ACTING ON CLIMATE CHANGE

Solutions from Canadian Scholars

Sustainable Canada Dialogues

United Nations Educational, Scientific and Cultural Organization

UNESCO Chair for Dialogues on Sustainability

McGill

Trottier ISPP

Réseau Environnement

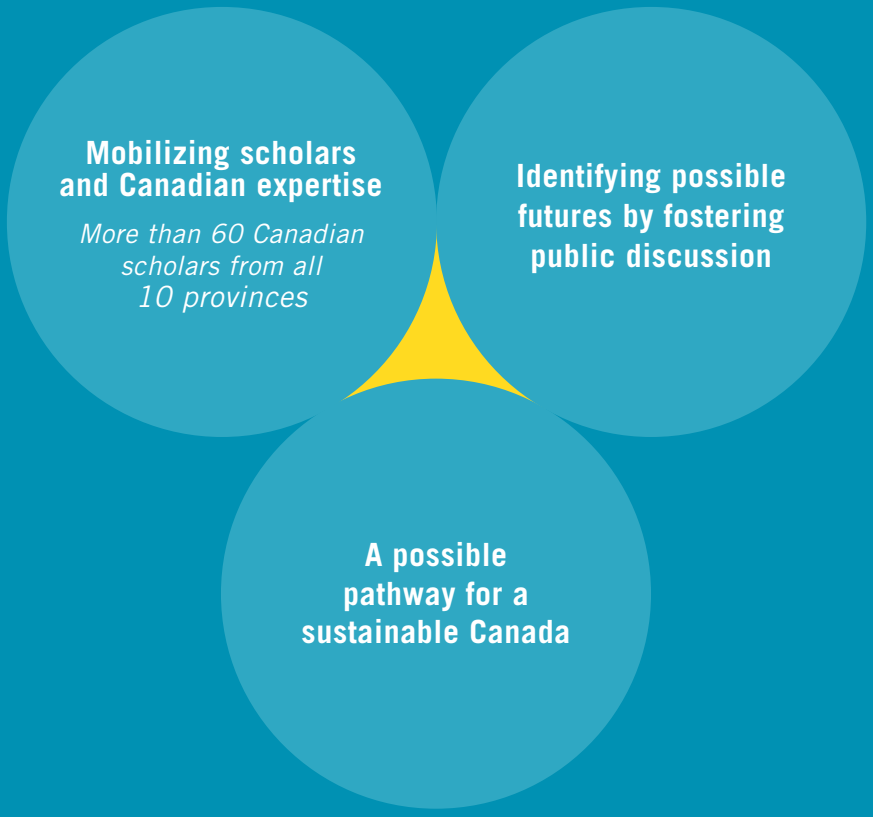
Association francophone pour le savoir

Acfas

SUSTAINABLE CANADA DIALOGUES

Sustainable Canada Dialogues (SCD) seeks to motivate change and help Canada in its necessary transition toward a low carbon economy. Through mobilization of scientific expertise, the initiative identified positive solutions that overcome obstacles to sustainability.

The initiative is oriented around three central activities:



ACKNOWLEDGEMENTS

This project was made possible thanks to the support of the **Trottier Institute for Science and Public Policy** of **McGill University** to C.P. and **UNESCO-McGill Chair for Dialogues on Sustainability**.

Many dedicated people made this project possible, to whom we owe our deepest gratitude. We are grateful to **Rosine Faucher**, who ensured implementation of the Delphi survey. **Taysha Palmer** did a great job as copy editor. Thanks also to **Martine Larouche** for proofreading the document. We are most grateful to **David Aldred** who provided the information necessary to produce the map of sustainable energies in Canada. The magical touch of **Globaïa** and **Felix Pharand-Deschênes** gave life to our position paper. **Jocelyne Néron** came to help when fatigue was setting in. Last but not least, **Natalie Richards** helped keep the ship afloat over an intense 18 months of work.

Thanks to **M. Anjos**, **F. Bouffard**, **C. A. Cañizares**, **E. Feurtey**, **J. Gibbons**, **L.D. D. Harvey**, **R. Lanoue**, **W. Locke**, **G. Marleau**, **J. Meadowcroft**, **N. Mousseau**, **P.-O. Pineau**, **I. H. Rowlands**, **H. Tremblay**, **L. Trottier**, **M.S. Winfield**, **J. Whitmore** and **E. Yiridoe** for contributions to a stimulating discussion during a workshop on Energy in Eastern Canada.

SCIENTIFIC COMMITTEE

CONTACT

dialogue.biology@mcgill.ca
@dialogsustainab
www.facebook.com/mcgillatwork

Check out: www.sustainablecanadadialogues.ca

March 2015

*To **Adèle** (2 months), **Alice** (4 years), **Arthur** (17 months), **Avery** (2 years), **Brookelyn** (7 years), **Camille** (3 years), **Elias** (5 years), **Emma** (1 week), **Evan** (8 years,), **Gabriel** (2 days), **Hanah** (9 years), **Isis** (3 years), **Jai** (10 years), **Josh** (10 years), **Jules** (2 weeks), **Keestin** (5 years), **Louve** (11 years), **Maggie** (13 years), **Megan** (13 years), **Manami** (2 years), **Matthew** (6 years), **Mireille** (13 years), **Naomi** (13 years), **Penelope** (7 years), **Samantha** (18 months), **Tal** (16 months), **Wilson** (12 years), **Wusko** (9 years), and **all other children**:*

YOUR FUTURE IS OUR INSPIRATION.

Canada's vast renewable energy potential

WIND ENERGY (W/m²) AT **50M**

50 — 1600

SOLAR ENERGY (kWh/kW)

758 — 1385

Existing Dams

Potential Dams

Transmission Lines

DATA
Solar Energy: Published by Natural Resources Canada and Environment Canada. Reproduced with the permission of Natural Resources Canada © Her Majesty the Queen in Right of Canada, 2007.
Wind Energy: Images downloaded from http://www.windatlas.ca on February 1 2015. Environment Canada.
Tranmission Lines: Government of Canada, Natural Resources Canada, Earth Sciences Sector, Canada Centre for Mapping and Earth Observation.
Existing Dams: Natural Resources Canada, Atlas of Canada 1,000,000 National Frameworks Data, Hydrology, Dams (v6.0), 2010.
Potential Dams: Global Forest Watch Canada, Hydropower Developments in Canada: Number, Size and Jurisdictional and Ecological Distribution, 2012.
Earth: NASA, Globalia. | Thanks to **David Aldred** for providing several datasets.

DESIGN
Félix Pharand-Deschênes, Globalia

10 KEY POLICY ORIENTATIONS

SHORT TERM	MIDDLE TERM	LONG TERM
POLICY ORIENTATION 1 **Put a price on carbon.**		
Adopt either a national carbon tax or a national cap and trade program.		
POLICY ORIENTATION 2 **Include aggressive goals for low-carbon electricity production in federal and provincial climate action plans.**		
Adopt ambitious sectorial targets for low-carbon electricity production.		
Support interprovincial electricity transportation infrastructure.		
POLICY ORIENTATION 3 **Integrate the oil and gas production sector in climate policies.**		
Eliminate all direct and indirect subsidies to the fossil fuel industry.		
Develop a clear regulatory framework coherent with the transition to a low-carbon economy.		
POLICY ORIENTATION 4 **Adopt a multi-level energy policy with energy efficiency and cooperation in electrification at its core.**		
Develop a national energy policy with long-term plans for transitioning to low-carbon energy.	Implement efficiency targets for energy use in the extractive industry.	
Ensure government efficiency standards and procurement.		
POLICY ORIENTATION 5 **Throughout Canada, rapidly adopt low-carbon transportation strategies.**		
Update emissions standards for vehicles and support fuel diversification.	Electrify road transport.	
Support new models of transportation.		
Favor active transportation.	Improve and increase intercity rail and intermodal transportation.	
POLICY ORIENTATION 6 **Integrate landscape, land use, transportation and energy infrastructure planning policies at multiple scales to ensure climate change mitigation.**		
Integrate climate change into the heart of territorial and urban planning and identify new avenues for financing.		
Acknowledge the importance of, and support, green infrastructure and "smart growth[1]" city planning.		
POLICY ORIENTATION 7 **Support evolution of the building sector toward a carbon neutral or carbon- positive sector.**		
Adopt ambitious targets for energy demand and efficiency of buildings and include climate change mitigation in national building codes.		
Invest in renewable and ambient energy for new and existing buildings.		
POLICY ORIENTATION 8 **Safeguard biodiversity and water quality during Canada's transition to a low-carbon society, while aiming for net positive approaches.**		
POLICY ORIENTATION 9 **Support fisheries, forestry and agriculture practices offering opportunities to limit GHG emissions, enhance carbon sequestration, protect biological diversity and water quality.**		
POLICY ORIENTATION 10 **Facilitate the transition to a low-carbon sustainable society through the implementation of more participatory and open governance institutions.**		

[1] *"Smart growth" cities are designed for high amenity, mixed land use and medium to high dwelling density, with all systems (water, waste, energy, transportation, buildings, etc.) made sustainable, clean, accessible, integrated, and connected using advanced technologies.*

EXECUTIVE SUMMARY

In fall 2014, UN Secretary Ban Ki-moon exhorted all countries in the world to raise the ambition of their climate change policies to avoid a global temperature increase of more than 2°C during this century. Answering this call, the scholars of *Sustainable Canada Dialogues*[1] (SCD), an initiative that mobilizes over 60 researchers from every province, worked collectively to identify a possible pathway towards a low carbon economy in Canada. Our network of scholars represents disciplines crossing engineering, the sciences and social sciences, where sustainability is at the heart of our research programs.

Acting on Climate Change: Solutions from Canadian Scholars identifies ten policy orientations illustrated by actions that could be immediately adopted to kick-start Canada's necessary transition towards a low carbon economy and sustainable society. **We unanimously recommend putting a price on carbon**.

Climate simulations, carried out in the context of SCD by the Consortium OURANOS[2] based on the mitigation scenarios of the Intergovernmental Panel on Climate Change, show that immediate global action would successfully limit temperature increases in Canada. We must act today to ensure tomorrow.

Besides putting a price on carbon, *Acting on Climate Change: Solutions from Canadian Scholars* examines how Canada can reduce its greenhouse gas emissions (GES) by: 1) producing electricity with low carbon emissions sources; 2) modifying energy consumption through evolving urban design coupled with a transportation revolution; and 3) linking transition to a low-carbon economy with a broader sustainability agenda, through creation of participatory and open governance institutions that engage the Canadian public. Our proposals take into account Canada's assets and are based on the well-accepted "polluter pays" principle. They are presented in detail in the core document that can be downloaded from the SCD website.

In the short term, policy orientations that could trigger climate action include:

- Implementing either a national carbon tax or a national economy-wide cap and trade program;
- Eliminating subsidies to the fossil fuel industry and fully integrating the oil and gas production sector in climate policies;
- Integrating sustainability and climate change into landscape planning at the regional and city levels to ensure that, amongst other goals, maintenance and new infrastructure investments are consistent with the long-term goal of decarbonizing.

1 http://www.sustainablecanadadialogues.ca/en/scd

2 http://www.ouranos.ca

In the short to middle term, the transition could be facilitated by:

- East-West smarth grid connections that allow provinces producing hydro-electricity to sell electricity to their neighbors to take full advantage of Canada's low-carbon energy potential;
- Well-managed energy efficiency programs that produce significant positive economic returns across the board, through cost savings as well as job creation. Energy efficiency programs could target the building sector as well as businesses and industries.

In the short to long term, the transition could support a transportation "revolution":

- Transportation strategies that move the sector away from its dependence on fossil fuel could rest on the implementation of a basket of options, ranging from electrification of transport to collective and active transportation.

Because renewable energy resources are plentiful, we believe that Canada could reach **100% reliance on low-carbon electricity by 2035**. This makes it possible, in turn, to adopt a long-term target of at least an **80% reduction in emissions by mid-century**, consistent with Canada's international climate mitigation responsibility. In the short-term, we believe that Canada, in keeping with its historical position of aligning with US targets, could adopt a **2025 target of a 26-28% reduction in GHG emissions relative to our 2005 levels**.

We envision climate policy as the ongoing, long-term project of making the *transition* to a low-carbon society and economy. This notion of transition has many advantages: the 80% target establishes the direction of change, allowing Canada to plan for the future while recognizing that goals will take time to accomplish. It permits governments, businesses and citizens to situate their activities within a dynamic context. As with other past and future major transitions, e.g. industrialization or electrification, there will be controversies and setbacks. Some economic sectors will contract as others expand. The most important aspect of Canadian climate policies is to build a sustainable future *starting today*.

Recognition that certain forms of economic development cause environmental damage led to the notion of sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." We have adopted a more recent definition of sustainability that emphasizes the importance of desired futures. We propose that the specific transition pathways to low-carbon economy in Canada could rest on the hopes of Canadians for social and environmental well-being and help to articulate a vision for the country.

The transition to a low-carbon sustainable society will usher in great opportunities for innovation by developing new technologies, businesses and employment. The international landscape has changed substantively since Canada withdrew from the Kyoto Protocol in December 2011. Canada's major trade partner, the USA, doubled their GHG emissions reduction target in 2014. For example in 2011, the International Energy Agency (IEA) estimated that investments for energy efficiency were worth USD 310-360 billion[3]. A clear climate policy framework would reduce uncertainty in the business environment, encouraging companies to invest in low-carbon technologies.

We have identified policy orientations designed to deliver substantial, viable change based on our expertise and dialogue among our members. We do not claim to offer all possible policies or incentives to achieve sustainability, and we understand that further analyses, debate and refinement will be required. However, in virtually all cases, our proposals are in line with a number of international and national analyses of viable policy options to decarbonize.

We believe that putting options on the table is long overdue in Canada and hope that our input will help governments at all levels to make ambitious and thoughtful commitments to emissions reductions before December 2015 and the *2015 Paris-Climate Conference*. We wish for an intense period of consultation and policy development to identify the policy instruments, regulations and incentives best suited to Canada. We offer our full cooperation to all levels of government in this challenging, but exciting, period. The time is now ripe to initiate ambitious climate change mitigation efforts.

3 http://www.iea.org/bookshop/463-Energy_Efficiency_Market_Report_2014

AUTHORS

Potvin, Catherine, Department of Biology, McGill University

Aitken, Sally, Faculty of Forestry, University of British Columbia

Anctil, François, Institut EDS, Université Laval

Bennett, Elena, Department of Natural Resources Sciences, McGill University

Berkes, Fikret, Natural Resources Institute, University of Manitoba

Byrne, James, Department of Geography, University of Lethbridge

Creed, Irena, Department of Biology, Western University

Cunsolo Willox, Ashlee, Department of Nursing and Indigenous Studies, Cape Breton University

Dale, Ann, School of Environment and Sustainability, Royal Roads University

de Lange, Deborah, Ted Rogers School of Management, Ryerson University

Entz, Martin, Department of Plant Science, University of Manitoba

Fraser, Lauchlan, Faculty of Science, Thompson Rivers University

Hoberg, George, Faculty of Forestry, University of British Columbia

Holden, Meg, Department of Urban Studies and Department of Geography, Simon Fraser University

Jacob, Aerin, Department of Geography, University of Victoria

Jodoin, Sébastien, Faculty of Law, McGill University

Margolis, Liat, John H. Daniels Faculty of Architecture, Landscape and Design, University of Toronto

Meadowcroft, James, School of Public Policy and Administration, Carleton University

Morency, Catherine, Department of Civil, Geological and Mining Engineering, Polytechnique Montréal

Mousseau, Normand, Department of Physics, Université de Montréal

Oakes, Ken, Department of Biology, Cape Breton University

Otto, Sally, Department of Zoology, University of British Columbia

Palmer, Taysha S., Knowledge Transfer Consultant

Paquin, Dominique, Climate Simulation and Analysis, Ouranos

Perl, Anthony, Department of Political Science, Simon Fraser University

Potvin, André, École d'architecture, Université Laval

Raudsepp-Hearne, Ciara, Consultant

Sinclair, Brent, Department of Biology, Western University

Slawinski, Natalie, Faculty of Business Administration, Memorial University

Stoddart, Mark, Department of Sociology, Memorial University

Wright, Tarah, Faculty of Science, Dalhousie University

PARTICIPATING RESEARCHERS

Bourque, Alain, Impacts and Adaptation Program, Ouranos

Dyck, Bruno, Asper School of Business, University of Manitoba

Godbout, Stéphane, Biological Sciences, Université Laval

Heyland, Andreas, Department of Integrative Biology, Guelph University

Huang, G., Institute for Energy, Environment and Sustainable Communities, University of Regina

Kemper, Alison, Faculty of Entrepreneurship, Ryerson University

Lucotte, Marc, Department of Atmospheric and Earth Sciences, Université du Québec à Montréal

Maranger, Roxane, Department of Biological Sciences, Université de Montréal

Matthews, Ralph, Department of Sociology, University of British Columbia

Mauro, Ian, Department of Geography, University of Winnipeg

McDonnell, Jeffrey, School of Environment and Sustainability, University of Saskatchewan

Mkandawire, Martin, Verschuren Centre for Sustainability in Energy and the Environment, Cape Breton University

Messier, Christian, Department of Biological Sciences, Université du Québec en Outaouais

Palmater, Pamela, Department of Politics and Public Administration, Ryerson University

Villard, Marc-André, Department of Biology, University of Moncton

Villeneuve, Claude, Department of Fundamental Sciences, Université du Québec à Chicoutimi

Wesche, Sonia, Department of Geography, University of Ottawa

INTERNAL SCD REVIEWERS

Bernstein, Steven, Department of Political Science, University of Toronto

Bleau, Nathalie, Built Environment Program, Ouranos

Brown, Bryson, Department of Philosophy, University of Lethbridge

Burch, Sarah, Department of Geography and Environmental Management, University of Waterloo

Etcheverry, Jose, Faculty of Environmental Studies, York University

Fenech, Adam, Climate Laboratory, University of Prince Edward Island

Henriques, Irene, Schulich School of Business, York University

Hoffmann, Matthew, Department of Political Science, University of Toronto

Ramos, Howard, Department of Sociology and Social Anthropology, Dalhousie University

Robinson, John, Institute for Resources, Environment and Sustainability, University of British Columbia

Simard, Suzanne, Faculty of Forestry, University of British Columbia

EXTERNAL REVIEWERS

who read and commented on earlier versions of the present document

Anjos, Miguel F., Trottier Institute for Energy, Université de Montréal

Bécaert, Valérie, Department of Chemical Engineering, Polytechnique Montréal

Harvey, L.D. Danny, Department of Geography, University of Toronto

Jaccard, M. School of Resource and Environmental Management, Simon Frazer University

Layzell, David, Department of Biological Sciences, University of Calgary

Miller, Eric, School of Public Policy and Governance, University of Toronto

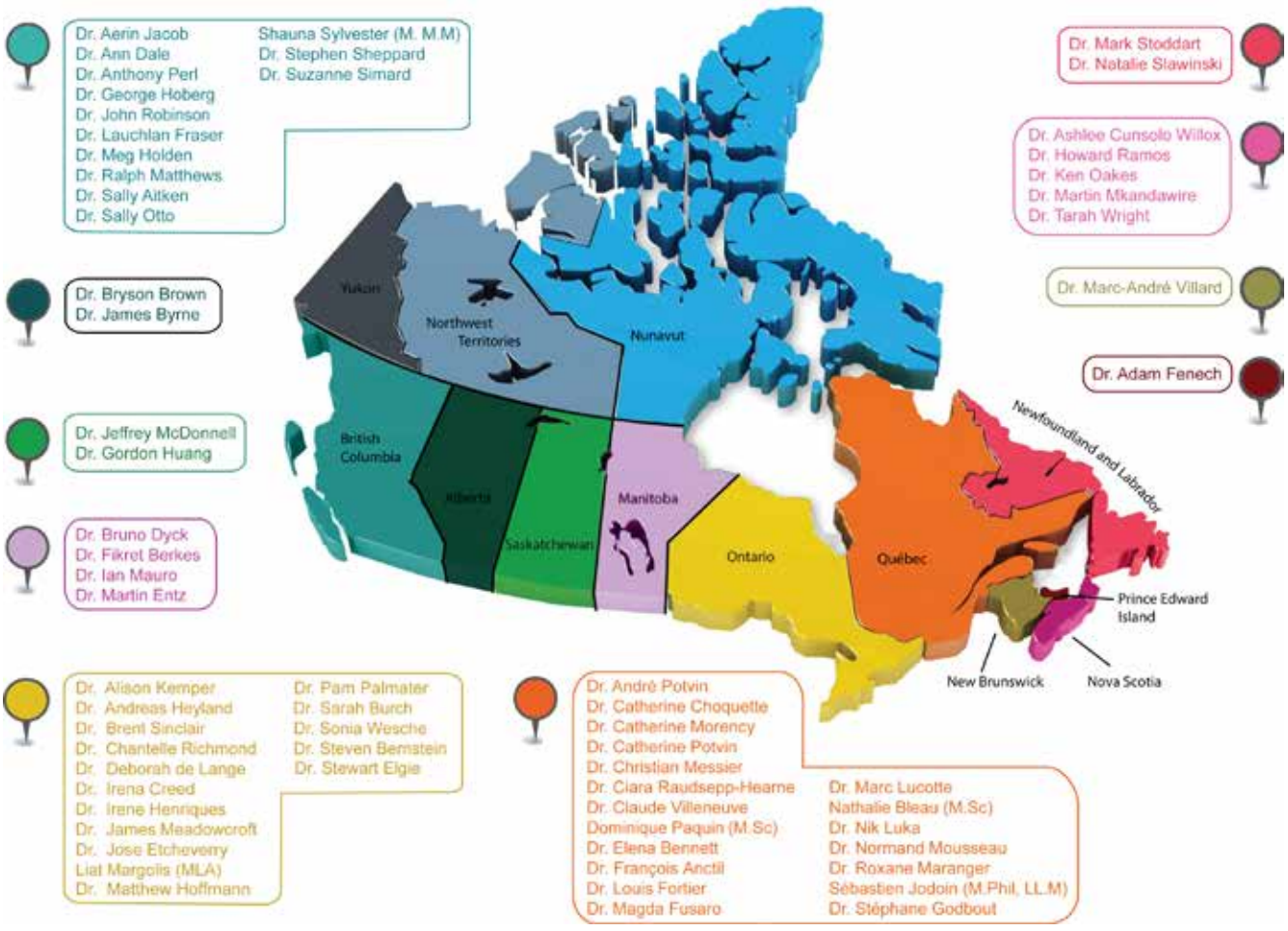
Pedersen, Thomas, Pacific Institute for Climate Solutions, University of Victoria

Pineau, Pierre-Olivier, Hautes Études Commerciales, Université de Montréal

Ragan, Chris, Department of Economy, McGill University

Whitmore, Johanne, Hautes Études Commerciales Montréal

MAP OF
SUSTAINABLE CANADA DIALOGUES SCHOLARS



COVERPAGE AND SUSTAINABLE ENERGY MAP : Félix Pharand-Deschênes/Globaïa
MAP OF SCD SCHOLARS : Christian Archibold
LAYOUT : Yuli Richard Lépine