economic incentives: the *Fuel Tax Act*,<sup>92</sup> the *Gasoline Tax Act*<sup>93</sup> and the *Retail Sales Tax Act*.<sup>94</sup> The *Fuel Tax Act* defines "an exception for bio-diesel used as clear fuel," voiding the fuel tax of 14.3 cents per litre for bio-diesel beginning June 2002.<sup>95</sup> In the *Gasoline Tax Act*, ethanol, methanol and natural gas are not defined as taxable gasoline,<sup>96</sup> and thus are exempted from the 14.7 cents per litre provincial gasoline tax. The *Retail Sales Tax Act* also confirms that "ethanol or methanol that is sold and purchased as fuel to generate power by internal combustion in any engine"<sup>97</sup> is tax exempt. The current alternative-fuel tax exemption program cost the government of Ontario approximately \$55 million in 2006.<sup>98</sup>

In Quebec, the *Fuel Tax Act*<sup>99</sup> mentions briefly that "in the case of the acquisition of a mixture of gasoline and ethanol, the tax provided "is reduced in the manner and on the terms and conditions prescribed by regulation." In the Budget Plan 2005-2006, the government of Quebec provided further "terms and conditions" with regard to bio-fuel tax credits. The

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<sup>89</sup> *Motor Fuel Tax Regulation*, B.C. Reg. 414/1985, ss. 51.1, 51.2, 51.3, 51.5.

<sup>90</sup> *Motor Fuel Tax Act*, R.S.B.C. 1996, c. 317, s. 51.

<sup>91</sup> British Columbia Ministry of Small Business and Revenue, Interpretation Bulletin MFT-005R, "Tax Rates on Motor Fuels" (February 2007) at 2.

<sup>92</sup> *Fuel Tax Act*, R.S.O. 1990, c. F35.

<sup>93</sup> *Gasoline Tax Act*, R.S.O. 1990, c. G.5.

<sup>94</sup> *Retail Sales Tax Act*, R.S.O. 1990, c. R.31.

<sup>95</sup> *Supra* note 92, s. 3(1).

<sup>96</sup> *Supra* note 93, s. 1(1).

<sup>97</sup> *Supra* note 94, s. 7(1), para. 12.

<sup>98</sup> Ontario Ministry of Finance, *2006 Ontario Economic Outlook and Fiscal Review, Background Papers* (Toronto: Queen's Printer for Ontario, 2006) at 98, online: Ontario Ministry of Finance <[http://www.fin.gov.on.ca/english/budget/fallstatement/2006/06fspaper\\_all.pdf](http://www.fin.gov.on.ca/english/budget/fallstatement/2006/06fspaper_all.pdf)>.

<sup>99</sup> *Fuel Tax Act*, R.S.Q., c. T-1, s. 2.

tax credit for ethanol in Quebec will be 18.5 cents per litre. The ethanol tax credit program commits \$12 millions to support the development of ethanol produced in Quebec.<sup>100</sup> In terms of bio-diesel, the *Fuel Tax Act* also states that “partial reimbursement to public carriers...whose services contribute substantially to curbing air pollution” will be entitled to claim a full refund of the fuel tax they pay on bio-diesel fuel.<sup>101</sup> For this partial bio-diesel tax reimbursement, Quebec has reserved a budget of \$2 million for both fiscal years 2005-2006 and 2006-2007.<sup>102</sup>

In spite of being home to Canada’s largest oil refineries and a net exporter of crude oil, the Alberta government has established regulations to support the development of ethanol. The *Fuel Tax Act*<sup>103</sup> sets the tax rate for all fuel oil purchased in Alberta at 9 cents per litre, but by definition, fuel oil does not include ethyl alcohol, another name for ethanol.<sup>104</sup> Although Alberta has the lowest gasoline tax rate in Canada, the *Fuel Tax Act*, administered by the Ministry of Revenue and Finance, has exempted the tax burden for the ethanol portion blended in gasoline.

To prevent a budget deficit due to forgone gasoline taxes and over-spending on ethanol programs, several provinces have established specific criteria of eligibility for governmental subsidies, which implies that economic incentives such as tax rebates, tax exemptions, or reductions are only applicable to bio-fuel produced and consumed within provincial boundaries. The provinces where inter-provincial tax barriers exist on ethanol include Saskatchewan,<sup>105</sup> Manitoba,<sup>106</sup> and Quebec.<sup>107</sup> In contrast, there is no restriction on sources of ethanol in Alberta and British Columbia. In these two provinces, bio-fuel tax exemptions apply to ethanol regardless of its domestic or internal source of origin.

### 3.2 Tax rebates for alternative fuel vehicles

To accommodate the use of alternative fuels, several provinces have regulations allowing tax rebates on alternative vehicles. In this regard, the British Columbia government has special regulations to promote the purchase of alternative passenger vehicles and hybrid electric vehicles.<sup>108</sup> According to the *Social Service Tax Act*,<sup>109</sup> qualifying vehicles include new passenger

<sup>100</sup> Ministère de Développement Durable, Environnement et de Parcs, “Budget de dépenses 2005-2006: Des investissements importants pour le développement durable, l’environnement et les parcs» (22 April 2005), online: Ministère de Développement durable, de l’Environnement et des Parcs, Québec <<http://www.mddep.gouv.qc.ca/infuseur/communique.asp?No=725>>.

<sup>101</sup> *Supra* note 99, s. 10(1).

<sup>102</sup> Finances Québec, *2005-2006 Budget: Additional Information on the Budgetary Measures*, s. 2 (Government of Quebec, April 2005) at 14.

<sup>103</sup> *Fuel Tax Act*, R.S.A 2000 c. F-28, s. 3(1).

<sup>104</sup> *Ibid.*, s. 1(k)(i).

<sup>105</sup> *The Ethanol Fuel (Grants) Regulations*, c. G-5.1 Reg. 107, s. 3(2)(a).

<sup>106</sup> *Supra* note 51, s. 4(1)-(3).

<sup>107</sup> Finance Québec, *2005-2006 Budget: Budget Plan in Brief*, (Government of Québec, April 2005) at 27.

<sup>108</sup> British Columbia Ministry of Small Business and Revenue, Interpretation Bulletin SST-085R, “Alternative Fuel Vehicles and Alternative Motor Fuel Tax Concessions” (March 2007).

<sup>109</sup> *Social Service Tax Act*, R.S.B.C. 1996, c. 431.

vehicles that are designed to operate exclusively on electricity, ethanol, methanol, natural gas, or propane; as a hybrid electric vehicle; or as a bi-fuel vehicle with two separate tanks that can be powered by propane or natural gas, as well as gasoline or diesel fuel.<sup>110</sup> The British Columbia Ministry of Small Business and Revenue is responsible for providing clear guidance to dealers, sellers, and lessors to assist them in collecting the appropriate tax on sales and leasing of eligible alternative fuel vehicles. Effective February 16, 2005, eligible new alternative fuel passenger vehicles may claim a partial rebate of 30 percent of the provincial sales tax paid, up to a maximum of \$1,000. The maximum rebate for alternative fuel buses is \$10,000.<sup>111</sup>

Similarly, the *Retail Sales Tax Act*<sup>112</sup> of Ontario specifies a rebate of the provincial sales tax for alternative fuel vehicles, according to which all vehicles designed to operate with “electrical energy, or energy derived from the internal combustion of propane, natural gas, ethanol, methanol or manufactured gas” will be qualified for a maximum \$1000 provincial sales tax rebate at the purchase.<sup>113</sup> At the moment, although technological advances and the long-term efforts of automobile manufacturers have resulted in practical models of alternative-fuel vehicles, the latter are still more expensive than their conventional counterparts. The retail sales tax rebate is one measure to encourage the expanded production and consumption of alternative fuel vehicles.

### 3.3 Ethanol producer grants

On the production side, favourable government measures support the development of the ethanol industry. Specific financial agreements have been granted by provincial governments to assure firms of the government’s support for the development of the ethanol industry at the provincial level. In the medium run, these instruments are expected to promote the production of bio-fuels on a larger scale and to enhance the utilization of ethanol in the fuel market.

In October 2003, under Canada’s climate change plan to reduce GHGs, the federal government launched a \$100 million Ethanol Expansion Program. The first round issued grants for six ethanol plants across Canada for \$72 million of government contribution toward construction costs. Funding for this program is part of the \$2 billion commitment to climate change actions made in Budget 2003.<sup>114</sup> On February 2004, the results of the second round of the Ethanol Expansion Program were announced, with a total allocation of \$27.5 million.<sup>115</sup> As observed in the profiles of the recipient companies, government contribution occupies about 17.3 percent of total construction costs. Among successful proponents, Commercial Alcohols received the largest grant of \$18 million to build its 126 million-litre capacity plant in the city of Varennes, Quebec. The Ethanol Expansion Program constitutes a large-scale

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<sup>110</sup> *Ibid.*, s. 75(2); *Social Service Tax Act Regulations*, B.C. Reg. 84/58, s. 11.1.

<sup>111</sup> British Columbia Ministry of Small Business and Revenue, Interpretation Bulletin SST-087R, “Alternative Fuel Vehicles: Calculating the Tax Reduction” (June 2007).

<sup>112</sup> *Supra* note 94.

<sup>113</sup> *Ibid.*, s. 48(3)(g)(i),(iii).

<sup>114</sup> Natural Resources Canada, “Government of Canada Launches Ethanol Expansion Program” (20 October 2003), online: Natural Resources Canada Newsroom <[http://www.nrcan-rcan.gc.ca/media/archives/newsreleases/2003/200387\\_e.htm](http://www.nrcan-rcan.gc.ca/media/archives/newsreleases/2003/200387_e.htm)>.

<sup>115</sup> *Ibid.*

intervention that can be realized by a fiscal budget allocation to promote ethanol production at the industrial level. This program reflects and confirms the government's strategy to expand renewable fuels in Canada. It is also a leading example of how the federal government can promote sustainable development by constructing a supportive set of interventions at the industrial level.

In Saskatchewan, ethanol grants are specified in the *Ethanol Production and Marketing Incentive Regulations*.<sup>116</sup> The regulation permits ethanol producers within the province to apply for government financial assistance to support the production and distribution of ethanol. The amount granted by the government will not exceed 40 cents per litre on ethanol produced or distributed in the province. Government financial assistance may be provided for the first four years of production. Thereafter, the grant may be renewed for a period of three months, at a rate not to exceed 25 cents per litre. The province has established the Ethanol Fund Committee to handle decisions related to ethanol development, such as reviewing grant applications from provincial ethanol producers/distributors, and tax reimbursements. This Committee is partly funded by the gasoline tax remitted.

The *Ontario Ethanol Manufacturers' Agreement*, announced in October 1994, continues to apply today. According to this document, the government may enter into project-specific agreements with ethanol producers in the province to guarantee that the ethanol tax exemption will be guaranteed until the year 2010,<sup>117</sup> even if the tax structure were to be changed by administrative or legislative action in the interim. In addition to legislative support, the government of Ontario has also made financial contributions to support ethanol plant construction. Commercial Alcohols Inc., a Canadian-owned company that processes corn to produce ethanol fuel, has received a \$5 million grant to build its 150 million-litre ethanol plant in Chatham, Ontario.<sup>118</sup> In the short term, producer grants appear to be necessary to facilitating a home-grown ethanol industry.<sup>119</sup> In the medium run, this instrument is expected to expand the scale of production of bio-fuels and help their integration on fuel markets. Thus, in the longer term, funding for these activities may require a shift in spending strategy.

### 3.4 Observations

In conclusion, decision-making at the provincial level appears to be strongly influenced by, and typically related to, local economic development priorities. Economic incentives introduced by provincial governments vary widely and seem primarily governed by the specific socio-economic characteristics of each province. Ethanol regulations reflect the specific natural and socio-economic conditions each particular feedstock-producing province.

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<sup>116</sup> *Ethanol Production and Marketing Incentive Regulations* (Repealed), R.R.S. c. D-8 Reg. 6.

<sup>117</sup> Olar *et al.*, *Ethanol Industry in Canada* (Centre de Recherche en Économie Agroalimentaire, University of Laval, 2004) CRÉA Research Series at 15, online: University of Laval <<http://www.crea.ulaval.ca/publications.htm>>.

<sup>118</sup> Ontario Ministry of Energy, *Ontario's Progress on Clean Energy, Conservation and Alternative Fuels* (2007), online: Ontario Ministry of Energy, News <[http://www.energy.gov.on.ca/index.cfm?fuseaction=archives.news2&back=yes&news\\_id=16&background\\_id=21](http://www.energy.gov.on.ca/index.cfm?fuseaction=archives.news2&back=yes&news_id=16&background_id=21)>.

<sup>119</sup> *Supra* note 15.

Firstly, the presence or absence of a provincial ethanol mandate indicates the state of ethanol development in the province, which in turn appears to be dominated by the particular natural conditions of the area. For example, in Prairie Provinces, where agricultural activities can provide stable sources of feedstock for ethanol production, pro-ethanol consumption policies such as ethanol-blend mandates and ethanol price subsidies are in place.

Secondly, the most popular economic incentive to promote ethanol end use is a sales tax exemption at the provincial level. Most Canadian provinces offer tax breaks for the ethanol portion blended into gasoline. At the moment, in addition to a federal ethanol sales tax break of 10 cents per litre, provincial ethanol tax concessions vary from 9 to 25 cents per litre from province to province. Such tax breaks are observed to gradually decrease over time, while the percentage of ethanol blends tends to rise toward the potential maximum of 10 percent ethanol. Other economic incentives to indirectly promote ethanol favour sectors related to bio-fuel production and consumption. Partial sales tax rebates for alternative fuel vehicles encourage the purchase of vehicles that can be filled with alternative or renewable fuels, including electricity and bio-fuels. Indeed, the economic incentives favoured by economists often fail to inspire long term behavioural changes. Despite high rates of participation at the beginning, economic incentives may fail to produce long-term commitment and enduring results because intrinsic environment values may have been destroyed by extrinsic rewards and motivations,<sup>120</sup> unless independently reinforced by local socio-economic development priorities.

Thirdly, the polluter–payer environmental principle has been turned on its head in the case of bio-fuels and the bio-fuel industry, for the polluters are now being paid. To date, the Canadian bio-fuel industry, as elsewhere across the world, has received government support as an infant “green” industry while its “green” characteristics are still under debate. In the meantime, while life cycle analyses comparing ethanol and gasoline have yet to draw unequivocal conclusions as to ethanol’s net environmental impacts, the bio-fuel industry has already received grants for infrastructural development and the installation of bio-fuels on the market has been actively promoted through tax exemptions. Both the environmental costs associated with the production of ethanol and ethanol feedstock and a specific plan of environmental clean-up to cover the potential negative externalities have been omitted.

Fourthly, the levels of public investments in ethanol promotion in each province, such as R&D activities, demonstrations, educational and information campaigns, and producer grants reflect the capacity and intention of provincial governments to develop a home-grown ethanol industry. It is evident that while bio-fuels are blooming in agricultural provinces such as Saskatchewan, Manitoba and Ontario, the Maritime provinces and the Yukon have felt no motivation to speed up their adoption of bio-fuel legislative frameworks. Insufficiency of land, fierce natural conditions, and harsh winters may prevent production of grains, corn, wheat, and oil seeds in quantities adequate to supply ethanol plants year round.

Ethanol manufacturing, depending as it does upon agricultural raw materials, could thus face potential problems of feedstock supply, utilization of arable land, potential changes in natural habitat, and distribution of agricultural products for food or fuel production. The deci-

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<sup>120</sup> Folke Ölander & John Thøgersen, “Understanding of Consumer Behaviour as a Prerequisite for Environmental Protection” (1995) 18 *Journal of Consumer Policy* 345 [Ölander & Thøgersen].

sion-making process to formulate a regulatory framework for bio-fuels in these regions thus becomes more complicated because legislators must examine carefully the environmental costs and benefits of this option. That the Canadian provinces operate with considerable authority in a relatively decentralized federal system reflects the long-standing constitutional power of the provinces over natural resources.<sup>121</sup> Due to this federal-provincial division of competence over the utilisation of natural resources, provincial legislatures have the authority to decide whether to develop a home-grown bio-fuel industry, if appropriate; to select a feedstock to sustain their bio-fuel industry; and to build a master plan of agricultural land use whereby adequate proportions of agricultural products are allocated to foods and fuels. The sweeping scope of this provincial competence leads in turn to the setting of suitable ethanol blend targets and economic incentives at the provincial level, and to deciding a provincial timetable for achieving GHG reduction targets.

#### 4. VOLUNTARY APPROACH

Even as the command-control approach and economic market-based incentives are perfected, a third and potentially dominant approach to the promotion of bio-fuel utilization and production may be appealed to by the State: the *voluntary* will of consumers, producers, and refiners to adopt greener behaviours. This third approach is “voluntarism,” which refers to the creation of incentives through the operation of which producers, consumers and refiners may accord increasing ethical preference to greener behaviour in environmental concerns. Although information is given to the social agent concerned, and an appeal may be made to his or her conscience, the ultimate choice of behaving according to one’s economic interest or to the benefit of others, including the environment, is left entirely to the consumer, producer or refiner. Synonyms for this term often used in the literature include: “ethical consumption,” “social consumption,” “the third way,” “socially responsible behaviour,” “consumption with a conscience,” “moral suasion,” or “autonomous green behaviour.” For the purposes of this paper, we shall limit ourselves to the terms “voluntarism” or “voluntaristic behaviour.” The field of energy efficiency and renewable alternative fuel is emblematic of voluntary government leadership and stake-holder cooperation. Under the voluntary spirit, sustainable development has become an example of joint efforts between governments and all stakeholders, such as research institutes, industry, associations, environmental, and social groups and the general population, in which the government coordinates, leads, and calls for participation.<sup>122</sup>

Environment Canada’s new approach to environmental protection stresses both voluntarism and good citizenship. From a political standpoint, whereby all environmental policies come ultimately from the government, it is important to evaluate to what extent government encouragement of voluntary consumption and production constitutes a component of regulatory and economic instruments.<sup>123</sup> Under voluntarism, the government can provide education and other types of information to consumers and producers, replacing the mandatory “thou

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<sup>121</sup> *Supra* note 36, s. 91(13)(16).

<sup>122</sup> *SD Strategy, supra* note 8.

<sup>123</sup> Fatma Maged, “Voluntary Approaches in Environmental Policy” (2004) 6(4) *Horizons Policy Research Initiative* 13; Marie-Louise Bemelmans-Videc, Ray C. Rist & Evert Vedung, *Carrots, Sticks & Sermons: Policy Instruments and Their Evaluation* (New Brunswick: Transaction Publishers, 1998).

shalt not” by the softer “let’s work together.” Even with such information, voluntary participation, particularly by firms, is usually not completely voluntary; rather, it merely anticipates government actions. Moreover, networks, individuals, and organizational structures constitute important internal determinants of voluntarism. When combined with external pressure from government, consumer groups, and trade unions, these internal determinants can significantly increase the level of voluntary action.

Voluntary approaches can be introduced as negotiated environmental agreements between public authorities and industry; unilateral commitments made by polluters without public government participation to result in self-regulation, voluntary codes of conduct, and environmental charters; or public voluntary programs developed by the government.<sup>124</sup> Of these three forms, the first two are more likely to focus on producer or firm behaviours, while the last may address behavioural changes in the general population. Once written, these agreements, codes of conduct, and charters, albeit voluntary, become more or less coercive. This application, lying at the nexus between regulation and voluntarism, is designed to elicit rational behaviour based on narrow economic interest.

On the consumption side, the voluntary approach relies mainly upon government efforts to provide social marketing measures, such as information, education campaigns, experiments, demonstrations, and pilot programs to improve public environmental problem awareness, inspire intrinsic environmental values, strengthen personal altruism, and thus provoke widespread public participation. Voluntary measures targeting the general population can be organized into two categories of knowledge imparted: general information and specific task know-how. General knowledge/information addresses the consumer’s psychological domains such as attitudes, awareness, and moral motivation. Specific task knowledge/how-to programs include experiments, expositions to establish the economic or technical feasibility of alternative products, and practical projects to deliver facts on how to directly participate in GHG reduction activities. Although general information is critical to the diffusion of innovation processes, how-to knowledge appears to bring more observable results and higher participation rates.<sup>125</sup>

Inspired by the federal *Alternative Fuels Act*,<sup>126</sup> the Ontario government is currently implementing the Alternative Fuels in Government Fleet program. This program was not written as a provincial regulation creating obligations to public authorities, but under the program the government announces its intention both to use ethanol-blended gasoline and bio-diesel in its existing vehicle fleets and to purchase new hybrid vehicles that reduce air pollution through improved efficiency. In 2004, approximately 9 percent of the fuels purchased for the Ontario Public Service fleet, some 1.5 million litres, were ethanol-blended.<sup>127</sup> At the municipal level, in July 2002, the City of Brampton became Canada’s first municipality to officially commit to the on-going use of bio-diesel fuel in city vehicles. B50, a blend of 50 percent bio-diesel and 50

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<sup>124</sup> OECD, *Voluntary Approaches for Environmental Policy: Effectiveness, Efficiency and Usage in Policy Mixes*, (Paris: OECD, 2003).

<sup>125</sup> Ölander & Thøgersen, *supra* note 120.

<sup>126</sup> *Supra* note 37.

<sup>127</sup> Ontario Ministry of Energy, *Transboundary Air Pollution in Ontario* by David Yap *et al.*, (Ontario Ministry of the Environment, June 2005), online: Ontario Ministry of Energy <[http://www.ene.gov.on.ca/envision/techdocs/5158e\\_index.htm](http://www.ene.gov.on.ca/envision/techdocs/5158e_index.htm)>.

percent conventional diesel, has been used in more than two hundred City of Brampton vehicles, ranging from large graders to community buses and litter-busters. The City of Brampton also plans to expand the use of bio-diesel fuel to most of its four hundred and fifteen vehicles and up to one hundred and thirty Brampton Transit buses.<sup>128</sup> Experience has thus proven that policies concerning renewable transportation fuels and sustainable development may be adopted at the community level. At the provincial level, Ontario provides an outstanding example in government leadership with regard to the utilization of alternative fuels.

Voluntary participation in sustainable development can also take into account technical and financial efforts from manufacturers, industry and research institutes to conduct research and experimental projects. To raise public awareness and communication, the government of Quebec has implemented several experimental transportation projects that relate to renewable fuels. From March 2002 to March 2003, the *BioBus* project was carried out in metropolitan Montreal to test the technical feasibility of B20, 20 percent bio-diesel with 80 percent regular diesel, in public transit. The total cost of the two-year experiment was approximately \$1.3 million. Such bio-bus experiments have been based on public-private partnerships, where the cost of implementation has been shared among governments, private companies and interested associations.<sup>129</sup> The *BioMer* project is a sequel to the *BioBus* that aims to test the technical feasibility of bio-diesel blends in commercial boats. The purpose of the project is to demonstrate that bio-diesel is a viable alternative for fuelling boats of various sizes and types in tourist-intensive areas of Montreal from June to October 2004. The total \$563,000 cost of the experiments was contributed by a public-private partnership between governments across levels, private companies and associations.<sup>130</sup>

The voluntary approach may thus catalyze a behavioural transformation in both well-managed firms and open-minded individuals. It may potentially allow for increased efficiency and the application of the polluter-payer principle through the decentralization of decision-making to those who are in the right position to evaluate what works best for them. From a democratic perspective, a voluntary approach based upon free, fully-informed choice could be the best solution to bio-fuel promotion in the long run. The administrative costs of educating people about a product like ethanol as a substitute for conventional unleaded gasoline generate substantial spill-over effects into other dimensions of ecological behaviour: demand for recyclable plastics and bottles, lowering the temperature in houses, turning off the lights when leaving a room, or using domestic water sparingly. The long term goal of voluntary programs should be to make each person in Canada aware of the potential negative environment impacts of every gesture they make at every moment of every day in every place.

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<sup>128</sup> Canada, City of Brampton, *Strategic Plan 2003* (City of Brampton, 2003) at 7, online: Brampton <<http://www.brampton.ca/cityhall/strategicplan.tml>>.

<sup>129</sup> *BioBus* Project Team, *Biodiesel Demonstration and Assessment with the Société de transport de Montréal Final Report (STM)* (May 2003) at 2.

<sup>130</sup> *BioMer* Project Team, *BioMer Final Report* (May 2005) at 2.

## 5. CONCLUSION

Study of bio-fuel as one representative of alternative transportation fuels constitutes a new subject of legislative investigation in Canada. Admitting that *Kyoto* targets are already beyond reach in the near-term, Canada's commitment to *Kyoto* and sustainable development remains unchanged. Moving toward the implementation of this vision, Canada needs to fix a transparent, concrete strategy, and achievable objectives within a reasonable time limit.

In response to our research questions, we have demonstrated the existence in Canada of a set of specific regulations concerning the production and consumption of bio-fuels at the federal, provincial, and community levels. Currently, Canadian government interventions to establish ethanol as a gasoline additive favour a combination of mandatory and economic incentives. At the federal level, these regulations have been implemented since 1995. In certain provinces, a diverse sets of acts, regulations, policies, and programs adjusted to local climatic and topographic conditions have been put into practice to establish bio-fuels as fuel additives. This reflects the decentralization of Canadian federalism in which individual provinces are granted large authority over the exploitation and utilization of natural resources.

At present, however, our systematic search reveals that there is no regulation with regard to bio-fuels or renewable transportation fuels in the Maritime provinces and territories of Canada. Geographically, the bio-fuels regulatory framework is further developed in the Central Provinces. While the warmer, southern provinces enjoy prosperous agricultural activities that encourage legislatures to promote the ethanol industry as a measure to support business investment and local economic development, the Northern territories evince little such interest because fierce natural conditions limit the choices of renewable energy. This implies that bio-fuel legislation is based upon particular natural resource and weather conditions that impinge upon the socio-economic activities and business interests of each province. Bio-fuel legislation should carefully consider, at the provincial level, socio-economic cost-benefit analyses of ethanol supply options such as home-grown ethanol vs. ethanol imports.<sup>131</sup> Although climatic and topographic conditions vary enormously across Canada, the general environmental challenge of developing a sustainable fuel policy is similar for all parts of this Nordic country. It is expected that the piecemeal and divergent policies which provincial legislatures have elaborated through independent legislative processes may eventually be harmonized. Also, an optimal division of responsibility between general policies at the federal level and locally-sensitive policies at the provincial or even community levels can be achieved. There will be important task for assimilating current policies around a fairly harmonized Canadian model.

The most popular form is a percentage ethanol mandate on blended gasoline. Surprisingly, the federal government has not exercised its mandatory power to date; but Saskatchewan, Manitoba, and Ontario have seen fit to implement mandates at the provincial level. Frequently, the mandated percentage is projected to gradually increase with time, still the highest percentage blend mandate of 10 percent is reached. This implies that Canada tends to use ethanol as a gasoline additive (E2 to E10), instead of an outright fuel (E85 to E100).

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<sup>131</sup> Antonia Maioni, "Les politiques sociales" in Manon Tremblay, ed., *Les politiques publiques canadiennes* (Quebec: Les Presses de l'Université Laval, 1998) 110.

Canadian federalism may allow the federal Parliament to mandate national targets and time frames for bio-fuels, including ethanol, within the national energy matrix. Ethanol percentage mandated targets at the federal level could be set at modest levels at the beginning and gradually increased in step with the bio-capacity of the economy. To give a clearer signal to the public and the industry, a national ethanol mandate can be followed by other bio-fuel mandates, such as for bio-diesel. These mandates can be introduced with the GHG emissions reduction targets as part of Canadian climate change legislation. Due to federal-provincial competence, such national mandates should also be flexible enough to leave room for provincial legislative enhancement to set their own targets. Regulatory decisions that can be made with provincial competence include provincial bio-fuel targets; ethanol feedstock production; and ethanol manufacturing, consumption, trade and commerce. These regulations at the provincial level must be appropriate to meeting the rising demands for ethanol, should the mandate be granted.

The most frequently-seen economic instrument is a sales tax rebate or exemption for the proportion of ethanol blend in gasoline. Bio-fuel tax cuts are normally specified for a definite period, and projected to decline with the increase of the percentage blends. While it is expected that as soon as ethanol blends are mandated in a province, ethanol tax credits could be immediately removed to retrieve forgone tax revenues, certain provincial governments are committed to maintaining bio-fuel tax exemption programs for ethanol produced and consumed in the home province over the next 10 years. In the case of ethanol, where the polluter-payer principle is not applied, tax exemptions, when combined with a mandate, would be costly but not necessarily environmentally efficient.

Canadian provinces have enacted tax exemptions on bio-fuels rather than increased excise taxes on gasoline. A recent study reveals that fiscally sounder energy taxes in the 10 percent to 25 percent range may have instantly noticeable impacts upon the energy efficiency of newly built homes, and adopting price subsidies for alternative energy of the 10 percent to 25 percent magnitude will help to launch significant modifications in behaviour.<sup>132</sup> Although policy impacts of these two opposite measures are more or less the same, excise taxes would generate the necessary government revenues for other environmental programs. Even if ethanol production costs decline as sales volumes rises, bio-fuel will hardly be cheaper than straight gasoline. Thus, in the long run, higher environmental taxes on petroleum and lower ethanol tax rebates or exemptions may become a necessary part of Canadian eco-fiscal reform. Besides the impacts of government regulations, adequate modifications of fiscal strategy, such as green fiscal reform, may attribute credits to governmental budget allocation on environmental protection and sustainable development.<sup>133</sup>

Government alternative fuels demonstration projects and public information programs should therefore accommodate voluntary participation and behavioural change.<sup>134</sup> In the long run, the ultimate objective is to see legislative and fiscal instruments be supplanted by behavioural co-operation; in other words, the sharing of responsibility by the general public is viewed

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<sup>132</sup> Jaffe & Stavins, *supra* note 35 at 60.

<sup>133</sup> James Wilen, "Renewable Resource Economists and Policy: What differences have we made?" (2000) 39 *Journal of Environmental Economics and Management* 306; Goldemberg *et al.*, *supra* note 11.

<sup>134</sup> Jaffe & Stavins, *supra* note 35.

as essential to maintaining the utilization of renewable products like bio-fuels in Canada. In this general framework, while the mandatory approach is viewed as a start-up instrument in the early stages of bio-fuel development, we have shown that little attention has been given to the voluntary approach. In a more mature phase, the gradual increase and transfer to a voluntary approach must be expected.

Bio-fuel producer grants for infrastructure investment at the early stage may generate private sector interest in what could become a large industry. Start-up producer subsidies still appear to be crucial to bio-fuel competitiveness on fossil fuel markets,<sup>135</sup> while waiting for more consumers to spontaneously choose alternative fuels as the fruit of their growing environmental awareness. By building a home-grown ethanol industry and enacting a gradual reversal in bio-fuel tax cuts, Canadian governments imply a withdrawal strategy. However, the regulators presume a gradual upswing in voluntary consumption behaviour rather than a sea change in the environmental movement. The transition could occur gradually, allowing bio-fuel producers and distributors the required time to adjust as demand grows. Over time, these combined incentives may help to build home-grown bio-fuel industries; fulfill the gradually rising renewable energy targets of the country; foster greater economic performance; and respond to the real concern about the quality of ethanol as a new environmentally-friendly product. Similarly, the search also reveals the total absence of regulations or references to impose standards for GHG emissions on automobile manufacturers. Those questions of standard performance and quality control are fundamental to the efficacy of public policies, particularly with respect to GHG emissions. To develop bio-fuels as a source of automobile fuel, Canadian policy makers should prepare to go through a period of negotiation and decision-making with stakeholders of industrial sectors such as the petroleum refineries, automobile manufacturers, chain distributors and consumer associations to establish regulations relating to GHG performance.

One daunting issue behind the environmentally friendly characteristics of bio-fuels remains: the likely small scope of impact. Even if all of the gasoline consumed in Canada was mandated to contain 10 percent ethanol, this would contribute approximately 5.4 million tons of GHG reduction, which is about 3 percent of the reduction of GHG the Canadian government committed to in the *Kyoto Protocol*.<sup>136</sup> A high proportion of ethanol (E85) used as transportation fuel will lead to significant reduction of GHGs but may bring heavier pressure to bear upon agricultural production. Ethanol blends used as gasoline additives (E2 to E10), although yielding modest contributions to GHG reduction, could be a good start in anticipation of more technical advances to employ urban refuse, forest bi-products and agricultural residues rather than agricultural products to produce ethanol on a large scale at acceptable prices.

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<sup>135</sup> José Goldemberg, Suani Teixeira Coelho & Oswaldo Lucon, "How Adequate Policies Can Push Renewables" (2004) 32 *Energy Policy* 1141.

<sup>136</sup> Government of Canada, *Ethanol Expansion Program* (Ottawa: Natural Resources Canada, 2004).

**Table 3: Summary of bio-fuel regulations and programs in Canada**

|                                 | <b>Mandatory approach</b>                                      | <b>Economic approach<br/>(Consumption side*)</b> |  |  |
|---------------------------------|--|--|--|--|
| Provinces and Territories       | Ethanol mandate (X percent by year Y)                          | Tax exempt for ethanol (cent/litre)              | Tax exempt for bio-diesel (cent/litre) | Tax reimburse for alternative fuel vehicle |
| Federal excise                  |  | 10 c/litre                                       | 4 c/litre                              |  |
| Alberta                         |  | 9 c/litre  |  |  |
| Ontario                         | 5 percent volume by 1/1/2007                                   | 14.7 c/litre                                     | 14.3 c/litre                           | Provincial sale tax rebate up to \$1000    |
| Manitoba                        | 5 percent - 2007<br>10 percent - 2010                          | 25 c/litre                                       |  |  |
| Saskatchewan                    | 7.5 percent -11/2005<br>10 percent - 2007                      | 15 c/litre                                       | 15 c/litre                             |  |
| Quebec                          |  | 18.5 c/litre                                     | 15.2 c/litre                           |  |
| British Columbia                | <i>Bill M 209</i><br>To mandate 10 percent ethanol in B.C. gas | 14.5 c/litre                                     | 15 c/litre                             | Provincial sale tax rebate up to \$1000    |
| Other provinces and territories | n.a.   | n.a.   | n.a.                                   | n.a.                                       |

\* Instruments which may belong to consumer approach are labelling and licensing to blend and manufacture ethanol.

\*\* Assuming that fuel tax exempt for farm vehicles and equipment will contribute to a lowering of the production costs of ethanol, given that the agricultural sector is a primary producer of ethanol feed stock for certain provinces.

| <b>Economic approach (Production side)</b>           |  | <b>Voluntary approach (Government leadership)</b> |  |
|--|--|---|--|
| Production subsidy (loans, grants)                   | Fuel tax exempt for farm use vehicles ** | Bio-fuels in government fleets                    | Demonstration programs                       |
| Ethanol Expansion Program (\$100m)                   |  | Alternative Fuel Acts                             | Co-funding with provincial gov't             |
|  | √  |   |  |
| Ontario Ethanol Manufacturers' Agreements            | √  | √   | Biodiesel Bus & fleets, The City of Brampton |
| The Ethanol Fund (to fund ethanol production grants) | √  | √   |  |
| The ethanol fuel (grants) regulation                 | √  |   |  |
|  | √  |   | Biobus, Biomer                               |
|  | √  |   |  |
| n.a.   |  | n.a.  |  |

Recently, Canada has witnessed a wide range of attempts to implement the mandatory approach, economic incentives on both the consumption and production sides, and the voluntary approach (Table 3). The evidence is still spotty, in particular with respect to tax exemptions for bio-diesel, alternative fuel vehicles, and bio-fuels in government fleets and demonstration programs. It is postulated that the most important policy elements should be demonstration programs to elicit voluntarism, ad-valorem taxes on conventional gasoline at the retail level and short-run mandatory standards on the percentage of ethanol in motor fuels. The province which comes closest to this profile today is Ontario, which has alternative fuel government-fleets, a mandate to achieve 5 percent ethanol by 2007,<sup>137</sup> production subsidies at the processing level, and demonstration programs.

It is too early to make a critical evaluation of Canadian bio-fuel legislation. For future development, assuming that elements in the policy matrix are not linear and policy mixes are always applicable, bio-fuel legislation should seek to fill in and properly weight a 2 x 2 x 2 level matrix (Table 4):

**Table 4: A planning matrix for integrated ethanol policy**

|                   | Mandatory  |             | Economic   |             | Voluntary  |             |
|-------------------|------------|-------------|------------|-------------|------------|-------------|
|                   | Production | Consumption | Production | Consumption | Production | Consumption |
| <b>Federal</b>    |            |             |            |             |            |             |
| <b>Provincial</b> |            |             |            |             |            |             |

Our research already suggests that, for Canada, the ideal solution for sustainable development of the national energy matrix could possibly be a mixed strategy containing economic instruments supported by quality control standards and regulations on one hand; and, on the other, the stimulation of full spontaneous voluntarism from social stakeholders. At the national level, the regulatory framework should serve chiefly to achieve a balance across socio-economic and environmental sectors and towards a set of common elements for a new Canadian energy-sector model. Widely variable development objectives and natural conditions emerge as major constraints to the conception and implementation of a pan-Canada strategy.

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<sup>137</sup> *Supra* note 54, s. 4(1).