A POLYMORPHIC APPROACH TO POLICY ANALYSIS: A CASE STUDY OF ONTARIO'S ETHANOL IN GASOLINE REGULATION

by
Kirby E. Calvert and Dragos Simandan

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ABSTRACT. This article develops a "polymorphic" approach to policy analysis, that is, an approach that draws on multiple forms of spatial reasoning. Specifically, the proposed framework deploys scale and network not merely as epistemological devices that make sense of "horizontal" and "vertical" politico-institutional structures, but as co-constitutive ontological processes that involve an ever-shifting interplay among legacies, rhythms, and events. This polymorphic approach, we argue, facilitates the identification and the examination of the mobilization of social networks and of the attendant cross-scalar interactions that must be articulated whenever a given policy is framed as a sensible and politically viable place-based solution. The novel conceptual framework is then applied to the empirical investigation of the formulation of the complex moral, political, and economic environment that enabled the emergence of Ontario's controversial Ethanol in Gasoline Regulation. Our polymorphic approach reveals how this regulation is a (failed) attempt to reconcile Canada's legacy as a resource-based economy and Ontario's legacy as a manufacturing-based economy where value is added, with the need for more rational and less harmful resource extraction and for greener fuels that can sustain the current order. We build on the lessons drawn from this case study to suggest that our approach has wider applicability in that it can help create a process-oriented, dynamic, and multi-dimensional geography of policy-making.

Keywords: biofuels, politics, sociospatial theory, scale, network, Canada

Introduction and overview

Public policy decisions to support the production and consumption of biofuels are intended to reduce consumption of fossil fuels and greenhouse gas (GHG) emissions while strengthening national energy security. In North America and Europe, the vast majority of biofuels are produced by the conversion of starch from energy intensive and otherwise edible crops into ethanol. In this context, questions are being raised about the extent to which biofuel policies achieve their stated energy and environmental objectives. Concerns are primarily related to conflicting scientific conclusions and public perceptions about the merits of biofuel production and consumption in terms of food security, (in)direct land use and land-cover change, biodiversity, and net energy and GHG benefits (Koh and Ghazoul 2008). Without passing judgment on these issues, this article studies the genesis and evolution of a specific biofuel policy in the context of these scientific deficiencies and value differences for the purpose of improving our understanding of policy change events, as well as the socio-political dynamics that underpin the changing geographies of energy production more generally.

Biofuel policy represents the intersection of environmental, energy, and agricultural policy (de Gorter and Just 2010; Goldthau 2013), but can be broadly considered resource policy. Policy development and policy change in all of these domains is a dynamic process with a very complex spatiality, characterized as unbounded (trans-boundary) and promiscuous (multi-causal) (DeSombre 2000; Castree 2002, 2003; Dalby 2002; McCarthy 2005). Furthermore, the institutional framework through which policy "fixes" in these domains are negotiated and implemented has extended beyond official government spheres, partly as a way to incorporate multiple voices and value systems into the decision-making process and of economic globalization (Smith 2003; Chilvers 2009); and partly to re-scale the locus of power and authority to achieve more effective spaces of regulation (Calvert and Simandan 2010; Osofsky 2011) or what is often referred to as "institutional fit" (Cash and Moser 2000). Indeed, the multi-dimensional spatiality of policy change and state transformation has been traditionally captured through two dominant sociospatial imaginaries: multi-level governance (with emphasis on scale, embeddedness, and territory/territoriality; Faludi 2012) and policy networks (with emphasis on connectivity and flows) (see also Büchs 2009; Allen and Cochrane 2010; Allen 2011). The underlying argument of this article is that while each of these imaginaries is necessary, they are by themselves insufficient as a means of understanding (the politics

of) policy change. Following Jessop *et al*. (2008, p. 392), we argue that 'as one moves towards increasingly "thick description" and/or tries to provide spatially sensitive explanations of more concrete and complex phenomena, analyses should involve the dynamic articulation of [multiple] dimensions [of sociospatial relations]' (see also Leitner *et al*. 2008; Harrison 2013).

How do territorially endogenous and exogenous policy drivers interact and converge on policy stakeholders and policy decision-makers? Who is involved in the process by which a set of relations *becomes* a problem in need of a policy fix, and why is a *particular* policy instrument chosen ahead of any other policy idea? These questions imply a polymorphic logic – that is, a theoretical framework predicated on "multiple spatialities" and thereby capable of understanding the relations between the trans-boundary nature of policy drivers, and the "vertical" and "horizontal" dimensions of the policy-making process. Although the notion of multiple spatialities has been applied to understand social movements and contentious politics (Leitner *et al*. 2008; Nicholls 2009; Leitner and Strunk 2014) as well as issues related to environmental justice (Walker 2009), such logic has not yet been applied, as far as we can tell, to understand specific policy change events. Recent work by Humalisto (2014) demonstrates that biofuel policy instruments are simultaneously multi-scaled and "mediated by agents of national assemblages". Similarly, Späth and Rohracher (2012) correctly argue that more attention should be paid to the interplay of local and non-local discourses, initiatives, and actors throughout the process of coalition formation in periods of energy transition. Neither of these works formally conceptualize the nexus of these multi-scalar and networked imaginaries and strategies.

This article develops and applies a polymorphic analytical framework of the policy-making process through a combination of two spatial concepts: scale and network. Although these are generally perceived as implying very different ontological luggage, and are typically applied as exclusive techno-epistemological tools by which to describe the policy-making process, we demonstrate that they are in fact co-constitutive and co-productive. Through an empirical case study of the Canadian province of Ontario, we show how this polymorphic approach helps to capture and theorize the (formation of) new socio-technical assemblages that co-evolve in the process of policy-making. The article is laid out in four parts. In the next section we reconceptualize scale and network as co-dependent and mutually reinforcing dimensions of sociospatiality in the context of policy-making. We then apply this framework to our case study in the third section. In the fourth section we conclude the article by making connections and commenting on the extent to which the proposed theoretical framework can travel beyond this specific application.

Scales and networks: the spatiality of policy change

Scale: from analysis to practice

The concept of scale is multi-modal, and a two-fold typology enables a more systematic use of the concept: scale as a category or unit of analysis and scale as a category of practice (Moore 2008). Moore (2008) argues that an uncritical conflation of these two categories is a primary flaw of researchers who use scale as a central concept. According to the author, conceptual conflation can be avoided by focusing on scalar representations and the production of scale (scale as practice; e.g. Simons *et al*. 2014), rather than on scales themselves (as abstractions of reality; as category of analysis). While we accept Moore's typology, we suggest that focusing only on scale as practice closes off important epistemological horizons, most importantly understanding the spatial extent of socionatural processes which is a significant consideration for scientific understanding of the complex (environmental) problems that policy ultimately intends to manage (see Sayre 2005; Prytherch 2007, 2008).

In policy research, the unit of analysis is typically delineated by, or "scaled" at, the boundaries of whatever level of government has enacted a specific policy of interest. Employing scale as a category of analysis in this way might encourage a bounded imaginary, which is especially problematic in policy research given that policy change events are influenced by interests and events across multiple spatial extents, from local to global (Humalisto 2014). In order to overcome these logical flaws we conceptualize scale, in terms of a category of analysis, as "context collapsed into the unit of analysis" (Simandan 2006). In other words, the social, economic, cultural, and ecological trajectories from which policy emerges operate in and through particular jurisdictions; they are at once exogenous and endogenous. According to Michaels *et al*. (2006) who build on Kingdon (1995), a (perceived) need

for policy intervention emerges when unpredictable events disrupt the pre-existing order of things and stimulate public interest, opening a window in time for policy entrepreneurs to drive policy change. Here, we build on Simandan's (2005, ch. 4) theoretical framework to show how the interplay of legacies and rhythms, *in addition to the events* that Michaels *et al*. (2006) discuss, give rise to the spatial manifestations and thus the issue-attention cycles that policy and policy actors address. Rhythms are defined as phenomena that bring some degree of order, predictability, and regularity to space. An event is an abrupt perturbation that disrupts the pre-existing order of things (i.e. the current rhythms which weave the fabric of space). All rhythms begin with an (inaugural) event, but not all events become rhythms. Some events are quickly inactivated and become legacies. Legacies are either former events or former rhythms which, although seemingly inactive, continue to shape the material landscape (e.g. the highly divisive National Energy Program, NEP, in Canada of the early 1980s). All events and rhythms become legacies, and all legacies can be re-activated by events, thereby connecting the past with the present (e.g. the NEP continues to frustrate the political development of contemporary national energy strategies in Canada).

The benefit of employing the concept of scale as context collapsed within the unit of analysis and with considering legacies and rhythms in addition to events, is threefold. First, the past is not relegated to obsolescence, which offers some level of historical depth. This allows us to take seriously the role of path dependence and initial conditions in structuring how policy is formulated. Second, the interplay of legacies, rhythms, and events is understood to be perpetual and non-linear so that the affairs which give rise to policy windows are conceptualized as unbounded, emergent, and always in a state of becoming. Finally, this trinity descriptively exhausts reality, and does not privilege the discursive, the economic, the ecological, the technological, the political, and so forth in the production of policy windows.

Extensive critical research in geography has made it clear that a scalar imaginary is not only a tool for socionatural spatial abstraction, but is also a representational trope which can be deployed as a political object throughout the policy-making process (Gatrell and Fintor 1998; Jones 1998; Kurtz 2003; Harrison 2006; Moore 2008; Bailey and Maresh 2009; Charnock 2010). In other words, social forces do not only operate in and through space, but also politicize space itself (MacKinnon 2011). Indeed, legacies, rhythms and events do not by themselves drive policy – they must ultimately be articulated and grounded by social actors. From a geographical perspective, we submit that the primary mechanism by which this "grounding" occurs is the "scalar premise", defined here as invoking a scalar imagery when mobilizing political power and building political capital throughout the policy-making process. That is, a scalar premise is a discursive event whereby context is discursively grounded or collapsed into a given territory; scalar relations are invoked with the goal to negotiate the spatial extent of the policy and to align sociospatial interests throughout the policy-making process (the "think globally, act locally" mantra is a general example of this process). What is more, these efforts are dynamic, as new situations (events) deserve new scalar frames. This is described by Kythreotis and Jonas (2012) as a process of "scalar manoeuvring" and by Kurtz (2003) as a process of scalar framing and re-framing.

Policy as a networked process

Theories of policy networks suggest that policy coalitions or assemblages are a function of resource interdependencies and shared interests that emerge when issues become politically salient (Compston 2009). Along these lines, Cox (1998) demonstrates that social networks often have as their focal point mutual "spaces of dependence" (e.g. market share; land-based livelihood strategies) which they maintain by leveraging "spaces of engagement" (i.e. spaces where deliberative and political activity can occur). While policy theorists argue that coalitions strongly determine the policy-making process, there is little discussion of how those coalitions are formed in the first place. Building on these insights, we contend that policy networks are formed by the associations or ties that are formed by the relation between particular stakeholders (government, civil society, industry) to particular legacies, rhythms, and events operating across scales.

Most important to understanding policy-making in an era of neoliberal governance is the economic tie, especially when a shared policy problem and/or solution has the ability to buttress established economic relations or to maintain the logic and the structure of incumbent economic regimes (thus contributing to what is often referred to as lock-in: see Unruh 2000; Simandan 2012; Martin 2014). In the case of

resource policy (energy, environmental, or agricultural), (re)commodification of a particular physical entity is often necessary to maintain prevailing economic regimes or to establish new ones. The process of (re)commodification enrols a physical entity into a social network (which means that policy networks are inherently socionatural), and aligns an expanded commodity circuit with the policy-network by extending the functionality of given commodities and thereby generating a broader range of human-nonhuman associations (see Prudham 2009). Policy fixes predicated on (re)commodification helps to ensure that mobile capital (e.g. monetary investment) will continue to flow through immobile capital (e.g. agricultural land) to meet established interests or to sustain the space of dependence of local actors (Cox 1998). Scalar premises are a second important tie as they help to build social networks and to connect distant allies (see also McCarthy 2005; Legg 2009; and the discussion above on scale). *Engagement*, not proximity, between entities is critical in a policy network (Cox 1998; Routledge 2008). A scalar premise is powerful because it helps to override the tyranny of distance and connect the so-called global with the so-called local.

Summary

The spatiality of the ecological problems and the power geometries that underpin biofuel policy specifically, but resource, environmental, energy, and agricultural policy more generally, are plural and polymorphic. The conceptual framework we have just developed takes these complexities seriously. We submit that policy change is driven by perceived problems or threats which emerge from the dynamic interplay of legacies, rhythms, and events operating across scales. Policy networks are formed by the mutual relation of actors to these social, economic, cultural, and ecological trajectories. Resource policy networks are most often structured by economic ties through the process of (re)commodification, while the spatiality of policy networks is structured by invoking scalar imaginaries. Indeed, scales and networks are co-constituted, and seeing it this way allows us to understand who "produces" scale, how, and for what purpose. In what follows, we illustrate the utility of this theoretical framework by taking a closer look at Ontario's Ethanol in Gasoline Regulation (EGR).

Application: Ontario's ethanol policy

Our research is based on a multi-method empirical investigation. This investigation initially focused on documentary analyses in order to trace policy and political developments between approximately 1994 (the year in which federal support for ethanol began) and 2007 (the year in which the EGR was enforced). Documentary analysis provided insights into key policy actors, their motivations, and the way in which spatial relations were elicited in the policy-making process. Following Stedward (1997), this process was used to identify key individuals for participation in semi-structured in-depth interviews which were used to attain situated accounts of the policy-making process. This purposive sample procedure was broadened through a snowball technique until a representative population was contacted. For the purpose of this study a representative sample includes participants from all relevant government ministries and stakeholder groups involved in the initiation and development of the EGR. Concurrently to the interviews, questionnaires were distributed to environmental non-governmental organizations (ENGOs) – an often neglected stakeholder in environmental policy studies (see also McCarthy 2005) – and other relevant organizations and lobby groups to determine the extent to which they felt their voices were heard and to help evaluate the accessibility of the policy-making process. Questionnaires were distributed to 83 non-governmental organizations using contact information provided on the Ontario Environmental Network website. Agencies were selected based on expertise in agriculture, energy and/or resource management. Lastly, we conducted statistical analyses to establish the extent to which a key variable – changes to the market price of corn – were as statistically significant as they were politically significant in motivating the EGR.

Response rates and participation rates in the interviews and questionnaires are summarized in Table 1. Due notably to time constraints and a lack of willingness to participate by many public officials and members of industry, the interviewee sample was not representative in in the way we had hoped. In line with the insights from Goldstein (2002) and Ward and Martin (1999), it became clear that the political-temporal contingency of the situation greatly constrained our empirical endeavours and thus influenced to some degree the analysis of ethanol policy in Ontario. Since mid–late 2007, the use of food products for fuel production, and the ethanol industry as a whole, has received considerable

Table 1. Summary of response and participation rates.

	Interview	Questionnaire
Contacted	18	83
Replied	18	14
Participated	4	3
'No expertise'	*4*	*5*
'No time'	*3*	*1*
No reason	*7*	*5*

NB reasons for lack of participation for those who responded shown in italics.

media attention, most of which has been negative. Regardless of attempts at being candid, forthright, and diplomatic about the intentions of the research, the salience of the issue in the media at the time was such that individuals close to the EGR were less inclined to participate in our research. Although the sample is small, it is also distinguished, which helps to overcome the limitations of a small response rate. In no suggestive order, interview participants was as follows: a former Minister of Agriculture, Food and Rural Affairs in Ontario (OMAFRA), a senior policy advisor with Ontario's Ministry of the Environment, a senior policy/economic advisor with OMAFRA, and the President of Ontario Agri-Food Technologies, a prominent Canadian biotechnology marketing firm based in Guelph. Two separate interviews were conducted with the senior policy advisor from Environment. The response rate and participation rate of the questionnaires was also quite low. We reflect on this outcome later in the article.

This section organizes the discussion of the empirical findings in three parts. First, we offer a brief chronology of ethanol policy in Canada and Ontario. Second, we reconstruct the original decision-environment of the EGR, based on a triangulation of the data from all the methods employed. Third, we analyse and interpret the genesis, form, and function of the EGR policy network.

A brief chronology: ethanol policy in Canada and Ontario

The global ethanol industry as it currently exists is approximately 30 years in the making. Presently, global annual production levels are driven by policy decisions made in the US and Brazil, and currently stand at approximately 100 billion litres (IEA 2011). Production is expected to increase dramatically by 2050 as the list of countries including biofuels in their long-term energy plans continues to grow. Primary feedstock includes sugar and starch from sugarcane and maize, although ligno-cellulose derived from woody and herbaceous biomass is expected to drive future expansion of the industry.

Canada has two levels of jurisdiction defined in its Constitution: the federal level and the provincial level. Jurisdictional boundaries between these two levels are not always clearly delineated and as a consequence there tends to be considerable overlap with positive and negative outcomes (Holland 1996; Hessing *et al*. 2005). The federal government's first attempt to encourage renewable content in transportation fuel came when they removed the CAD 0.10 excise tax/litre on gasoline that was blended with ethanol. In 1995, the federal Alternative Fuels Act (AFA) legislated the mandatory use of "alternative fuels" such as methanol, natural gas, ethanol or bio-diesel in the vehicle fleet of Crown corporations (Government of Canada 2014a). In other words, the AFA generated an "elite" niche market in Canada for ethanol producers. Federal investments in domestic ethanol production intensified with the Ethanol Expansion Program in 2003 (NRC 2014), which has subsidized the construction of ethanol production facilities. The ecoENERGY for Biofuels Initiative in 2007 (NRC 2014) and the now expired Biofuels Opportunities for Producers Initiative (Agriculture and Agri-Food Canada 2011) maintained funding for all the actors of a successful biofuel regime: growers, investors, producers, and distributors. These efforts were made in the context of changes to the Canadian Environmental Protection Act (Government of Canada 2014b) which, as of 26 June 2008, implemented a blending mandate of 5 per cent ethanol content by volume in Canada's gasoline supply.

The province of Ontario, particularly the southwest region, has established itself as an epicentre of Canadian ethanol production. Commercial Alcohols, now Greenfield Ethanol, began turning corn, as maize is known throughout North America, into fuel in Chatham-Kent in 1993 and has since become the largest ethanol producer in Canada. In 1998, the member of provincial parliament for one of the larger political ridings in Southwest Ontario (Chatham-Kent) introduced Bill C-34 – A Bill to Amend the Environmental Protection Act. This was an attempt to mandate oxygen content – 2.7 per cent by weight – in all transportation fuel sold in Ontario. The main oxygenate was to be ethanol derived from corn feed-stocks. An analysis of the legislative proceedings via Hansard and the results of

Table 2. Describing the context within which the EGR was conceived and implemented.

Scale	Legacies	Rhythms	Events
Global	Co-evolution of life and climate Industrialization	World Trade Organization Global trade of corn-based commodities	Kyoto Protocol (revised in 2002) New scientific evidence (e.g. Farrell *et al*. 2006)
International (North America)	Strong economic ties with the US US economic clout, particularly in agricultural sector	NAFTA US subsidization of corn production in successive Farm Bills	2002 US Farm Bill Drastic reduction of corn prices in Chicago, Illinois and then in Chatham, Ontario (2003)
National (Canada)	Economy based on resource extraction Federal political structure Constitution silent on "environment" as a matter of jurisdiction	Market-oriented environmental policies Tax exemptions for renewable fuels Governments acting unilaterally on environment	Investments in ethanol industry in Manitoba, Saskatchewan, and Ontario Annual climate change mitigation plans released by federal government
Regional (Ontario)	Economy based on manufacturing Highest transportation-sector CO_2 emissions in Canada	Increasing "smog days" in major urban centres Struggling corn producers	Promises made in 2003 election to promote renewable fuels Ethanol industry investments
Local (rural areas)	Culture of entrepreneurialism History of corn cultivation and corn-based landscapes Susceptibility to trade policies and market fluctuations	Difficulty producing corn at a profit in a globalized market Relatively low employment rates and increasing incidence of low income families	Petitioning to bring the concerns of Ontario corn producers to the WTO (post-1996) Rural Job Strategy Fund, 1997 Commercial Alcohols begin producing ethanol, 1994

Source: authors' elaboration.

the provincial election on 3 June 1999 indicate that this bill was a casualty of political change.

In November 2004 the Liberal Government of Ontario committed to a "renewable fuel standard" which mandated, on average, a minimum of 5 per cent ethanol by volume in all gasoline sold in Ontario. This commitment was executed by the EGR as part of Ontario's Environmental Protection Act in 2005; enforced officially beginning with 1 January 2007. With the EGR, Ontario joined Manitoba and Saskatchewan as Canadian provinces that passed ethanol legislation ahead of any national standard but in the wake of pre-committed federal funding. The EGR is financially supported – in conjunction with the federal investments mentioned above – by the Ontario Ethanol Growth Fund (OEGF), which carries a budget of CAD 520 million over 12 years. The OEGF is used primarily for capital grants, industry subsidies and the reduction of market barriers for Ontario ethanol producers.

The most notable insight gathered from an analysis of these policy developments is that ethanol policies in some form have been lobbied for and legislated by both federal and provincial governments, and by all political parties. Indeed, in the election campaign immediately prior to the development of the EGR, all parties in Ontario promised some form of renewable fuel policy (Moore 2003), and it was the federal Conservatives and provincial Liberals that ultimately acted.

Ontario's ethanol policy as multi-scalar and path dependent

> Policy-making is not a problem of a lack of ideas. But the pieces need to line up, and *multiple drivers are needed to get those ideas off the table*'. (Senior policy analyst, Ontario Ministry of the Environment, interview, our emphasis)

The multiple drivers that mobilized the development of biofuel policy in Ontario extended far beyond provincial boundaries. Table 2 is a suggestive rather than exhaustive summation of the legacies, rhythms, and events from which the need to change Ontario's agricultural, energy, and environmental policy emerged. The imagery provided by this table is unfortunate: we do not wish to imply that each legacy, rhythm, and event inheres in these scales, nor do we wish to suggest that they are bounded or

exist as "levels". This imagery is deployed only for the sake of clarity, to illustrate the non-site specific phenomena of varying geographic proportionalities that have been "collapsed" into Ontario to provide the set of opportunities and constraints from which the EGR ultimately emerged.

The 2002 US Farm Bill is particularly worthy to note, because it was highly disruptive to North American agricultural trade and, as a result, politically salient in the context of existing competitive challenges among the Ontario corn producing sector. The farm bill granted three incentives to American corn producers: (1) direct payments up to USD 0.28/bushel; (2) countercyclical payments to offer protection from falling prices; and (3) substantial marketing loans (USDA ERS 2007). Additionally, it offered an export credit guarantee that Canada and other countries claimed was a direct violation of World Trade Organization (WTO) sanctions (Schnepf 2007). Although the Canadian International Trade Tribunal ruled otherwise, Canadian corn producers continued to lobby against what they perceived to be unfair treatment on the marketplace.

Results from a Mann–Whitney *U* test of corn price data from Chatham, Ontario, Canada and Chicago, Illinois, USA confirmed that corn price from 2002 to 2007, after the implementation of the Farm Bill, were significantly lower than corn prices between 1996 and 2002.[1] It would be misleading to impart full causal power on falling corn prices to the US Farm Bill of 2002. There were certainly other factors involved: changing operating costs, investor speculation and global market changes, to name only a few. However, the correlation between the 2002 US Farm Bill and suppressed corn prices is a key element in the development of Ontario's ethanol policy. The following quotes substantiate this point:

> This [policy] can't be taken out of the context of what our corn producers were experiencing at the time. (Senior financial and policy analyst, Ontario Ministry of Agriculture, Food, and Rural Affairs, OMAFRA, interview)

> [Ontario's corn] price is set by what happens in the US. (President, Ontario Agri-Food Technologies, interview)

> The US is the price leader for corn with 61 per cent of corn exports generally sold at prices below estimated production costs […] Deep-pocket US farm subsidies have stimulated over-production and driven down prices on world markets to the extent that Canadian corn farmers now face an income crisis, falling prices and an inability to recover even their cash costs of production. (Parliament of Canada 2005; minutes from the Standing Committee on Agriculture and Agri-Food)

> […] we need to look at the real problem, which is market power. (Director, National Farmer's Union, quoted in Mayer, 2008)

The vulnerability of Ontario corn producers, while fully exposed by this event, has been a function of prevailing rhythms and underlying legacies, including (a) large-scale political-economic integration via NAFTA; (b) the fact that corn is a globally traded commodity subject to conditions set by the WTO; and, most importantly, (c) their weak market clout relative to the US corn producers. Indeed, the US is a world leader in corn production, averaging 325 million tonnes of corn grain per year, while Canada averages only 9.5 million tonnes (Agriculture and Agri-Food Canada 2009). Almost 60 per cent of this is grown in Ontario (Statistics Canada 2007a). Given (a), (b) and (c) above, Canadian corn prices are sensitive to those set in the US, and when these prices are artificially depressed as a result of US government intervention, Ontario corn producers have difficulty competing on the market. Figure 1, which covers the period of analysis, clearly illustrates that Canada's balance of trade has tilted in the direction of American producers since the turn of the millennium. If we examine the changes in price in conjunction with the changes to the balance of trade illustrated below in Figure 1, it is obvious that American producers were favoured in the marketplace, which negatively affected corn producers in Ontario (see also HighBeam Business 2005; Parliament of Canada 2005; Vyn and Marchand 2005; Schnepf 2007).

The effects of depressed corn prices and an unfavourable balance of trade in Ontario materialized quickly. Statistics Canada recorded 5000 fewer corn growers in 2006 than in 2001 in Ontario, and a reduction of nearly 500,000 acres of land seeded for corn (Statistics Canada 2007b). The socioeconomic effects of this lost production were pronounced in the context of a dire and deteriorating situation in rural Ontario, particularly in the southwest where a "rust-belt" was forming due to the loss of (particularly automotive) manufacturing. Given that the

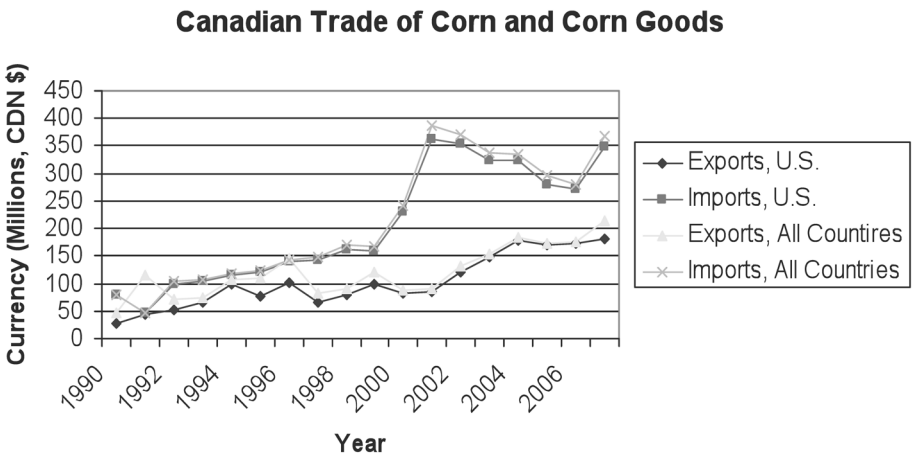

Figure 1. An illustration of Canada's corn-based balance of trade: trade in corn and corn goods during the period in focus in this article.
Source: data from Agriculture and Agri-Foods Canada.

corn industry directly and indirectly employs between 15,000 and 28,000 people in Ontario (Vyn and Marchand 2005, Tables 1–3), an expanded ethanol industry was appealing regardless of the ambiguity in the academic literature regarding environmental benefits. Support for ethanol is a demand-side policy that offers value-added processing, with the potential to balance the otherwise skewed supply–demand relationship which was being manipulated by US market clout and government intervention:

> All I [Jim Johnson, Alviston corn producer and president of the CRFA in the late 1990s] want is a price. I don't care if [ethanol producers] buy my corn or not. All I want them to do is help me improve my price. (From Tobin and Button 1997)

> [Economist for, and then manager of, the OCPA Brian] Doidge predicts the Chatham ethanol plant will boost corn prices in the southwest by an average 10 cents a bushel (From Tobin and Button 1997)

> [Ontario's corn] price is set by what happens in the US. [Ethanol policy] was a price fix for corn farmers who were screaming they were getting screwed. It was also a good use of government money. We couldn't take on the US treasury, so [regulating ethanol] was a solution. (President, Ontario Agri-Food Technologies, interview)

> [Ethanol is] made from agricultural crops, so this will be a major boost for rural communities. And it's great news for ethanol producers, who can now move forward on new investments and jobs (Premier Dalton McGuinty quoted by Ontario Office of the Premier, 26 November 2004)

Indeed, finding a new use for an existing product, or in other words "recommodifying" corn from food to fuel, helps to alleviate the effects of trade-related economic slumps (Dibden and Cocklin 2009; Goldthau 2013). The EGR helped to institutionalize and therefore realize this process. Previous support for biofuels was limited to a CAD 0.10 excise tax exemption on blended fuels. The EGR eliminated this tax exemption and used the revenue to establish a "home grown" industry which offered a new market for corn as well as expected indirect benefits in the form of employment.

Scalar premises in Ontario's biofuel policy-making process

Unfavourable ecological rhythms such as climate change, local air pollution, and large-scale land-cover changes have become salient political issues. Of significance to the EGR is Canada's obligation to the Kyoto Protocol, which linked accountability from the local scale through to the global scale: 'Through these GHG reductions, Regulation 535/05 [the EGR] will help Canada meet its obligations

under the Kyoto Protocol' (Backgrounder, Ethanol in Gasoline Regulation, Ontario Ministry of the Environment, our emphasis). We have emphasized the term under because it nicely suggests that global political and ecological processes have influenced actions at the national scale through urgent international accountability, as a consequence of the Kyoto Protocol and of the annual Climate Change Plans published by the federal government. Given that approximately 31 per cent of Ontario's GHG emissions come from the transportation sector, it comes as no surprise that this sector is heavily targeted.

Since the early 1990s Commercial Alcohols, now Greenfield Ethanol, has been operating an ethanol plant in the Chatham-Kent area and selling their entire ethanol stock to Suncor. During this time ethanol was being used as an oxygenate to enhance the octane rating in their gasoline and thus to limit carbon monoxide and volatile organic compound emissions. Ethanol was favoured over existing lead-based oxygenates because it had lower political and ecological costs: 'Ethanol was bootstrapped to the problems that MTBE [methyl tertiary butyl ether, a commonly used oxygenate] was posing to water supplies' (Senior policy advisor, Ontario's Ministry of the Environment, interview).

In the late 1990s, Jim Johnson, a corn producer from Alviston, Ontario, became president of the Canadian Renewable Fuels Association (CRFA), thus linking Ontario's corn-producing community to a national renewable fuel lobby. The CRFA had already made ties to Suncor, one of the most prominent oil refiners and distributors in the country, because, along with Greenfield Ethanol, they were lobbying to make corn-based ethanol the oxygenate of choice in Ontario. But oxygenates in general were being contested in the late 1990s on two fronts. First, air (oxygen) intake was more efficient in newer vehicles while steps were being made to capture unburned fuel; and second, alcohol-based oxygenates facilitate airborne aldehyde formation which is a major component of smog.[2] This was a major point of debate for a member of Canadians for Renewable Fuels who commented in the questionnaire that 'aldehyde production from engines using ethanol fuel will be huge'. The rationale for oxygenates was quickly losing steam: 'Because the rationale for oxygenates has declined over the years given better technology in internal combustion engines, the focus turned from reducing smog to reducing GHG emissions' (Senior policy analyst, Ontario's Ministry of the Environment, interview).

Although the policy drivers had changed, the political support did not, which suggests a tenacious and adaptable policy network which perceived significant benefits from an ethanol policy. Indeed, just as the network was being contested, the scalar frames shifted as articulations of broader environmental issues mobilized a wider set of actors in step with renewed vigour on the Kyoto Protocol, rising oil prices, and the ecological ramifications of extracting and using fossil fuels. Scientific research (e.g. Rogner 2000; Shapouri *et al*. 2002; and also that produced from Natural Resources Canada through its climate modelling programme, GHGenius) showed that ethanol consumption would reduce oil dependence and carbon dioxide (CO_2) emissions. Building on the notion that ethanol was important locally, the CRFA, Ontario's corn-producing community, and existing ethanol producers and consumers (e.g. Greenfield Ethanol and Suncor) began to focus the intentions of ethanol on these international and global issues; ethanol was thereby constructed as a solution to problems at larger geographic scales.

Indeed, the motivators behind the EGR were many and operated at/impacted many different scales. And it was in the context of these political, economic, social, ecological, and technological relations that interests were pursued, relations were formed, and spatialities were produced by a heterogeneous policy actor-network. To politically negotiate the system of relations that gives rise to undesirable patterns of socionatural welfare, policy actors and stakeholders elicit a scalar imagery to justify and to set a policy agenda for their jurisdiction. The following quotes demonstrate some of the ways in which scalar premises are manifest in the policy-making process:

> Regulation 535/05 [The EGR] will help Canada meet its obligations under the Kyoto Protocol. (Backgrounder, Ethanol in Gasoline Regulation, Ontario Ministry of the Environment, our emphasis)

> This is a boost for *rural Ontario* (Ontario Office of the Premier 2004, our emphasis)

> [Ethanol] policy had three goals: cleaner fuel, new opportunities and *rural economic development*. (Former Minister, OMAFRA, interview, our emphasis)

> Ethanol growth fund is good news for farmers, rural communities, and the air we breathe. (Ontario Office of the Premier 2005)

Collectively, the quotes above all illustrate that actors "macrostructure" (e.g. under Kyoto) and micro-prioritize (e.g. local success) the policy agenda, and are thus active in the process of "localizing" and "globalizing" various spatial processes: the local remains global, and the global remains local.

This is not to say that political boundaries are not privileged in the process. Indeed, the boundaries and borders at which a given problem can be rectified and in which a policy is required are discursively maintained. This is especially important given that constituents are often wary of decisions made "at a distance" and must be re-assured that the policy is attuned to their specific circumstances. Furthermore, there are clear vested interests in the scale at which regulation occurs (Osofsky 2011). As a consequence of scalar premises, scalar imagery is granted political agency because the nested feature it summons becomes a *means* by which the spatiality of policy is formed. Indeed, there remains an insistence that the policy favours the scale at which it is meant to apply:

> With the [former] 14.7 cent tax exemption [on ethanol-blended fuel] we were subsidizing imported ethanol; the province had to take the lead on a *home grown* ethanol industry […]. We needed a *made in Ontario plan*. (Former Minister, OMAFRA, interview, our emphasis)

> Before adopting a programme that began in another jurisdiction – say, Manitoba or California – we have to ask *if the solutions make sense for us*. (Senior policy advisor, Ontario Ministry of the Environment, interview, our emphasis)

As corn became connected to GHG mitigation, reduction of dependence on oil, a slumping corn industry, and socioeconomic development, the ethical value of using corn for fuel production rather than food production, and thus the monetary value of corn as it is split between the transportation and the food-processing sectors increased. These connections not only stabilized a dense and heterogeneous actor-network, they also imparted a singular meaning on corn: it became ethanol, which itself was a singular term signifying renewable fuel, an alternative to oil, and a tool for CO_2 mitigation. This enabled policy-makers to pass a regulation that would rely on corn-to-ethanol systems. But given the tenuous environmental benefits identified in research into corn-to-ethanol systems and the discursive prioritizing of the need for rural jobs, corn-market stability, and energy supply security in the policy-making process, biofuel policy is clearly as much economically and socially motivated as it is environmentally motivated, fact which must call into question the codification of the EGR as an 'environmental regulation'.

Policy network building

> Key industry stakeholders, as well as health and environmental organizations, were consulted during the drafting of [the EGR]. We listened to their concerns and employed their comments to strengthen the regulation. (Backgrounder, Ethanol in Gasoline Regulation, Ontario Ministry of the Environment)

E-consultation through Ontario's environmental registry, set up as per the requirements of Ontario's Environmental Bill of Rights (EBR), offers a space of engagement for critical scrutiny with direct orientation towards the decision. If actors did not engage the registry, they had little power, since they would otherwise be left in relative isolation:

> The job of the Environmental Bill of Rights is to identify those who do not agree with a given policy. (Senior policy advisor, Ontario Ministry of Environment, interview)

> The essence of the [EBR] is to ensure that the public is consulted prior to forming any new environmental legislation. The registry is set up for this. If stakeholders felt they were silenced, a large part of the reason for that is because they did not use the registry to their advantage. (Former Minister, OMAFRA, interview)

Political power inequalities within policy-networks, then, are partly the result of agents bypassing, or failing to engage and connect with, crucial centres of calculation in the policy-making network. One of the most compelling discoveries of this research was a lack of ENGO involvement in the public consultation process. To illustrate, of the 26 parties that commented on the first draft of the EGR, only six were not affiliated with the oil industry. Only three of

these six were environmental agencies. Further, we experienced a very low response rate from our questionnaires (~4 per cent!) sent out to ENGOs. In other words, it is clear that the ENGO voice was lacking in this case.[3] *For the most part, ENGOs were not silenced, but silent*, a sentiment that was shared by a senior policy advisor with Ontario's Ministry of the Environment (interview): '[Ethanol] didn't seem to be on [ENGO's] radar at the time [the regulation was being drafted].'

The members who did engage the registry – Ducks Unlimited, Sage Center and the Sierra Club – successfully shaped the policy outcome by having the policy revised to reflect the added benefits that lignocellulosic biomass (a much less controversial source of ethanol) would bring (see Government of Ontario 2005). This was significant because it embedded in the policy a mechanism by which "corn lock-in" might be overcome with technological advances to lignocellulosic biofuel production. That said, these groups did not present any significant dissent with biofuels. Ironically, the Fleet Services of the City of Toronto, a city where smog and dependence on fossil fuels are major problems, contested the fundamental idea of ethanol in gasoline through the Environmental Registry:

> Critics such as David Pimentel of Cornell University point out that it takes 1.3 gallons of oil to produce one gallon of ethanol […]. Through evaporation [ethanol will] increase emissions of volatile organic compounds, which can contribute to ozone formation and smog. (Fleet Services of the City of Toronto; Government of Ontario 2005, posting number 18)

Although this actor made a connection to dissenting science and argued against the scientific consensus that served as the epistemic foundation of ethanol regulation, no other actors engaged and thus the opposition remained weak. To be fair, the few ENGO respondents to the questionnaire cited a lack of expertise on the matter. The question of ozone and smog was at the time based on modelling experiments, although more recent empirical evidence lends credence to the argument (Salvo and Geiger 2014). On the energy return ratio, scientific consensus took precedence: '*Patzek and Pimenetel* [the main academics who opposed ethanol production] seemed to use old data and did not account for the generation of co-products. *They were, and still are, considered outliers*.' (Senior policy advisor, Ontario Ministry of the Environment, interview, our emphasis). In addition to this lack of significant contention throughout the decision-making process in official public spheres, ethanol regulations were becoming more common globally, a trend that was invoked throughout and after the policy-making process:

> Experts from all ministries and their respective divisions form analyses of science and of other jurisdictions, and centre it on the Cabinet. (Former Minister, OMAFRA, interview)

> The decision-making process involves an analysis of all other jurisdictions […]. We don't work in our own little silo. (Former Minister, OMAFRA, interview)

> Before *adopting* a program that began in another jurisdiction […]. We also need to ask if it is consistent with everyone else […] *California* is always out ahead and we tend to look to them first. (Senior policy advisor, Ontario Ministry of the Environment, interview, our emphasis)

> The skeleton of the regulation was mostly *taken from Hawaii* (Senior policy advisor, Ontario Ministry of the Environment, interview, our emphasis)

Policy-makers in Ontario were thus able to 'be a leader without taking risks' (senior policy advisor, Ontario Ministry of the Environment, interview) in Canada. Ontario received the benefits of being perceived as progressive, without the costs associated with (1) being the first to act and bearing the cost of a steep learning curve, or (2) acting last and being perceived as slow to move or "reactionary". That existing provincial mandates in Manitoba and Saskatchewan were largely ignored in the discussions with policy-makers, and that Hawaii and California were used as a warrant for ethanol regulation in Ontario and as the model for its implementation, seems to indicate that proximity is not a powerful predictor of how and from which jurisdiction policy is emulated.

Discussion and conclusion

In this article we have applied a polymorphic approach to help understand the dynamics involved in the process of policy change. The claims made in this article are limited to the extent that they are

based on a single case study approach, and the extension of our findings should proceed with caution. That said, there are some important generalizations that can be drawn from this research.

First, future policy analyses will benefit from a polymorphic mode of sociospatial analysis that deploys scale and network not simply as epistemological devices that make sense of horizontal and vertical politico-institutional structures, but as co-constitutive processes. Theorizing scale as a category of analysis and as a category of practice, it is possible to understand how multiple drivers converge on policy actors, and how those drivers are elicited and framed throughout the policy-making process. Combining with this perspective an analysis of the ways in which policy assemblages are formed makes it possible to understand how scalar imaginaries "do work", and to more fully appreciate the politics that underpin policy development. This polymorphic approach provides a conceptual framework with which to identify the cross-scalar interactions that converged in Ontario, but perhaps more importantly how these cross-scalar interactions were articulated in order to shape a moral, political, and economic environment in which the EGR could be envisioned as a sensible and political viable solution. Indeed, we continue to see scalar premises being used as a way to align policy networks across scales as global issues are localized and local issues globalized through discursive strategies. In a recent endorsement of approval for a liquefied natural gas export terminal on the west coast of the USA, Senator Ron Wyden (Democrat, Oregon) noted that 'the approval was exactly what Coos Bay, North Bend and America need: new jobs and new investment, while factoring in a changed geopolitical landscape through a case-by-case process' (Sickinger 2014).

Second, and especially in the case of biofuel policy in Ontario, place-based livelihoods figure prominently throughout the policy-making process. Policy fixes, especially through a process of recommodification, help to maintain spaces of dependence (see Cox 1998) in terms of strategic assets, capitals and capabilities which help to perpetuate 'relatively localized and immediate strategies of subsistence and use of resources (broadly conceptualized) aimed at ensuring the stability of life and lifeways' (Perreault 2009, p. 449). In other words, policy change is sometimes about the continuation of some basic relationships. Going further, this insight begins to answer a question posed by Hessing *et al*. (2005) who ask: what does the future look like for environmental and resource management policies in Canada? Up-scaling and extrapolating the results of the study above suggests the following: if we accept the fact that Canada is still largely reliant on a "staples" economy with natural resource extraction as the baseline of its economic well-being, we must understand that resource extraction policy has not only moved from direct exploitation to a more environmental focus (e.g. from clear cutting to selective cutting in forestry or from till to no-till agriculture), but to direct exploitation *for the environment*. This shift is embodied in ethanol policy, which seems to be the reconciliation of Canada's legacy as a resource-based economy and Ontario's legacy as a manufacturing-based economy where value is added, with the need for more rational and less harmful resource extraction and for "greener" fuels that can sustain the current order.

Third, this research points to a lack of coherent activism in the civil sector (see also Wilson 2002). Given the lack of engagement of ENGOs at the time, and a policy-network that could hardly be distinguished from the commodity circuit, many of the voices and value systems that opposed using food and agricultural land for energy production were, at the time the EGR was being drafted, relatively silent. Consultation strategies need to be taken more seriously by so-called marginal voices to bring coherence and strength to their voices and value systems in the event that they are not called directly to the bargaining table.

Finally, the research re-affirms the notion that political-economic integration continues to narrow the ambit of policy choices, especially at the provincial level in Canada. It is likely that policy-makers would have waited for a more suitable alternative to oil than corn-ethanol had it not been for the political fallout after the 2002 Farm Bill (given NAFTA/WTO restrictions and the loss of value-added processing industry that makes it difficult to compete with cheap imports) and early attempts to meet Kyoto obligations by the federal government which initiated industry support. In other words, contrary to the notion that Ontario's ethanol policy is "home grown", there is no such thing as a policy made in isolation from legacies, rhythms, and events at other spatial scales. In fact, as we have shown, other jurisdictions and other scales served as premises for the policy.

Given that the future for biofuels is subject to future policy decisions, greater scientific scrutiny,

advancements in biotechnology and biorefining, and changes to fuel consumption patterns in both kind and degree, whether biofuels are a wise policy choice or not remains to be seen (de Gorter *et al*. 2013; Wise *et al*. 2014). The point of this article is not to pass such judgment, however, but to capture and understand the complex and polymorphic nature of environmental policy-making. It is our hope that this article has contributed to our understanding of how the geographies of energy production are being (re) shaped by policy change events, and, perhaps more importantly, to a deeper, and more sophisticated understanding of the spatiality of policy-making. More generally, the polymorphic approach we illustrated in this article holds the promise of bringing us closer to the ideal of a geography of policy-making that is process-oriented, dynamic, and multidimensional.

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Kirby E. Calvert
Department of Geography and
Penn State Institutes of Energy and Environment
Pennsylvania State University
302 Walker Building
University Park, PA 16802
United States
Email: kec21@psu.edu

Dragos Simandan
Geography Department
Brock University
500 Glenridge Avenue
St Catharines, ON L2S 3A1
Canada
Email: simandan@brocku.ca

Notes

1. Data acquired from Agriculture and Agri-Foods Canada.
2. An aldehyde is a volatile organic compound (VOC) caused by the oxidation of an alcohol. Since ethanol is an alcohol, and most internal combustion engines do not burn 100% of their fuel, there are concerns that unburned ethanol will be *more* rather than less harmful in terms of contributing to smog and respiratory diseases. An aldehyde is not a pollutant that Canada controls through emissions regulations.
3. An ethanol research and development workshop was conducted at the national order in Canada in the mid-1990s (Canada 1997). Of the 49 individuals that comprised various committees, only *one* person was directly affiliated with an environmental group. The remaining members were from Agriculture and Agri-Food Canada, Natural Resources Canada, and oil/agriculture firms. Of symbolic importance is the fact that the Ethanol Program Advisory Committee was chaired by a member from Mohawk Oil. While this is not directly representative of the ethanol network in Ontario, it is certainly indicative of the lack of "environmental" individuals and voices that constitute an ethanol social network.

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