

Accelerating sustainability in British Columbia: Enablers of transformative multi-level governance in communities

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The Canadian province of British Columbia (BC) is taking significant steps towards climate change mitigation, including a carbon tax on fossil fuels and legislation that mandates greenhouse gas reductions within public sector organizations and greenhouse gas reduction targets for municipalities. Communities are responding to these signals with the tools available to them (such as land use and transportation planning, waste management, and public engagement campaigns) but also face a range of barriers to innovation on climate change.

This paper presents the results from qualitative empirical work carried out in eleven case studies throughout BC. These case studies were chosen to represent examples of significant innovation and leadership on climate change, ranging from the neighbourhood scale to multi-municipality regional districts in both urban and rural communities. By focusing on two cases in particular (the cities of Surrey and Revelstoke), we examine the key actors who have designed and implemented climate change and sustainability initiatives (whether individuals or organizations), their participation in, and influence on, networks, and the ways in which various levels of government ranging from the local to the federal may build capacity, supporting key enablers of climate change innovation. We investigate how are these various governance architectures shaped by the agents at play. Ultimately we explore the potential for the strategies undertaken in these case study communities to trigger a fundamental shift towards sustainable, resilient, and low carbon development paths.

1. Introduction

Global climate change poses an immediate and serious threat to both the ecological integrity of Earth's biosphere, to the social and economic stability of society (IPCC, 2007; Stern, 2006) and also to continuing human prosperity. Success in addressing climate change at the international level has been mixed; though some countries have responded to their Kyoto Protocol commitments, Canada has formally withdrawn from the Protocol and failed to significantly reduce its emissions.

While there are often complicated issues of institutional rigidities, technological lock-in, and path dependence (Newman and Dale, 2009), communities may be more adept than their national counterparts at fostering technical, regulatory, or social experimentation in the climate change realm. For instance, from an institutional perspective, municipalities are at a scale where prospects for integrated decision-making may be feasible, building in systems for accounting for climate change in the face of other development goals (Burch and Robinson, 2007). However municipalities, in general, possess limited capacity, fewer financial resources and legislative tools (Burch, 2010) than their federal or provincial counterparts (such as the legal jurisdiction to require the construction of green buildings and enforce their maintenance over time) (Curran, 2010).

Communities are also of particular interest as they have direct control of critical sources of emissions (Betsill, 2001; Bulkeley and Betsill, 2005) and are the scale at which the potentially catastrophic impacts of climate change will play out (Wilbanks and Sathaye, 2007). They face a particular set of challenges and opportunities as they struggle to respond to diverse needs including the pressing need for climate action among other development goals. They are at a scale that is responsive to citizens through public participation in decision-making (e.g., town hall meetings, advisory sessions, civil society engagement, etc), strengthening forms of governance and public buy-in (Beierle and Cayford, 2002).

Newer models of governance consider the emergence of multiple loci of agency (Hooghe and Marks, 2003; Termeeer et al., 2010), the importance of values, norms and habits in decision-making (Olsen and March, 1989; Peters, 2005)), and the value of participation, exchange and social learning (Dryzek, 2000; Fischer, 2003; Moote et al., 1997). Paired with a more tangible appreciation of politics, widespread community planning and engagement and social learning, these models begin to unite the disparate elements of the sustainability equation. This combination has the potential to yield crucial insights into the need to transform the underlying development paths in order to dramatically alter both emissions and vulnerability.

Sub-national governments are working to address climate change within their own jurisdictions, leading to climate mitigation and adaptation in communities across the Canadian province of British Columbia. Communities in this province are responding to a series of unique policy instruments such as the 2008 carbon tax, incentives for carbon neutral government operations and regulating climate change targets and planning in official community plans (ie Bill 27, the ‘Green Communities’ amendment to the Local Government Act). These local-scale innovations taking place provide a research opportunity to investigate the types of policy, institutional, technical and social innovations that communities employ in response to climate change, and the barriers that are being overcome in order to implement effective plans and projects.

This paper introduces empirical work in eleven case study communities across British Columbia, each of which has demonstrated both local innovation on climate change and the potential to trigger a transformative shift in emissions trajectories. By focusing on two of these cases, the cities of Surrey and Revelstoke, this paper explores: 1) the presence or absence of participatory processes and community networks, and the role of this participatory model of governance in triggering innovation; 2) the institutional architecture, including organizational structure and regulatory tools, that supported this innovation; and 3) the challenges presented by institutional and behavioural inertia or path dependency.

2. Transformative change and the multi-level participatory governance of climate change

A coherent theory of development path change is required in order to fully understand the dynamics of community innovation on climate change. Early evidence from diverse but deeply interwoven theoretical domains begins to suggest the key elements of a theory of transformative change. This theory informs the conceptual framework of this research, and draws inspiration from the fields of: multi-level governance, adaptive management,

resilience thinking, socio-technical change theory, political ecology, new institutional theory and knowledge mobilization/community engagement. Together, these bodies of theory and associated empirical work offer five core insights that shaped this research.

First, focus is shifting from government to governance, in which power and agency are increasingly distributed amongst non-traditional actors, each of which may face different constraints and opportunities to act (Edelenbos, 2005; Pierre, 2000; Rhodes, 1997; Termeer et al., 2010). Much of the recent governance literature emphasizes that rigid, state-centric, intergovernmental processes no longer account for all major policy responses, but that more varied and diverse multi-level governance processes and approaches with multiple and often overlapping centres of authority are gaining momentum (Hooghe and Marks, 2003). This literature is honing in on the emergence of a “network society” (Termeer et al., 2010) and a focus away from rigid top-down, state-centric, hierarchical, and formally institutionalized forms of government to less formalized modes of governance that reflect an appreciation of mutually interdependent stakeholders (Blatter, 2003; Edelenbos, 2005; Kooiman, 2003; Pierre, 2000; Rhodes, 1997; Termeer et al., 2010).

Second, values, norms, and habits are powerful ingredients of both individual and collective behaviour change, and work alongside rational analysis and cost-benefit calculus (Olsen and March, 1989; Peters, 2005; Slovic et al., 2007). Indeed, affective dimensions of action are intricately interwoven with cognitive elements (Peters and Slovic, 1996; Powell and DiMaggio, 1991; Slovic et al., 2007), since individuals are more often guided by values than by formal rules or rational choices (Peters, 1999). This normative or affective lens is a powerful one through which to view local governance institutions. An improved understanding of the interactions between institutions and other components of development paths, such as technological and cultural trajectories (O’Riordan, 2001; Swart et al., 2003) is essential to the formulation and implementation of effective policies to manage risks.

Third, effective policy development, governance, and behaviour change require an

iterative process of social learning (Robinson, 2003; Robinson and Tansey, 2006), and fruitful opportunities for participation and network building (Dale and Onyx, 2005) that remedy existing social marginalization (Zimmerer and Basset, 2003). Traditional decision-making strategies tend to de-emphasize interests and values in favour of objective analysis, often leading to diminished legitimacy, irrelevant or incompetent outcomes, and a lack of popular acceptance (Renn et al., 1995). The idea of ‘communicative partnerships’ speaks to this, and describes a new form of governance based on collaboration and fair exchange of information among scientists or experts, governments, businesses, and citizen actors (Burgess et al., 2005). This is part of a shift in the understanding of public consultation, a cornerstone of which is the goal of enhancing quality of participation rather than simply focusing on representation (O’Riordan, 2001). For a truly consultative and consensus-oriented process to occur, not only a broad sample of the community must be engaged, but community members must also be adequately equipped with technical knowledge or understanding of the goals of the process in order to participate in an equitable and effective fashion (Robinson et al., 2009).

Fourth, this social learning may serve to address sources of path dependency or inertia (Burch et al., 2010), Social learning can be defined as a change in understanding that goes beyond the individual to become situated within wider social units or communities of practice through social interactions between actors within social networks (Reed et al. 2010). Niche conditions, are protected spaces in which a radical novelty can develop, unhindered by the market forces and socio-cultural rules that typically provide relative stability in the broader socio-technical system (Geels, 2004). Rules in these niches are less certain, providing an opportunity for intentional deviation from the underlying path (Garud and Karnøe, 2003) and are areas where considerable social learning occurs.

Finally, pervasive shifts in collective behaviour that have the potential to change the underlying development path require the embedding of sustainability or climate change concerns in the standard operating procedures of organizations (Burch, 2010) and are deeply value-laden and emergent rather than rational and prescribed (Robinson and

Tansey, 2006). Adaptation is likely to be implemented only if it is consistent with programs designed to cope with non-climatic stresses (Yohe, 2001) and effective mitigation actions are very likely to be those that are most fully integrated into more general policy strategies (O’Riordan et al., 1998). In other words, isolating climate change responses in an organizational or policy sense (for instance, by leaving the entirety of climate action to a small group of specialists without the buy-in throughout the range of municipal departments) is unlikely to yield the depth or scale of transformation required to produce truly resilient, carbon neutral communities.

Taken together, these insights suggest that community-based responses to climate change may be stymied by inconsistent policies at higher levels of government, and institutional and behavioural inertia. In contrast, participatory processes that draw on local networks of actors and strategically align objectives may serve to enable the effective multi-level governance of climate change and potentially transform the underlying development path. The empirical work that follows investigates these hypotheses in the context of British Columbia municipalities, all of which are subject to a suite of provincial climate change policies.

3. Methods

A mixed-methods and contextual, comparative case study approach (Stake, 1995, 2006; Yin, 2003) was used to conduct an empirical inquiry that investigates a contemporary phenomenon within its real life context using multiple sources of evidence (Yin, 2003). An advantage is that a case study methodology can be useful to capture the “emergent and immanent properties of life in organizations and the ebb and flow of organizational activity, especially where it is changing rapidly” (Hartley, 1994). Although some authors have criticized case studies for their lack of generalizability, they are highly appropriate when dealing with a process or with complex real-life activities in great depth (Noor, 2008).

This research consisted of two phases of data collection and parallel analysis. Phase 1

involved an in-depth assessment of the success of mitigation and adaptation efforts in each case community via document analysis. This phase of the research program began with the collection of documents pertaining to the design and implementation of initiatives or policies specifically aimed at responding to climate change. Documents collected included: Official Community Plans, climate change action plans or strategy documents, monitoring and evaluation reports, Council reports, analyses of these communities carried out by partners, internal memoranda, community reporting on efforts to reach provincial targets (such as documents responding to Bill 27 ‘Green Communities’) and others. Documents were analyzed using elements of discourse analysis (Brown and Yule, 1983; Gee, 2005; Wodak and Meyer, 2009) and comparative policy analysis (Ragin and Amoroso, 2010; Wildavsky, 1979) to obtain data on the following key indicators or drivers of transformative change: 1) key stakeholders or actors; 2) antecedent policies or initiatives that target climate change or influence emissions/vulnerability indirectly (such as land use plans); and 3) qualitative and quantitative indicators of mitigation and adaptation success, such as emissions inventories and observed or projected damages from impacts.

In Phase 2 of this research, semi-structured interviews were conducted with 8-12 key actors from each case. A detailed interview protocol structured the collection of data on key indicators or drivers of transformative change as well as the following additional elements that are more fruitfully explored through interactive discussions: 1) culture and structure of key organizations leading best practices; 2) perceived responsibility and capacity of other levels of government and actors, such as the provincial government and private sector; 3) presence of inter-institutional intermediaries; and 4) density and centrality of network formation.

3.1. Case selection criteria

Case selection followed a replication (rather than sampling) logic; cases selected are expected to have both similar and contrasting results from one another based on the theoretical framework, possibly in predictable ways (Yin, 2003). Two primary criteria

structured the initial selection of case studies directly informed the interview protocol.

1. Leadership on adaptation, mitigation, integrated adaptation/mitigation approaches, and sustainability. We chose examples of particularly innovative action that has either transformed emissions pathways and/or vulnerability or holds significant promise to do so in the future.
2. Evidence of multi-stakeholder involvement and social learning. The scale of the cases was not be limited to municipal governments, thus opening up the possibility of studying compelling action in neighbourhoods, regions and other scales. We have chosen cases where action at one scale has been taken up by, or is of direct relevance to, other scales.

While communities demonstrating best practices were sought, case studies were chosen that spanned a variety of secondary criteria in order to enhance the relevance of findings from these cases to communities beyond the initial sample. Secondary criteria include: 1) a mix of small, medium and large communities; 2) a mix of rural and urban; 3) communities with a long history of climate change action and emerging leaders; 4) a mix of resource-based and diversified economies; 5) a mix of government led and grass-roots approaches; 6) generalizability or relevance to other communities; and 7) evidence of social mobilization as a component of action.

The case study communities that were ultimately chosen were: Victoria, City of Vancouver, Prince George, Dawson Creek, T'Sou-ke First Nation, Eagle Island neighbourhood of West Vancouver, City of North Vancouver, Campbell River, the Kootenay Regional Districts, Revelstoke, and Surrey. Each of these cases meet the two primary criteria and represent a diverse sample with regard to the seven secondary criteria. Cases were chosen in close collaboration with an array of civil society and government actors.

The empirical sections that follow focus on two of these eleven cases: the City of Surrey and Revelstoke. Both of these communities are implementing and aiming to expand a

District Energy System, and both are increasingly framing climate change action in terms of sustainability or energy security rather than the more narrow focus of adaptation or mitigation.

3.2. Case background

The City of Surrey, nearly one third of which is agricultural land paired with moderately dense urban development, is a rapidly growing municipality in the Lower Mainland of British Columbia. Surrey is a large community with a land area of around 317.19 sq. km and a population estimated at 473,238. From 2001-2006 Surrey's population change was 13.6 percent. The city is made up of three distinct urban areas with a fair bit of travel required between them. Large distances paired with limited options for transit creates challenges for limiting transportation related greenhouse gas emissions.

The key innovations in Surrey relate to the creation of a District Energy system and the approach to planning (ie Development Cost Charges, density bonuses, and integrated energy/neighbourhood planning) that is simultaneously being pursued in order to support it. This represents a cluster of innovations rather than a single tool or strategy, which may provide interesting lessons to other municipalities.

Efforts to integrate energy planning into neighborhood planning are being led by the City of Surrey Planning department but in partnership with landowners and citizens (S1). These efforts are designed to enable changes to zoning, such as from single use to a more compact mixed-use form, bringing benefits for livability, efficiency, and climate resilience. In order to stimulate this high-density development, transportation must be simultaneously considered (S1), revealing the importance of integrated planning for sustainability transitions. In addition, a new bylaw states that new buildings must have the capacity to connect to the District Energy system in the downtown core (S1).

Alongside this is the City's approach to sustainability: namely, its development of a Sustainability Charter. Finally, the City has devoted staff to both greenhouse gas management as well as climate change adaptation. The former focuses mainly on corporate emissions, while the latter is only in its infancy.

Though modest in size, Revelstoke has a long history of community planning that is carried out with significant public input. The city's Community Development Plan was last revised in 2007, during which the three 'pillars' of sustainability were incorporated. Following this was the drafting, community consultation, and ultimate approval of the Community Energy and Emissions Plan, and the District Energy Expansion Pre-Feasibility Plan. Revelstoke is currently in the process of developing an Integrated Community Sustainability Plan, which will serve to update portions of the Official Community Plan and set out a comprehensive vision for community sustainability.

The City of Revelstoke has signed the British Columbia Climate Action Charter and has developed both a Corporate GHG Emissions Inventory and Reduction Strategy as well as a Community Energy and Emissions Plan in 2011. A part time Environmental Coordinator was contracted by the City of Revelstoke beginning in 2010 to assist the city in meeting its obligations under the Climate Action Charter and to implement strategies that are consistent with the city's strategic plan. Partnerships between the environmental and social coordinators, as well as a variety of community groups, have proved integral to early successes on sustainability in Revelstoke.

Key climate change and sustainability innovations have occurred in Revelstoke that are both driven by, but also largely independent from, provincial action on climate change. These include 1) the formation of the Revelstoke Community Energy Corporation to support a district energy system in the community; 2) the design of a Unified Development Bylaw that will further a vision of Revelstoke as a compact, complete, and socially and environmentally sustainable community, and 3) the

initiation of a Integrated Community Sustainability Plan process. Though not without regulatory, financial, and other challenges, these innovations are deeply rooted in ongoing public participation, fruitful collaboration with community groups, and consideration of the future of Revelstoke in a changing climate.

4. Findings

4.1. The influence of participatory processes and networks

Revelstoke has a history of integrated planning. Economic and social planning was integrated beginning in 2001 (R2; R1)¹, and in 2003 a separate environmental plan was created. In 2006 environmental issues were woven into economic, social, and cultural planning (R2). The current Integrated Community Sustainability Plan represents the next step of this integration, and so is built on a strong foundation. Social issues are actually more fully integrated into planning in Revelstoke, with environmental issues only receiving full consideration upon the hiring of an environmental coordinator three years after (2010) a social coordinator had been hired (2008). This integrated planning is paired with deep and ongoing public engagement, a crucial ingredient of Revelstoke’s action on sustainability issues. Although criticisms of this engagement have surfaced – namely that the public feels ‘over-consulted,’ and that a tenuous link exists between plans and action on the ground, meaningful public engagement has also allowed for the expression of the values at the core of sustainability and the identification of synergies and tradeoffs between various community priorities.

¹ Codes are used to refer to each interviewee in order to maintain confidentiality. Codes R1-R12 and S1-S8 refer to Surrey interviewees.

Related to the issues of integrated planning and public engagement is the prevalence of strong community partnerships. There are close-knit links between the environmental and social communities in Revelstoke (ie the environmental coordinator, the social coordinator, and the North Columbia Environmental Society), allowing staff to avoid duplication and exploit synergies amongst their work (R1). Strong relationships also exist between civil society and city staff (R1), and the community has a history of volunteerism and public engagement, which has become a crucial element of sustainability actions in Revelstoke (R7). This directly contributes to Revelstoke following a sustainability oriented path, rather than tackling climate change in isolation.

Despite significant and ongoing public engagement, one interviewee noted that there had been no outreach on the District Energy system, and the Revelstoke Community Energy Corporation, prior to the Community Energy and Emissions Planning Process (R12). This interviewee felt that there had been more focus on finding funding for the District Energy system, rather than community engagement, leading to significant controversy with potential customers on the DE network (R12) and questions about RCEC governance.²

Similarly, while public engagement repeatedly arose as a crucial ingredient of success in Revelstoke, some interviewees indicated distrust in these procedures (R2). This appears to arise out of a) unclear path from the consultation process to action, leading participants to feel ‘over-consulted’ without receiving the pay off of seeing action on the group; b) challenging personality dynamics within the consultation procedure.

Taken together, integrated planning, community engagement and partnerships, and novel funding mechanisms have led directly to early sustainability successes in Revelstoke. While significant barriers exist, these factors nevertheless hold the

² <http://www.bclocalnews.com/news/142663086.html>

potential to be replicated in other communities, and to contribute to a long-term sustainability transition.

BC Hydro's support of Community Energy Managers has been integral to the actions taken in the City of Surrey. Funded through a shared agreement between BC Hydro and the host municipality, Community Energy Managers form a network that facilitates the sharing of knowledge (S1; S3). One interviewee indicated that CEMs are at the front edge of a market transformation (S3) and represent a key source of expertise. Partnerships between BC Hydro and Fortis BC have also been crucial in the realm of energy conservation. These partners are both more experienced with, and more focused on, stimulating demand-side management of energy (S1). As such, awareness-raising around conservation is most often left to these organizations rather than undertaken by the City of Surrey.

Overall, community engagement and public awareness-raising do not appear to be central to Surrey's approach to sustainability. This may be a determinant of the perceived (and real) disconnect between Surrey's sustainability rhetoric/mandate and its day-to-day planning practices. Deeper engagement with the public, and more vocal demand from the community for sustainability and climate change action (S2), may serve to remedy this disconnect and combat developer pressure for unsustainable expansion. The Community Energy and Emissions Plan process is one way to begin to do this. Stakeholder engagement sessions (including the Surrey Board of Trade, BC Hydro, and Translink) as well as public engagement sessions were part of the early phases of the CEEP (S6) and will continue throughout the process.

4.2. Governance architecture, organizational structure, and regulatory tools

The City of Surrey's approach is very much focused on sustainability and energy efficiency rather than on climate change. This is evident in the focus on developing

the Sustainability Charter and the framing of the District Energy system (ie economic and energy security). Priorities in Surrey appear to be transit, providing new services to expanding areas, and energy resilience (S3; S5; S7). The extent to which sustainability or carbon management are consistent with these priorities appears to be the extent to which they are undertaken.

While energy security and economic development are the primary objectives of Surrey's District Energy plans, co-benefits include greenhouse gas reduction and waste diversion. This is a case in which the climate change mitigation is most frequently considered to be a co-benefit, rather than the initial driver of the action. Co-benefits are important aspects of both the framing and implementation of climate change and sustainability activities in Surrey. One interviewee indicated that a clear articulation of co-benefits facilitated a more aggressive push towards ambitious targets (S6).

A dichotomy or inconsistency between sustainability/climate change targets and the actual way that Surrey develops is a key barrier standing in the way of a transformative sustainability transition in the community (S2). Building out (or up) more sustainably, however, is contingent on the provision of funding for rapid transportation and community awareness and support – both of which are lacking in the case of Surrey (S2). It appears that priorities other than carbon management are of primary concern to the Surrey City Council (S3), although a symbolic commitment has been made to it (S3).

The framing of provincial policy was also raised as a barrier. Framing the greenhouse gas emissions issue entirely in terms of climate change precludes the inclusion of the broader issues of pollution and air quality (allowing doctors to be cited regarding human health impacts, for instance). Similarly, the issues weren't framed in terms of a jobs agenda, or green energy development. Climate stood alone so it didn't naturally reinforce other priorities (S3), and if co-benefits occurred they were by accident. This highlights the tradeoffs between focusing very narrowly on one issue that requires a strong push to trigger leadership, and versatility and

resilience of policy mandate that is more broadly acceptable and more widely defined.

Funding for rapid transit in Surrey is largely contingent on provincial decisions and is thus out of the hands of Surrey. Translink, however, requires that density thresholds be met before the investment in rapid transit is deemed viable (S6). Surrey may not reach these thresholds in the near future, and this may suggest the need of case-by-case threshold reduction in order to stimulate sustainable patterns of development. The alternative option is to densify first, in order to demonstrate the need for transit provision (S5). Furthermore, a lower density threshold is needed to justify the construction and expansion of District Energy than is required to support transit (S3), and yet transit directly supports even the density necessary for DE. This raises the question of which comes first, and time horizons upon which decisions are made. To overcome this ‘chicken and egg’ relationship between transit and density, Surrey is working to incentivize density along corridors where planners expect to need transit (S5).

4.3. Challenges presented by inertia

Many barriers in Revelstoke are heavily characterized by path dependency (or inertia). One interviewee, for instance, identified the reliance on industrial agriculture (resulting in part from the flooding of agricultural land as part of the Keenleyside dam process) and reliance on fossil fuels, as major barriers to effective climate change mitigation and sustainability more broadly. Intractable attitudes and preference for a particular lifestyle was also identified as being particularly challenging to change (R5). A number of interviewees described the public mentality as ‘frontierish’ (R2), self-sufficient, or rugged (R10). This may be helpful in some ways, as residents may feel responsible for providing for themselves and solving problems, but may also create a resistance to new ideas or approaches that are seen as coming from ‘the city.’ Other path dependent ‘conventions’ were

identified, including the need for streets to be a particular width to accommodate fire trucks and snow removal, but new planning principles that create a walkable, human-scale community suggesting the need for narrower streets (R10).

Similarly, inertia (or path dependency) is a challenge with regard to urban development (S5;S6) in Surrey. Density and transit can be used to lure higher concentration of jobs into Surrey and away from Burnaby, Richmond, and Vancouver, but this is a very gradual process and will likely never match the ‘pull’ of downtown Vancouver jobs (S5). Due to public perceptions and infrastructure costs, it is also easier to create density on new land, rather than convert low density developed areas to high density (S5).

5. Conclusions and future research

In both cases transformative change to emissions pathways is most likely to occur if regulatory tools (such as density incentives and Development Cost Charges) are paired with innovative energy technologies (ie District Energy systems). Cultural norms, particularly in support of low-density urban form, may stand in the way of District Energy expansion in both Surrey and Revelstoke.

Tradeoffs between climate change actions and other (economic and social) priorities present significant barriers to public acceptance and implementation. The early integration of economic and social planning, combined ultimately with environmental planning, helps to identify and avoid some of these tradeoffs.

Sparking innovation is a matter of ‘being ready’ with bylaws that support best practices in planning, while cultivating a municipal staff and community culture that supports leadership. While public engagement and participatory processes appeared more crucial to success in Revelstoke than in Surrey, it is also apparent

that the commitment to sustainability in Surrey may be more vulnerable to pressure from the development community and concerns about economic resilience.

Ultimately, these cases illustrate the complexity of community-based climate change innovation: while significant potential exists to transform emissions from land use, transportation, and waste management, a dramatic reduction in overall community emissions requires alignment between provincial policies and local strategies. Participatory models of multi-level governance hold out the promise of adaptive, integrated strategies that capitalize on co-benefits and build community buy-in. Future research will consider patterns emerging in the remaining nine case study communities, focus more carefully on costs and benefits of a sustainability approach compared with a narrow focus on climate change, and move towards a more rigorous assessment of the transformative potential of these community-based approaches.

6. References

Beierle, T.C., Cayford, J. (2002) *Democracy in practice: Public participation in environmental decisions*. Resources for the Future Press, Washington, DC.

Betsill, M. (2001) Mitigating climate change in US cities: opportunities and obstacles. *Local Environment* 6, 393-406.

Blatter, J. (2003) Beyond hierarchies and networks: institutional logics and change in transboundary spaces. *Governance* 16, 503-526.

Brown, G., Yule, G. (1983) *Discourse Analysis*. Cambridge University Press, Cambridge.

Bulkeley, H., Betsill, M. (2005) Rethinking sustainable cities: Multi-level governance and the 'urban' politics of climate change. *Environmental Politics* 14, 42-63.

Burch, S. (2010) In pursuit of resilient, low-carbon communities: An examination of barriers to action in three Canadian cities. *Energy Policy* 38, 7575-7585.

Burch, S., Robinson, J. (2007) A framework for explaining the links between capacity and action in response to global climate change. *Climate Policy* 7, 304-316.

Burch, S., Sheppard, S., Shaw, A., Flanders, D. (2010) Addressing municipal barriers to policy action on climate change: Participatory integrated assessment of climate change futures and the use of 3D visualizations as decision support tools. *Journal of Flood Risk Management* 3, 126-139.

Burgess, J., Clark, J., Chilvers, J. (2005) Going 'upstream': issues arising with UK experiments in participatory science and technology assessment. *Sociologia e Politiche Sociali* 8, 107-136.

Curran, D., (2010) Jurisdiction options for energy efficiency and renewable energy in buildings. The Pembina Institute and Deborah Curran and Company, Vancouver.

Dale, A., Onyx, J. (2005) A dynamic balance: social capital and sustainable community development UBC Press, Vancouver.

Dryzek, J.S. (2000) *Deliberative Democracy and Beyond: Liberals, Critics, and Contestations*. Oxford University Press, Oxford.

Edelenbos, J. (2005) Institutional implications of interactive governance: insights from Dutch practices. *Governance: An International Journal of Policy, Administration, and Institutions* 18, 111-134.

Fischer, F. (2003) *Reframing public policy: discursive politics and deliberative practices*. Oxford University Press, Oxford.

Garud, R., Karnøe, P. (2003) Bricolage versus breakthrough: distributed and embedded agency in technological entrepreneurship. *Research Policy* 32, 277-300.

Gee, J.P. (2005) *An Introduction to Discourse Analysis: Theory and Methods*. Routledge, New York.

Geels, F.W. (2004) From sectoral systems of innovation to socio-technical systems: Insights about dynamics and change from sociology and institutional theory. *Research Policy* 33, 897-920.

Hartley, J., (1994) Case Studies in Organizational Research, in: Cassell, Symon (Eds.), *Qualitative Methods in Organizational Research*. Sage Publications, London, pp. 208-229.

Hooghe, L., Marks, G. (2003) Unraveling the Central State, but how? Types of multilevel governance. *The American Political Science Review* 97, 233-243.

IPCC (2007) *Impacts, Adaptation, and Vulnerability: Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge, UK.

Kooiman, J. (2003) *Governing as governance*. Sage, London, UK.

Moote, M.A., McClaran, M.P., Chickering, D.K. (1997) Theory in Practice: Applying Participatory Democracy Theory to Public Land Planning. *Environmental Management* 21, 877-889.

Newman, L., Dale, A. (2009) Large footprints in a small world: toward a macroeconomics of scale. *Sustainability: Science, Practice & Policy* 5, 9-19.

O'Riordan, T., (2001) *Globalism, Localism, and Identity: Fresh Perspectives on the Transition to Sustainability*. Earthscan, London.

O'Riordan, T., Cooper, C.L., Jordan, A., Rayner, S., Richard, K.R., Runci, P., Yoffe, S., (1998) Institutional Frameworks for Political Action, in: Rayner, S., Malone, E. (Eds.), *Human Choice and Climate Change Vol. 1: The Societal Framework*. Battelle Press Ltd., Columbus, Ohio.

Olsen, J.P., March, J.G. (1989) *Rediscovering Institutions: The Organizational Basis of Politics*. The Free Press, New York.

Peters, B.G. (1999) *Institutional theory in political science: the new institutionalism*. Pinter, London, New York.

Peters, B.G. (2005) *Institutional theory in political science: the new institutionalism*, 2nd ed. Continuum International Publishing Group, London, New York.

Peters, E., Slovic, P. (1996) The role of affect and worldviews as orienting dispositions in the perception and acceptance of nuclear power. *Journal of Applied Sociology* 26, 1427-1453.

Pierre, J., (2000) *Debating governance*. Oxford University Press, Oxford, UK.

Powell, W.W., DiMaggio, P.J. (1991) *The New Institutionalism in Organizational Analysis*. University of Chicago Press, Chicago.

Ragin, C.C., Amoroso, L. (2010) *Constructing social research: The unity and diversity of method*. Pine Forge Press, Thousand Oaks, Calif.

Renn, O., Webler, T., Wiedemann, P., (1995) *Fairness and Competence in Citizen Participation: Evaluating Models for Environmental Discourse*. Kluwer Academic Publishers, Dordrecht, Boston, London.

Rhodes, R.A.W. (1997) *Understanding governance: policy networks, governance, reflexivity and accountability*. Open University Press, Milton Keynes, UK.

Robinson, J. (2003) Future Subjunctive: Backcasting as Social Learning. *Futures* 35, 839-856.

Robinson, J., Burch, S., Talwar, S., O'Shea, M.S., Walsh, M., (2009) *Envisioning sustainability pathways: Recent progress in the use of participatory backcasting*

approaches for sustainability research, 15th Annual International Sustainable Development Research Conference, Utrecht, the Netherlands.

Robinson, J., Tansey, J. (2006) Co-production, emergent properties, and strong interactive social research: The Georgia Basin Futures Project. *Science and Public Policy* 33, 151-160.

Slovic, P., Finucane, M.L., Peters, E., MacGregor, D.G. (2007) The affect heuristic. *European Journal of Operational Research* 177, 1333-1352.

Stake, R. (1995) *The Art of Case Research*. Sage Publications, California.

Stake, R. (2006) *Multiple Case Study Analysis*. Guilford Press, New York.

Stern, N. (2006) *Stern Review on the Economics of Climate Change*. HM Treasury and Cabinet Office.

Swart, R., Robinson, J., Cohen, S. (2003) Climate change and sustainable development: expanding the options. *Climate Policy, Special Issue on Climate Change and Sustainable Development* 3, S19-S40.

Termeer, C.J.A.M., Dewulf, A., van Lieshout, M. (2010) Disentangling scale approaches in governance research: Comparing monocentric, multilevel, and adaptive governance. *Ecology and Society* 15, 29.

Wilbanks, T.J., Sathaye, J. (2007) Integrating mitigation and adaptation as responses to climate change. *Mitigation and Adaptation Strategies for Global Change* 12, 957-962.

Wildavsky, A. (1979) *Speaking truth to power: the art and craft of policy analysis*. Little, Brown, Boston.

Wodak, R., Meyer, M. (2009) *Methods of critical discourse analysis*. Sage, London.

Yin, R.K. (2003) *Case Study Research: Design and Methods*, 3rd ed. Sage, Thousand Oaks, CA.

Yohe, G.W. (2001) Mitigative capacity: the mirror image of adaptive capacity on the emissions side. *Climatic Change* 49, 247-262.

Zimmerer, K.S., Basset, T.J. (2003) *Political Ecology: An Integrative Approach to Geography and Environment-Development Studies*. Guildford Press, New York.