

Let's Get This Transition Moving!

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Dans cet article, j'analyse quatre éléments sur lesquels doit s'appuyer le cheminement du Canada vers une économie à faibles émissions de carbone. Premièrement, il est important que les décideurs politiques, les analystes politiques et les chercheurs abordent la question en termes de transition vers une société qui aura éliminé les émissions de carbone. Deuxièmement, au Canada, il est essentiel de favoriser les divers cheminements régionaux qui peuvent mener à une économie à faibles émissions de carbone. Troisièmement, nous devons nous donner des « stratégies de développement vert » si nous voulons profiter au maximum des occasions à saisir que fournira cette transition. Et, quatrièmement, nous devons réaliser que la réduction des émissions de carbone est une question de politique tout autant que d'économie.

Mots clés : économie à faibles émissions de carbone, développement vert, transition, politique, cheminements régionaux

This paper makes four basic points about movement toward a low carbon economy in Canada: first, that it is important for political leaders, policy analysts, and researchers to approach the issue in terms of a transition to a carbon-emission-free society; second, that in Canada the development of regional pathways to a low-carbon economy is crucial; third, that we need “green development strategies” if we are to maximize the opportunities presented by this transition; and finally, that we should think about low-carbon politics as well as low-carbon economics.

Keywords: low-carbon economy, green development, transition, politics, regional decarbonization pathways

Framing the Argument in Terms of Transition

More serious engagement with the challenge of climate-change mitigation in Canada can be encouraged by framing the discussion in terms of a societal transition to a low-carbon-emission economy.

The idea of “transition” suggests movement over time from one set of circumstances to another. It has been used widely in the social sciences to discuss long-term processes of societal transformation. We talk, for example, of the transition from hunter-gatherer societies to settled agricultural communities, or of democratic transitions away from authoritarian rule. And there is an established discussion on energy transitions: the shift from traditional reliance on biomass to modern fossil-fuel-based economies, which witnessed first the ascendancy of coal, then of oil, and now (increasingly) of natural gas.

Of particular relevance here is the idea of “socio-technical transitions” that involve major shifts in core systems of societal provisioning, spanning one or more generations (Rotmans, Kemp, and Van Asselt 2001).

They involve deployment of new technologies but also the adoption of novel social practices, rules, and governance mechanisms. Such transitions can be appreciated at different scales, relating to the reach of the social and technological practices involved. We have experienced many such transitions in the past: for example, the change from sailing ships to steam ships for maritime transport, or from gas to electricity for municipal lighting.

Historical experience suggests that periods of relative socio-technological stability—where innovation focuses primarily on incremental improvements to a dominant design (Abernathy and Utterback 1978)—predominate. Path dependence and social and technological lock-in make a switch to an alternative trajectory difficult (Unruh 2000). At the outset, novel technologies typically appear inferior (more expensive and with functional disadvantages); it is not obvious that existing arrangements should be displaced; and attempts often fail. Yet with time, problems accumulate for the existing “regime,” more challenging innovations emerge in protected “niches,” and a shift in broader economic, social, and political circumstances (the “landscape”), can open the

way for a more or less significant reconfiguration of existing arrangements (Geels 2002; Geels and Schot 2007).

Over the last fifteen years a substantial academic literature on transitions has emerged, providing insight into historic processes of socio-technical change and reflection on the extent to which it is possible to orient and accelerate such changes to address issues of sustainability (Geels 2005; Smith, Stirling, and Berkhout 2005; Kemp, Lorbach, and Rotmans 2007; Raven, Van den Bosch, and Weterings 2010; Foxon 2013). Of course, it is common to note that while historical transitions have been largely “spontaneous” (unplanned, driven mainly by private actors, with implications often appreciated only after the fact), a timely transition to a low GHG-emission energy system will require conscious intervention by public authorities (involving regulation, expenditure, negotiation of international agreements, and so on). Yet care must be taken not to overstate this contrast. “Visions” of the future play an important role in orienting all transitions; states have often assumed an active role in mobilizing resources (think of building the railroads or the internet), and in reorganizing legal rules to facilitate change (expropriating property, changing regulatory systems, adjusting intellectual property regimes, and so on). Moreover, transitions typically involve protracted economic and political battles as interests associated with established socio-technical configurations deploy all the tools at their disposal to preserve their position (Meadowcroft 2005, 2011).

Consider the transition from horse-drawn transport to automobiles. Between 1880 and 1920 there was a burst of experimentation to develop a modern passenger vehicle, involving competition among alternative chassis configurations and power-trains based on steam, electricity, ethanol, and even compressed air. Ultimately the design settled on a four-wheeled vehicle driven by an internal combustion engine running on gasoline. And this dominant design has been more or less stable for a century. Over time, hundreds of thousands of engineers, and vast amounts of capital, have been mobilized to secure incremental improvements that have given us the automobile we know today. As the industry grew, auto producers and their allies in the petroleum sector used a range of political and economic tactics to disable competitors (streetcars, ethanol fuels), institute societal norms compatible with the new regime (the offence of jaywalking), and secure investment of societal resources (building national highway networks). Today the auto sector is closely integrated with the oil and chemicals industry, the production of steel, glass, plastics, synthetic rubber, electronic control systems, and so on. It involves networks of dealers, repair shops, institutes for training and design, finance (for firms and consumers) and insurance, and complex governmental regulation. More-

over, it has co-evolved with the design of buildings and the organization of cities. Yet today this socio-technical system is beginning to show strain. A variety of landscape factors (including concerns with climate change, energy security, and urban air quality) have increased interest in alternatives, including electric cars, plug-in hybrids, fuel cells, natural gas, hydrogen, and biofuels. New business models are appearing (direct sales, car sharing), self-driving cars are becoming a reality, and there are hints of a shift in the interest of the younger generation away from vehicle ownership. Pressure from industry outsiders (Tesla, or perhaps Chinese car makers) is disrupting established routines, while tactical and strategic errors of industry incumbents (consider the Volkswagen emissions scandal) are creating radical uncertainty for the future path of the personal transport sector. And, of course, there are advocates for dramatically reducing dependence on cars of any kind (especially in urban settings), by emphasizing mass transit, the promotion of walking and cycling, and (over the long term) the redesign of cities.

Framing movement toward a low-carbon economy in terms of a societal transition has several advantages. From the perspective of public discussion, “transition” conveys the idea of change stretched over time: not a one-shot effort or an overnight turn-around but a process of cumulative change that will span several decades. And “transition” imparts a clear sense of directionality: although the pace of change may vary, its orientation is clear.

In recent decades, discussion of climate change in Canada has tended to focus on short-term incremental goals for GHG-emission reductions. Instead, we need to articulate a clear vision of where we want to end up and to consider current actions in relation to the long-term goal. Climate mitigation ultimately implies reducing global GHG releases to a few percent of current emissions (IPCC 2008). Limiting climate risks this century entails GHG reductions of 80 percent or more over the coming decades in rich countries such as Canada, with the virtual elimination of emissions from energy production and consumption. And this requires (among other things) a radical transformation of the energy system to drive out emissions from electricity production, the built environment, and the transport sector. Simply put, we have to break societal dependence on fossil fuels.

From the perspective of policy, a transition framing makes explicit the long-term goal of dramatically curtailing carbon emissions to reach a carbon-neutral energy system, encourages the development of alternative visions of how that goal might be achieved, and the identification of pathways toward those visions. This can help coordinate societal actors—consumers and producers, firms and public institutions—providing a common point of

reference for investment decisions and energy choices. It links up to other strategic approaches such as national, regional, and enterprise carbon budgeting. And it provides a framework within which to approach the design of policy instruments such as carbon pricing.

Thinking in terms of transition pathways encourages discussion of sequencing and of enabling technologies, institutions, and social or business practices that can facilitate more fundamental transformation. Decarbonizing the Canadian electricity system over the next decade or two can prepare for a subsequent doubling of demand as clean electricity is called upon to meet a greater share of societal energy needs—in transport, heating, industrial uses, and so on (Bataille, Sawyer, and Adamson 2015). Support to expand the market share of electric and hybrid vehicles today can prepare for the future phase out of petroleum-driven automobiles in the personal transport sector. And measures to stimulate innovation now can accelerate the development of the novel technologies that will be required in the future for industrial sectors that currently lack GHG-abatement alternatives (e.g., cement or steel production).

From the perspective of research, a transition approach helps focus the agenda on identifying barriers and enabling conditions for the low-carbon transition, including issues related to technology development, social acceptability, experimenting with alternative technologies and social innovations, and so on.

Considering Regional as well as National Pathways to a Low-carbon Economy

Until comparatively recently, Canadian discussion of climate change was focused largely at the national level. To some degree this was understandable: national governments undertake commitments under the United Nations Framework Convention on Climate Change (UNFCCC), and the constitutionally defined authority of the federal government, with its significant powers of taxation and expenditure, make it a potentially powerful actor. Yet with the abdication of federal responsibility under the Harper government, attention turned to provincial programs, such as the BC carbon tax, Alberta's Specified Gas Emitter Program, the Ontario coal phase-out, and Quebec's cap-and-trade system. Still, for the most part these have been seen as "second best" options, as sub-optimal and piecemeal ways to implement GHG control. Clearly there is substantial truth to this perspective: a Canada-wide climate strategy with a coherent set of national policy instruments such as carbon pricing is likely to be more effective, equitable, and cost efficient in the long term (Hoberg 2015).

Yet in the Canadian context, exploring regional transition pathways is of critical importance. Moreover, the national approach should be designed to enable these

regional efforts and to encourage their mutual coordination. Let's face it: the country is big, diverse, and politically decentralized. Above all, there are critical differences in the energy political economies of the Canadian provinces. This expression is meant to refer not simply to the energy industries related to the natural endowments found in each region, although differences here are already profound, but also to larger patterns of energy-related economic and political development that have emerged over time. This includes the structure of the provincial electricity sector (generation sources, ownership, and regulatory system); energy-dependent industrial and economic activity, as well as the government strategies and programs related to this activity; the intertwining of economic and political interests that lend a distinctive colour to provincial politics; and the energy-related linkages in the construction of regional political identity.

Consider the contrasts between Alberta and Quebec. On the one hand, in Alberta we have a jurisdiction with massive oil and gas resources, an economic development trajectory tied to hydrocarbon extraction, a powerful petroleum industry lobby, a largely coal-based and deregulated electricity system, provincial reliance on hydrocarbon rents to keep tax rates low, a history of tension with the federal government over energy, and a political culture deeply marked by its energy frontier status. On the other hand, in Quebec we have a region with abundant hydro resources; a state-run electricity system established during the Quiet Revolution that is a symbol of national pride; an economic strategy that has been focused on leveraging cheap hydro for industrial development (aluminum, aerospace, and now solar) and supplementing provincial revenues through electricity exports to the United States; and an identity that draws on a green image. Again, very different stories could be told in British Columbia, Saskatchewan, Manitoba, Ontario, and so on.

The fact is that Canada's energy political economy is to a large extent a series of regional political economies. The current configurations have deep historical roots and are closely entwined with the overall development trajectory of the provinces. And precisely because of this history, with its significant lock-in and path dependence, efforts to accelerate the transition to a low carbon economy need to start from a clear appreciation of these particularities.

Yet we must not overstate the case. There are also many unifying factors across the country. Oil sells to an international market, gas to a continental market, and electricity is traded across jurisdictions. Canadian provinces are linked economically to proximate US states and integrated more broadly with the United States and Mexico through NAFTA. Major energy firms are active

in multiple Canadian regions. The Canadian banks are big players in energy across the country, and major projects tap international financial markets. Firms in eastern Canada provide goods and services to western oil fields, while labour is pulled to where demand is highest. Federal jurisdiction extends over many energy-related issues, providing a unifying frame. And consumers from coast to coast fill up their cars at the gas pump and expect the electricity to be there when they turn on the switch. Moreover, many of the core technologies in a low-carbon economy will involve transnational production chains, and Canadian firms contributing to the green economy must be competitive in such international markets rather than in local/parochial spaces.

Clearly the federal government has a critical role to play in moving the country toward a carbon-neutral future. This includes developing a strategic national orientation; mobilizing financial resources; driving reform in areas over which it has jurisdiction; creating processes where the federal and provincial governments can jointly and iteratively adjust their policy frameworks and distribute collective burdens while engaging with First Nations and municipal governments; building joint initiatives with the United States and Mexico; and engaging more broadly with international efforts, including support for vulnerable developing countries.

All this is true, and yet in the Canadian context the very different regional political economies of energy, and the potential for provincial administrations to enable (or frustrate) the low-carbon transition, cannot be ignored. Transition pathways must take into account not only the existing energy industries' economic structure and infrastructure but also the potential to exploit new low-carbon resources (wind, tidal, geothermal, biomass, etc.), to redeploy existing economic or technical prowess into low-carbon economic opportunities, to favour technical pathways and social innovations that are appropriate in particular circumstances, and to mobilize political and cultural specificities. Alberta has wealth from hydrocarbon exploitation that might be set aside to diversify its economy toward low-carbon options; existing technologies could be adapted to low-carbon uses (e.g., geothermal energy production). It may be possible to generate carbon-neutral energy from the bitumen resource. Alternatively, there are routes to step away from the bitumen trap. Whatever pathways are explored, they will be rather different from those in Quebec, which has ideas about using its hydro surplus to advance the electrification of transport.

Here is not the place to try to elaborate regional decarbonization pathways. Rather, the point is to argue that it needs to be done. Defining regional low-carbon pathways would include:

- developing a good understanding of the historical trajectory of the regional energy political economy, and how past choices may enable or constrain low-carbon development pathways;
- analyzing key regional economic clusters and leading firms, and their potential contributions to decarbonization efforts;
- identifying critical technologies and social practices with particular significance for decarbonization in the regional context, given the character of local resources and economic structure;
- defining transition visions that build on existing strengths and opportunities;
- developing appropriate instruments to address competitiveness concerns in trade-exposed industries, and suitable adjustment schemes for sectors that will experience inevitable decline as the low-carbon transition intensifies (retraining workers, providing community sustainable-development assistance, etc.);
- exploiting regional and local governance institutions and potentials;
- mapping complementarities and collaborative initiatives with neighbouring jurisdictions;
- constructing storylines that exploit local/regional symbols and resonate with established social and political traditions.

Clearly such issues would constitute the basis for a substantial research agenda that can be productively pursued through intensive interaction among academics and societal stakeholders.

Green Economic Strategies

Over the past several decades, the idea of "industrial policy" has fallen out of favour in most developed countries. It is not a great exaggeration to say that the accepted wisdom has been that the core contribution that governments can make to long-term economic prosperity is to provide a stable macroeconomic environment that allows private-sector actors to exploit business opportunities, develop markets, and drive forward innovation. Emphasis has been on trade liberalization, ensuring flexible labour and capital markets, and establishing policy regimes that encourage entrepreneurial activity, with perhaps some attention to education and training. And yet, notwithstanding the official rhetoric, the substantial consensus, and the formal rejection of industrial policy, *in practice* all OECD governments maintain elaborate programs intended to protect or encourage certain industries, strengthen domestic firms, build exports, attract foreign investment while controlling foreign ownership in strategic sectors, and steer technological development in areas deemed to be in the national interest. A vast array of

policy instruments—including regulation, taxation, depreciation allowances, investment credits, low-interest loans, subsidies, and even occasionally tariffs or local content requirements—are deployed to this end.

The idea behind traditional industrial policy was that national economic development was too important to be left entirely to the whims of the market, that government intervention was required to steer economic activity, and that protection was sometimes needed to shield domestic industries from the structural power of international competitors. In short, industrial policy was linked to the idea of national economic development and power. It was deployed first by states playing industrial catch-up in Europe, acquired a further twist during post-World War II economic reconstruction, and was then taken up by developing countries to steer their industrial rise (Shapiro and Taylor 1990; Beath 2002). In its 1970s guise in countries like the United Kingdom it was seen as way to break out of stagflation and was associated with support for key economic sectors, nationalization of failing industries, and promotion of national champions. The actual practice of such industrial policy has been the object of numerous critiques, but underlying most is the idea that state policies that aim to achieve policy-makers' ideas of what economic development should look like (e.g., establishing or preserving one industry over another) ultimately depress overall output and squander existing comparative advantage.

"Green economic strategies" can be understood as government intervention (at various levels) to encourage a greening of economic activity to meet economic, social, and environmental goals. They share with traditional industrial strategy a belief that state action is required to reorient the "natural" path of economic development. They differ in the fact that their focus is primarily to ensure a "green shift," building the foundations for economic prosperity in an environmentally constrained world. The reference here is to "economic" rather than "industrial" strategies in order to emphasize that this is not just about material goods production but about economic activity writ large. And it is cast as "green," rather than "low-carbon," because the economic adjustments required for climate-change mitigation can then be set in the context of a broader array of environmental and resource issues, which will in any case become increasingly difficult to disentangle as the impacts of climate change become more severe. These include conventional air pollution, water- and land-use management, biodiversity, and so on. And, of course, this resonates with recent work by UNEP on the "green economy," and by the World Bank and the OECD on "green growth" (OECD 2011; UNEP 2011).

The core political justification for governments (at various levels) to pursue green economic strategies is that the existing economic, social, and political circum-

stances are so skewed that state action is required to break historically constituted patterns of activity (path dependence, lock in) and to allow a timely shift to an alternative development trajectory (Binder, Janicke, and Petschow 2013). Economists might put this in terms of externalities that relate not just to the social costs of carbon (and to other forms of environmental destruction) but also to other issues such as under-investment because of the difficulty for firms to recoup the full benefits of innovation. So while carbon pricing is essential, it is not sufficient. After all, there are political reasons why the carbon price is unlikely to be set high enough to secure desirable change. And while policy frameworks that encourage innovation in general can be helpful, they can also generate innovation that is counter-productive from an environmental perspective.

The point here is not to return to old-fashioned industrial policy that depends on tariff barriers to protect domestic industry from international pressures, or that funnels huge amounts of public money into designated national "industrial champions." Governments should not compete with each other, offering public money to attract transnational firms to their districts. Nor should the idea be to make green investments to secure specific job numbers in designated sectors. And yet there is a great deal that governments can do to encourage the emergence of a green economy—beyond a carbon tax and maintaining the general framework conditions for a healthy innovation-oriented economy.

One of the arguments involved with industrial strategies is that states are "not good at picking winners" (i.e., technologies, but also companies and even sectors). The truth is that no one is particularly good at this. For every hundred bright ideas dreamed up by engineering professors, only a handful make it to the start-up phase, and most of these fail. Moreover, private-sector firms regularly fail or become vulnerable to takeover by competitors because of bad technology bets. On the other hand, dominant firms can continue making money for decades with socially suboptimal technologies because informational deficits, barriers to entry, un-priced environmental externalities, and other factors prevent alternatives from getting established. And while firms that place losing bets eventually disappear, states hang around to be reminded later of their mistakes.

Green economic strategy does not necessarily mean picking specific technologies or companies. In many contexts it is sufficient to define functional requirements and then leave it to competition among firms and technologies to see who can deliver the most attractive package (acceptable performance at reasonable cost). On the other hand, policies that simply encourage the uptake of the lowest-cost (functionally adequate) technology may provide insufficient support for potentially higher performance technologies that are further from

the market (and that therefore require more targeted support). Moreover, it is important to realize that in relation to many large-scale energy technologies, government cannot simply stand by and “let the market decide.” The scale of social investment required, the potential social impacts, and the nature of the risks mean that developments will not proceed unless the public power decides to support a given trajectory. For example, there is no possibility that new nuclear installations will be built or carbon capture and storage (CCS) projects implemented unless the state accepts the ultimate risk. States are already fully involved in structuring energy markets, so the question is how to tip the playing field so that low-carbon development policy can be advanced.

A helpful starting place is to consider how to exploit existing resources, infrastructure, technological capacity, and expertise and to leverage these into greener areas. In other words, how can existing comparative advantages be extended in new directions? And how can potential comparative advantages that might emerge in the context of a world that presses more closely against environmental limits be actualized? Canadian political economists have spoken of exploiting resource linkages to break free from staples (and in this case also carbon) traps (Haley 2011). Here one might consider sideways steps to use existing resources in more sustainable ways, to green existing industries, and to adapt technological strengths to new areas. And investing in natural capital can, over time, enhance resource productivity while securing environmental benefits. Of course there are potential pitfalls: if green-economy policies are improvised, are not based on careful analysis and integrated decision-making, lack a vision of longer-term objectives, or are directed parochially rather than with a view to international markets, they are unlikely to succeed, as Winfield’s work on Ontario’s 2009 Green Energy and Economy Act has shown (Winfield 2013; Winfield and Dolter 2014).

The idea of green development strategies provides many promising avenues for research, particularly in terms of learning what does and does not work and how to avoid costly mistakes. There are several possible tracks, including investigating what other jurisdictions have done and are doing, and examining more closely Canadian experiences with both traditional industrial policy (such as the oil-sands development) and the green economy.

Think about Low-carbon Politics as well as Economics

Finally, we need to spend more time thinking about low-carbon politics. After all, the primary obstacles to moving toward a low-carbon economy are not technological. They are not even economic, in the sense that such a movement would impose debilitating economic

costs or threaten long-term prosperity. They are above all political: because policy action is required to tilt economic development away from its current GHG-emitting fossil-energy path. For a long time, powerful economic interests that benefit from current arrangements have been rather successful in hampering the emergence of a more determined political stance. Yet the recent elections of the NDP in Alberta and of the Liberals at the federal level show how rapidly political circumstances can alter the tone and orientation of the debate.

The truth is that at present we have lots of neat policy designs and instruments that could accelerate a transition to a GHG-emission-free energy system. But the political conditions required to bring them into play are only just emerging. So here are a few suggestions that could be cited under the heading of thinking more politically.

- *Building coalitions*: How can we establish political coalitions that are interested in driving forward the transition to a low-carbon economy? In this context, strengthening a green business sector is important not only economically but also politically, because such a sector will mobilize resources to push economic greening further. In other words, it alters structural power. But coalition-building includes many other dimensions. In the Canadian context, deepening understanding with First Nation and Metis communities could be a powerful lever, and there are many other constituencies that have yet to be fully mobilized, including professional organizations and faith groups.
- *Governance institutions*: How can we set in place institutional mechanisms that can maintain momentum for a low-carbon transition over the longer term (even when the attention of political leaders and the public wander)? The UK system of long-term carbon budgets, with its independent Climate Change Committee and system of parliamentary reporting, provides an example along these lines. In fact, we need an ecosystem of different institutions engaging with different functional aspects of the low-carbon transition, including the provision of scientific advice, strategic planning, acceleration of RD&D, mobilization of finance, assessment and monitoring, citizen engagement and public education (Meadowcroft 2009).
- *Distributional burden-sharing*: One of the successes of EU climate policy was to institute a burden-sharing approach (with differentiated climate targets) that acknowledged the varying circumstances of member-states, allowing more enthusiastic countries to push ahead while recognizing that others would eventually have to pull their

weight (Macdonald et al. 2013). No comparative Canadian mechanism exists.

- *In politics and policy, efficiency is not everything:* While lowest-cost solutions are desirable, the messy character of political bargaining, and the layering of new policies on top of old, mean that it is very hard to find policy areas where design and implementation are ideal. The low-carbon transition is unlikely to be any different. Ontario's coal phase-out was achieved by political fiat, over and above the objections of industry insiders. Equivalent carbon reductions might have been achieved more cheaply by carbon pricing. But carbon pricing was not then on the table. Sometimes a policy that strikes at a narrow target is politically easier than one that more directly involves wider publics.
- *Delegitimizing opponents is a critical transition manoeuvre:* Transitions are not just about technologies but also about the definition of social norms, public preferences, habits, and tastes. They involve cycles of hype and deliberate attempts to undermine the appeal of alternatives. Supporters of large-scale fossil (or nuclear) generation contrast the "reliability" of their facilities with the "intermittency" of new renewables, while the supporters of wind and solar now complain about the "inflexibility" of traditional plants. US campaigners made the Alberta tar sands the poster child for irresponsible hydrocarbon development. Twenty years of denial, obfuscation, and resistance to climate policy led by producer organizations like CAPP, and compliant governments, earned its reward.
- *Weakening the structural power of incumbents can open the door for change:* Incumbents enjoy economic and political ascendancy. Anything that weakens either strand can build momentum for change. For example, it is in transport that fossil fuels enjoy their greatest ascendancy. Rather than leaving this for last (because it is harder), immediate efforts to spur countervailing innovation can open up options. In the personal transport sector, electric vehicles stand furthest from the established trajectory. Even the threat of significant electric vehicle (or plug-in hybrid) penetration in major markets would have a powerful impact on oil producers. If nothing else it would stimulate innovation in directions (such as biofuels and hydrogen) where established fuel providers have some hope of controlling long-term supply. So significant public support for EVs might make sense, regardless of whether this provides cost-effective short-term emission reductions, or whether they ultimately emerge as the dominant personal low-carbon transport solution. Weakening incumbents economically also weakens them politically.

Conclusion

This paper emphasizes four interrelated elements that are important for Canada's journey toward a carbon neutral future: framing the movement in terms of a societal transition, developing regional decarbonization pathways, elaborating green economic strategies, and focusing on the politics of the low-carbon transition. The research community can contribute in each area: on transitions, by interrogating experience—both historical and cross-national—concerning niches and the development of portfolios of societal experiments, building systems of innovation, neutralizing and co-opting opponents, defining transition pathways, and so on; on regional decarbonization, through the analysis of political/economic configurations of power and the identification of technologies, firms, social forces, and citizen alliances that present opportunities for place-based fulcrums of change; on green economic strategies, by identifying innovation trajectories, establishing conditions for effective state action, and providing timely feedback on government initiatives; on politics, by helping to understand the interaction of political forces around the low-carbon societal project and approaches that can strengthen the momentum for change. But, above all, each of these areas defines a sphere for practical political action that must be taken up by societal forces to advance the struggle to achieve a carbon-neutral Canada.

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