NRT

NATIONAL ROUND TABLE ON THE ENVIRONMENT AND THE ECONOMY

PLANNING FOR PROSPERITY:
BUILDING CANADA'S LOW-CARBON GROWTH PLAN

NRT-Canada West Foundation
Stakeholder Consultation Session

Canada West FOUNDATION

"HOW EACH NATION ADAPTS TO A CARBON-CONSTRAINED WORLD WILL, TO A LARGE EXTENT, DETERMINE ITS FUTURE ECONOMIC COMPETITIVENESS AND ABILITY TO CREATE PROSPERITY FOR ITS RESIDENTS."

The Climate Institute & E3G in *"G20 Low Carbon Competitiveness"*

CanadaWest
FOUNDATION

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Section ONE

IMPACTS OF A LOW-CARBON GROWTH PLAN FOR **CANADA**

MEETING PURPOSE

The National Round Table on the Environment and the Economy (NRT) is investigating the economic risks and opportunities of climate change for Canada. As part of this initiative the NRT is exploring what a low-carbon economy looks like for Canada. This meeting is one of ten regional events being held by the NRT and its Regional Partners across the country throughout November and December, 2011. The purpose of these sessions is to obtain stakeholder input and advice on the regional and pan-Canadian opportunities and challenges inherent in the global transition to a low-carbon economy, and how Canada can succeed and prosper in this new reality. This input will shape the findings and recommendations of the NRT in its development of a low-carbon growth plan for Canada.

The meeting will help:

- Solicit broad-based private sector input on how Canada should position itself in the global low-carbon transition;
- Improve our understanding of regional priorities and opportunities; and
- Ensure that our advice is grounded in the regional realities.

ABOUT THIS DOCUMENT

This document provides an overview of the subject matter, presenting the motivation for the work and how we approach it. It contains some initial ideas as to priorities and issues deserving further exploration. The intent is to provide you, the participant, with guidance on the input we are seeking without constraining the discussion and new ideas. Where helpful, we have included some preliminary findings from our research and analysis.

The relevance and quality of our research and advice depends on our ability to capture both the diversity of regional perspectives and business and industry views across sectors. Your engagement is critical in ensuring that your region's priorities are accurately represented and your industry's perspective is heard. Your input will influence our findings and recommendations and ultimately, the direction of the proposed low-carbon growth plan for Canada.

BACKGROUND

"This is not just about coping with climate change, but **Prospering** through it."

The NRT – an independent federal policy advisory agency – has embarked on a comprehensive policy initiative called *Climate Prosperity*, exploring the economic risks and opportunities of climate change for Canada. This multi-year policy research program focuses on two streams of research – low-carbon transition and climate change adaptation – and will result in the publication of six policy reports. Four studies have already been released (*Measuring Up; Degrees of Change; Parallel Paths; Paying the Price*).

The focus of this discussion, Climate Prosperity Report 6 (Report 6), builds on the two completed reports in the low-carbon economy stream (*Measuring Up* and *Parallel Paths*) with the intent of charting a path forward to position Canada to prosper in the context of anticipated future global carbon constraints and new low-carbon economic opportunities.

It is fair to say that the global economy is already beginning a transition to a low-carbon economy. Climate change, rising energy costs, and security concerns are combining to create increasingly favourable conditions for countries and companies across the world to invest in and develop markets for "clean" or "green" technologies. This investment has the potential for transforming energy and transportation systems around the world. In order to remain competitive, Canada's economy will also need to transition to a lower carbon intensity.[i] The manner in which this is done, the timing, pace and scale with which this is accomplished, will have significant implications for the Canadian economy and for individual regions and sectors.

[i] Carbon intensity of the economy refers to the average quantity (mass) of carbon dioxide equivalent (CO_2e) associated with the generation of one dollar of gross domestic product (GDP). The inverse of this metric – carbon productivity, or how much income the economy generates per unit carbon expended – is also useful.

Climate Prosperity Report 6 will identify key components of this transition, examining the implications for Canadian regions and sectors with respect to both risks and opportunities. Ultimately we seek to identify the steps required to ensure a smooth transition – to best manage risks and harness opportunities for Canada. This low-carbon growth pathway will improve energy efficiency, drive innovation, create jobs, incite sustainable resource development and reduce environmental impacts. It will consider where Canada needs to invest, how private and public investment can be leveraged, what we need to do to develop and promote Canadian products domestically and in international markets, as well as what governance structures and mechanisms are required to facilitate this transition.

WHY A LOW-CARBON GROWTH PLAN ?

A global low-carbon transition is underway.

Canada's competitors and trading partners are active in planning for and initiating resource-efficient growth: the EU published its 2050 low-carbon growth roadmap this past March; UNEP published its Green Economy Report in early May; and the OECD released its series Towards Green Growth in May. The United Kingdom continues to be a leader in undertaking detailed studies, developing plans, and initiating action as exemplified most recently by the establishment of the U.K. Green Bank. Emerging economies are not to be left out of the picture: China released its 12th 5-year plan – its primary economic planning document – in March. This document highlighted climate change as a priority issue and the reduction of the carbon-intensity of the Chinese economy as an area for action (17% reduction in GHGs per unit GDP).

> "At home and abroad, the opportunities are huge. For jobs, exports, and growth, the future is green. We are already feeling the benefits. Because the cost of investing in low-carbon energy and security of supply pales in comparison to the costs of dangerous climate change and energy dependency... There are real economic opportunities up for grabs."
>
> - Chris Huhne, UK Climate Change Secretary, April 2011.

Significant investments are being made by both public and private sectors.

World-wide investment in "clean energy" (excluding R&D) has grown 630% to $234 billion since 2004, growing 30% in the last year alone.[1] Following the financial crisis of 2008, the world's major economies promised $194.3 billion in clean energy stimulus funds.[2] Despite cuts in the 2011 budget, the United States is investing heavily in low-carbon energy as part of its economic recovery and job creation strategy[ii], and is ranked third globally in terms of attracting clean energy investment.[3] In 2010, the Australian government announced a $652 million Renewable Energy Future Fund as part of its $5 billion Clean Energy Initiative.[4] The EU, led by Germany (ranked second globally in attracting clean energy investment) is investing significantly in clean energy systems. Most interestingly, however, as documented in the Breakthrough Institute's report, *Rising Tigers, Sleeping Giant*, China, Japan and South Korea are expected to out-invest the US in terms of public expenditure on "clean technology" (a significant portion of which is low-carbon energy) by a factor of 3 to 1 over the 2010 to 2014 period. The accuracy of this prediction is already being seen in the ability of Asia to attract private sector capital on the clean energy front.

[ii] While the US has long been a leader in clean energy investment, significant spending reductions in energy efficiency and renewable were introduced in the 2011 budget. Despite these cut-backs, public spending on clean energy remains significant ($31.8 billion on energy and water). In addition, President Obama's jobs plan includes mention of renewable energy, energy efficiency, sustainable green buildings, and high-speed rail transportation infrastructure.

The growth potential for low-carbon goods and services is substantial.

Preliminary NRT analysis suggests that global investment in low-carbon goods and services (LCGS) sectors is currently in the range of $2 trillion.[5] Going forward under a business-as-usual scenario, this investment is expected to grow to over $4.5 trillion in 2050. If carbon mitigation policies were broadly implemented, this annual investment would be expected to be twice as large.[iii] Our analysis also estimates that under a business-as-usual scenario for Canada, domestic LCGS investment would grow from about $10 billion (currently) to almost $60 billion in 2050. The domestic growth rate in low-carbon goods and service sectors is close to double the expected overall annual economic growth rate. This represents a significant opportunity in terms of both domestic and international markets.

Carbon is increasingly central to trade.

Low-carbon and clean energy have increasingly been cited as factors or motivations in trade discussions and bilateral relations. The UK-China Low Carbon Cooperation agreement was signed in January 2011, a memorandum of understanding aimed at increasing collaboration on energy markets and low-carbon technology. France is considering carbon labelling under its "Grenelle 2" law, potentially introducing non-tariff trade barriers to imported products. Low-carbon fuel standards are under discussion in numerous jurisdictions, and the relative carbon content of oil from Canada's oil sands has been a subject of much discussion south of the border. Given Canada's heavily resource-oriented economy, this focus presents obvious trade risks but also opportunities.

[iii] In estimating potential growth in LCGS sectors, two possible future scenarios published by the International Agency (IEA) were considered: the Baseline; and the Blue Map. The Baseline is a business-as-usual projection whereas the Blue Map is target-oriented with an objective of halving global energy-related CO_2 by 2050 (compared with 2005 levels). The BAU follows the IEA's World Energy Outlook reference scenario to 2030 and then extends it to 2050. It assumes that governments introduce no new energy and climate policies. The Blue Map scenario would be close to achieving the emissions reductions necessary for the atmospheric concentration of CO_2 to remain within 450 ppm.

Canada needs to position itself to most effectively manage the risks and harness the opportunities inherent in the global low-carbon transition.

While it is not necessarily a matter of "being left behind", Canada does need to position itself to compete in those areas where we have economic advantage – if we don't occupy the space, someone else will. There are windows of opportunity that will close if we are not prepared and positioned to take advantage of them. We may not be leaders in all areas related to "low-carbon", and we must continue to exploit our comparative natural resource advantage; however, we will lose opportunities and incur higher costs if we approach this inevitable transition in an ad-hoc or delayed manner. Planning and investing now provides opportunity to shape possibilities and secure our prosperity for the future.

WHERE DOES CANADA STAND?

Traditional measures of competitiveness are inadequate in assessing the implications of the manner in which countries respond to the opportunities and costs inherent in the global low-carbon transition.[6] Low-carbon competitiveness is not simply a matter of where a country is now, but of its direction, how fast it is changing direction, and the magnitude of the challenge, especially when compared to others.

NRT's 2010 report, *Measuring Up*, published a unique low-carbon performance index for Canada, comparing our performance within the G8. Seen below, it considers Canada's performance in terms of five categories: Emissions and Energy, Innovation, Skills, Investment, and Policy and Institutions (Governance). This analysis found that while Canada was competitive on some fronts, it placed sixth out of the G8 and was not yet well-positioned overall to compete in a carbon-constrained world.

OVERALL RANKING OF G8 COUNTRIES BY CATEGORY AND TIER

	OVERALL	EMISSIONS & ENERGY	INNOVATION	SKILLS	INVESTMENT	POLICY & INSTITUTIONS	NORMALIZED FINAL SCORE
TIER 1 (AVERAGE SCORE: 53 POINTS)							
France	1	1	4	3	1	4	58
Germany	2	5	2	2	3	2	52
United Kingdom	3	4	6	5	5	1	48
TIER 2 (AVERAGE SCORE: 40 POINTS)							
Japan	4	2	1	8	7	5	43
United States	5	3	5	4	2	7	40
Canada	6	6	3	1	4	6	38
TIER 3 (AVERAGE SCORE: 17 POINTS)							
Italy	7	7	7	6	6	3	27
Russia	8	8	8	7	8	8	7

* NORMALIZED SCORE IS ROUNDED UP TO A WHOLE NUMBER.

Both the approach and this conclusion are supported by other international studies, one of which considers a cross-section of three indices – low-carbon competitiveness; low-carbon improvement; and low-carbon gap – and suggests that Canada requires a "significant turnaround in performance" to be carbon-competitive going forward. This study ranks Canada 7th place with respect to low-carbon competitiveness (consistent with NRT's "carbon productivity" ranking under the emissions & energy category) but goes on to highlight that this ranking is not expected to improve without directed action as evidenced by Canada's ranking (9th and 15th) in the low-carbon improvement and low-carbon gap indices. These metrics build on the carbon-competitiveness index and consider the future rate of reduction in carbon-intensity as a function of the existing policy framework, anticipated changes in this framework, and the investments and policy direction required to improve carbon productivity across the economy.[7]

> "A good hockey player plays where the puck is. A great hockey player plays where the puck is going to."
>
> - Wayne Gretzky

We have some work to do. It is not simply a question of low-carbon vs. high-carbon. It is not necessarily the abandonment of our past and present for a radically different future. In this time of economic uncertainty it is an opportunity for transformative thinking. This transition could lead to a re-thinking of how we do things, how we invest, and how we position ourselves for the long-term. Significant investments have been made in establishing economic advantage in our resource sectors – we need to build on this and to look at new and innovative ways of sustainably developing these resources. We need to avoid "locking-in" to a carbon intensive future while making good use of the natural resources on which our current wealth is based. We have a comparatively low-carbon electricity system – we need to determine what must be done so that we can effectively use it as a backbone for growth. The very expansive nature of our country which, on the one hand is a benefit, is also a burden with respect to transportation and freight GHG emissions. We need to make investments today to realize a more carbon-competitive network in the future. *We need a plan to position Canada to be competitive and prosperous through the global low-carbon transition.*

BUILDING CANADA'S LOW-CARBON FUTURE

An assumption underpinning the research and analysis for Report 6 is that carbon constraints abroad (through policies in other jurisdictions) will eventually have economic implications for Canada. The nature, scale and timing of these carbon constraints are uncertain. From this assumption, we identify two areas of opportunity for Canada moving forward:

1. In the short run, there are opportunities to supply goods and services in response to growing domestic and international demand for low-carbon goods and services (LCGS); and

2. In the long run, carbon constraints, whether explicit (carbon price) or implicit (policies and regulations, high fossil fuel prices, non-tariff trade and market access barriers, etc.), national or international, are likely to expand in scope across the economy and to increase in magnitude. The second area of opportunity is in maintaining and enhancing competitiveness in non-LCGS sectors in an increasingly carbon-constrained world.

LCGS Streams

Upstream	Wind Solar PV Wave & Tidal Biomass (power) Geothermal Hydro Nuclear Power Biofuels (transportation and non-transportation) Carbon Capture & Storage
Combined	Efficient manufacturing and industrial processes
Downstream	Energy management Low-carbon buildings Efficient vehicles Low-emission agricultural practices Low-emission forestry practices

The objective of this work is to articulate a coherent policy pathway (*a low-carbon growth plan*) to respond to these opportunities – to ensure Canadian economic growth and competitiveness under future global carbon constraints.

We are approaching the examination of Canada's low-carbon growth, competitiveness, and prosperity from two high-level perspectives: investment and governance. In addition to these two high-level, cross-cutting lenses, we are considering four policy categories in the development of a low-carbon growth plan:

- Emissions and Energy;
- Trade;
- Innovation; and
- Labour Markets.

Investment

Investment is the means by which actions are taken, by which the future is defined. But investment is more than simply dollars spent. There is a role for direct public investment, and there are questions around where government dollars are best spent, particularly in this era of economic uncertainty and fiscal restraint. Government spending can also be leveraged through the private sector to increase the potential return on public-sector investment. Government policy also directly and indirectly affects private sector investment, encouraging or discouraging it, and guiding where it occurs. In this work we are seeking to answer the following questions in the context of positioning Canada for competitiveness and prosperity in a carbon-constrained future:

- Where should Canada be investing?
- How can public-sector investment be most effectively leveraged?
- What can government do outside of direct investment to stimulate private-sector investment?
- What are the barriers to private-sector investment?
- What are the barriers to effective public-sector investment?

Prosperity and Competitiveness

Prosperity

Prosperity, in the context of this work, refers to economic well-being – the continued growth and development of our economy. However, the term also implies that this economic well-being is sustainable over the long-term.

Competitiveness

Competitiveness, in the context of this discussion paper, is canada's ability to secure future prosperity – if we are competitive today we are well positioned to thrive tomorrow. Competitiveness is thus not necessarily premised on a zero-sum game.

Governance

Governance defines who makes decisions, the manner in which decisions are made, and the framework within which the outcomes of decisions – performance – is assessed. Governance can be defined as the sum of organizations, policy instruments, financing mechanisms, rules, procedures and norms.[8] The governance of low-carbon economic growth and innovation is a complex challenge, with responsibility for emissions reduction and investment decision-making spread across multiple public- and private-sector actors. Even strictly within government, responsibility may lie across multiple ministries and/or agencies in addition to the shared responsibilities between levels of government. The objective of governance for low-carbon growth is to narrow the gaps (e.g. information, capacity, funding, administrative, policy, etc.) among different actors so as to improve coordination of efforts – create the enabling conditions for effective action. This can be done through streamlining and/or as necessary, establishing new structures, processes, institutions, etc. As we look at how Canada needs to position itself for competitiveness and prosperity in the carbon-constrained future, we are asking:

- Are existing Canadian governance structures and mechanisms best suited for seeing us through the global low-carbon transition?
- How can existing governance structures be adapted to ensure successful vertical and horizontal coordination of government efforts?
- Are there innovative governance structures, processes, and/or institutions from elsewhere that Canada could employ to increase the effectiveness of its efforts?

Emissions & Energy

As a resource-rich country, an important contributor to our current economic well-being – and certainly our economic growth in recent years – is energy and emissions intensive industrial activity and manufacturing as well as services that cater to these industries. Any plan for low-carbon growth must consider the role of these sectors, the opportunity going

forward, and the risks to which they may be exposed under future global carbon constraints. Given our climate and the expansive nature of our geography, energy consumption in buildings and transportation is fundamental to the carbon-competitiveness of our country. Our electricity system is relatively carbon-competitive, but there is untapped potential and opportunities exist both with respect to electricity generation and transmission. Our transportation system is highly oriented around the personal vehicle (intra-regionally) and aviation (inter-regionally). Changes to the status quo involve significant investment. New fuels may require step changes in innovation and substantial changes in infrastructure investment, climate policy targets and plans. We need to identify where the key opportunities lie, where there are significant risks, and those situations where the window of opportunity is limited – either for positioning Canada to take advantage of an opportunity or to effectively manage a risk.

- What are the elements (actions, investments, etc.) that need to be included in a low-carbon growth plan for Canada?
- What are the immediate windows of opportunity for transitioning cost-effectively to a low-carbon economy? Where do we need to act in the next ten years to avoid technological lock-in and path dependency?

Trade

There are uncertainties associated with the potential magnitude of LCGS sector growth, just as there are uncertainties with respect to potential risks and costs associated with operating in a carbon-constrained world. In the short term, certain trade policies and/or approaches could be employed to assist in harnessing the export opportunity for Canadian LCGS sectors and to develop the Canadian domestic market. For example, trade negotiations and special agreements could be initiated in order to secure better access to priority markets and import technology that could help Canada to be more resilient over the long term (e.g. where Canada has no competitive advantage). In the long term, if Canada does not start to reduce the carbon-intensity of its economy and continues to depend heavily on energy and emission-intensive competitive advantages

for growth, it may face risks in the form of potential trade barriers and other measures employed by countries to protect the environment and their industrial interests by preventing carbon leakage or to meet national and international climate goals. We are seeking to better understand:

- What are the key trade risks and opportunities for Canada with respect to global carbon constraints in both the short- and long-terms?
- What should Canada be doing to bolster international trade in LCGS sectors?
- How can trade policies / measures contribute to Canada's transition to a low-carbon economy?
- Are there domestic barriers to trade that hamper our carbon competitiveness?

Going forward, how important will the carbon foot-print of our consumption (i.e. embodied carbon of imported products) be relative to the footprint of our production?

Innovation

Innovation[iv] is fundamental to the transition to a low-carbon economy – in terms of technology and research & development. In addition to providing the opportunity to develop first mover advantages and increase opportunity in export markets, technological innovation can be seen as the very basis for carbon-competitiveness. The question to answer is how low-carbon innovation can be encouraged. While at a national level competitiveness can be considered in terms of a zero-sum game in which market share is the predominant determinant of competitiveness, competitiveness can also be considered in terms of productivity.[9] This perspective suggests that a country's standard of living depends heavily on its own domestic performance and less on how it performs in international markets. The more efficiently an economy produces goods and services, the more wealth is generated and the higher the standard of living. Innovation is fundamental to increasing resource efficiency. There has been significant critique and analysis of Canada's performance in innovation,

[iv] Innovation can be considered from a number of perspectives: product/service innovation, process innovation, system innovation, organizational innovation, and policy innovation (Wolff et al., 2007).

particularly in terms of our capacity for commercialization of R&D, with the most recent analysis undertaken by the Federal Review Panel on Research & Development scheduled for release in October. Two questions come to mind:

- Are there actions that need to be taken specific to low-carbon innovation, or are the challenges and recommendations generally consistent with innovation writ large?
- What are the priority areas for low-carbon innovation – where is innovation most needed in the short- and long-term?

Labour Markets

The global transition to a low-carbon economy will involve changes to the Canadian economy over the long-term, including changes in technology and energy systems, and possibly the emergence of new industries alongside those that underpin today's economy. In particular, increased investment in LCGS sectors is expected to influence the number and nature of jobs that will be created in Canada over the coming decades. It is estimated that investment in Canada's LCGS sectors will increase substantially over the next 40 years (2010-2050) positively influencing employment both directly within the LCGS sectors and in the industries supplying them.[10] Preliminary analysis suggests that the employment resulting from investment in LCGS sectors could grow from under one hundred thousand full time jobs in 2010 to several hundred thousand jobs in 2050 under a business-as-usual scenario.[11] Workers and employers across Canada will need to adjust to this new reality and the post-secondary education system might have to provide new types of workers.

The Canadian labour market has the capacity to adjust to changes, but these adjustments will likely take years, depending on factors such as specific skills needs, labour market information, the rate and scale of technological changes, worker mobility, and the capacity of the post-secondary education system to provide new workers and of the private sector to train existing workers.[12] It is not yet clear which types of jobs will most be in demand or in low demand, which jobs will change, and what new jobs will emerge in a low-carbon economy. In

addition, labour market pressures and the capacity to adjust to them might not be the same across the different regions of Canada, depending on regional factors such as industrial mixes and demographics.[13] Two questions arise:

1. Will the low carbon economic transition change the types and/or proportion of skills needed in any given sector(s) or region(s)?

2. Does the Canadian labour market (0n a regional basis) have the inherent capacity to adjust to these changes in a timely manner, or is policy intervention and/or targeted investment required?

DISCUSSION QUESTIONS:
NATIONAL FOCUS

1. What are the key drivers for developing a national low-carbon growth plan for Canada?

2. What are the most important elements of a low-carbon growth plan? What are the "must haves"?

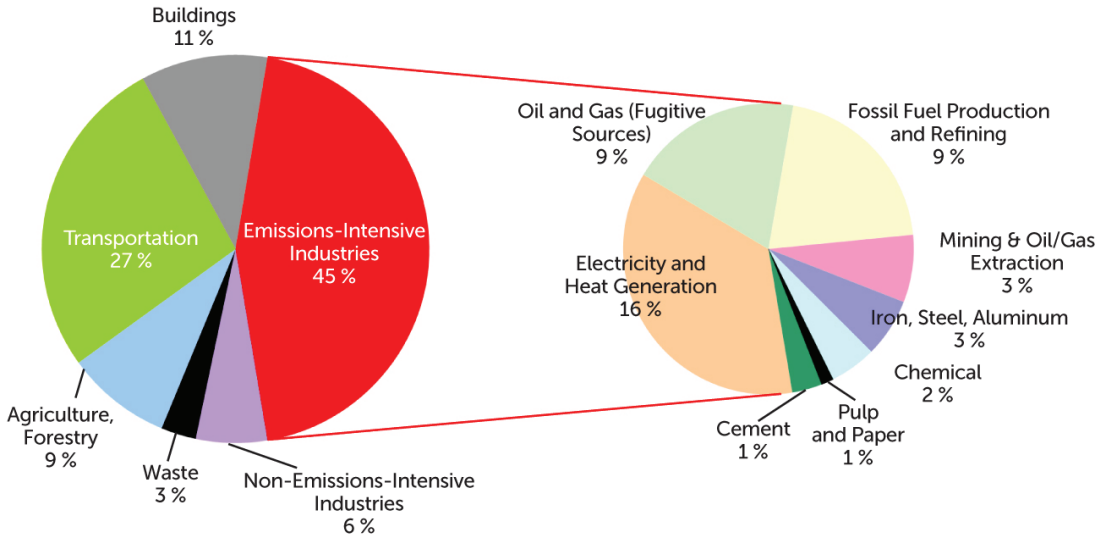
3. What is needed to implement a national low-carbon growth plan? What do you see as the most significant barriers / challenges to implementation? How would you overcome these barriers?

SNAPSHOT: CANADA AT-A-GLANCE

ENVIRONMENT

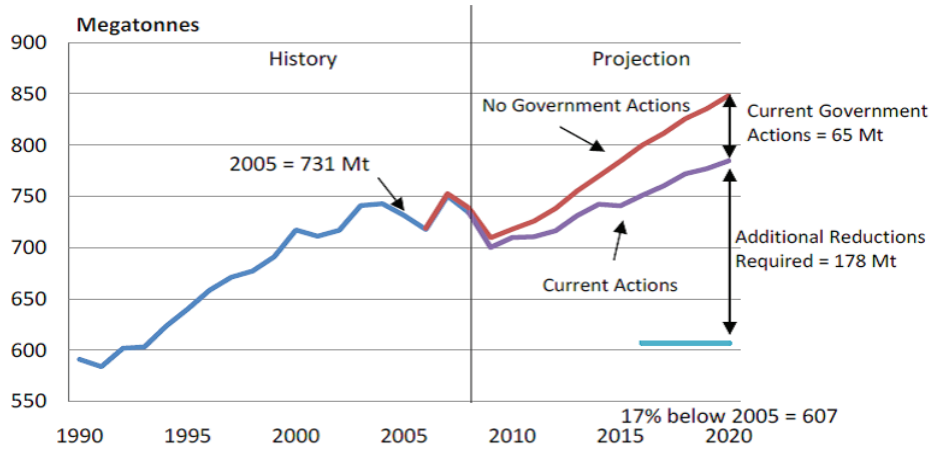
GHG Emissions: 731 Mt (2005) or 2% of global emissions
Canada's GHG Emission Reduction Target: 17% below 2005 levels
Oil Sands: Emissions from oil sands activities grew 40% between 2005 and 2009, but were offset by reduced production in conventional oil (12%) and natural gas (1%); overall emissions from fossil fuel production rose by 4 Mt (2%).
Projected Emissions growth in 2020: oil & gas (46%), transportation (16%) and waste /other (15%)
Impacts: The effects of a changing climate are already apparent across the country; reduced sea ice extent, earlier spring snow melt, longer growing seasons, shifts in the distribution of plants and animals are but a few (NRT, 2010. Degrees of Change).

GHG Emissions by Sector (2008)



Source: Environment Canada (2010), Canada's GHG Emission Inventory

GHG Emissions Projections (Mt of CO_2e, 1990-2020)



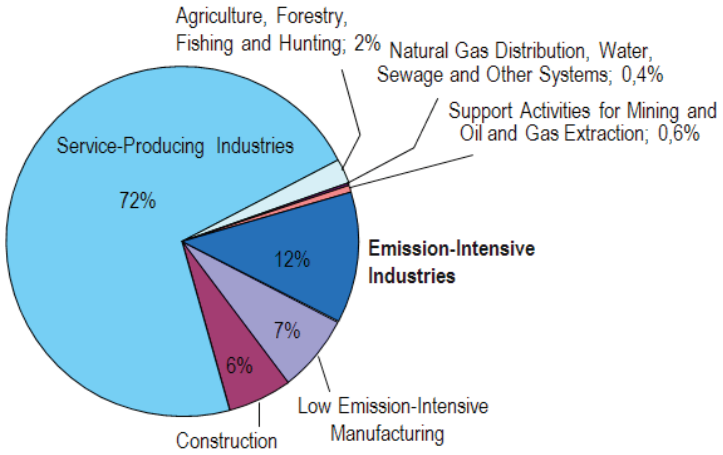
Source: Environment Canada (2011), Canada's Emissions Trends.

SNAPSHOT: CANADA AT-A-GLANCE

ECONOMY

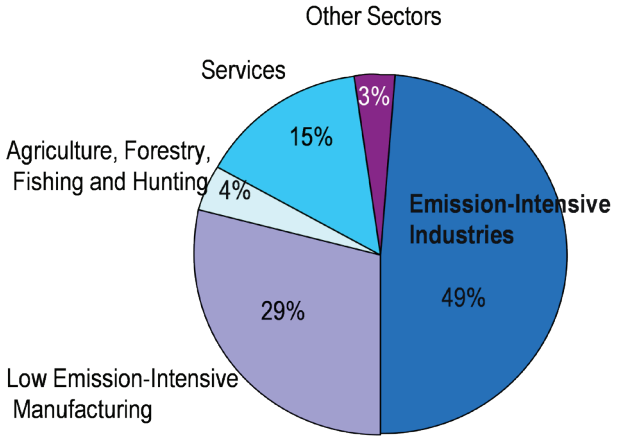
GDP (2010): $ 1.23 trillion (2002 chained dollars) – world's ninth largest economy
Avg. GDP Growth Rate: 2% (Real GDP from 2001-2010)
Economic Growth Overview: Canada's economic growth has been dominated over the last decade by services producing industries (primarily finance, insurance and real estate) as well as by growth in oil & gas extraction and the construction sector. Despite recent resurgence from recession levels, manufacturing's contribution to overall GDP has declined over the long-term.
Trade: Canada's trade in goods is dominated by manufactured products with exports in this sector doubling exports from mining and oil & gas and other primary industries (primarily forestry and agricultural unprocessed goods); however, we have a significant trade deficit in this same area which outweighs the positive trade balance in the other sectors.
Export Markets: The primary market for Canada's exports is the U.S. with the exception of the mining sector whose primary market is the U.K., followed by the U.S.

Share of Canadian GDP by Sector (2010)



Source: Statistics Canada, 2011.

Share of Canadian Exports by Sector (2010)

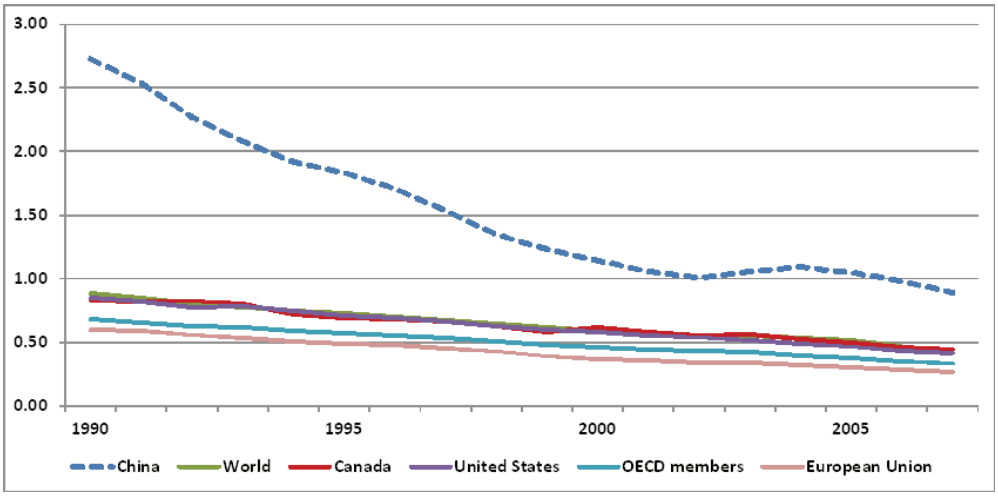


Source: Statistics Canada, 2011.

SNAPSHOT: CANADA AT-A-GLANCE

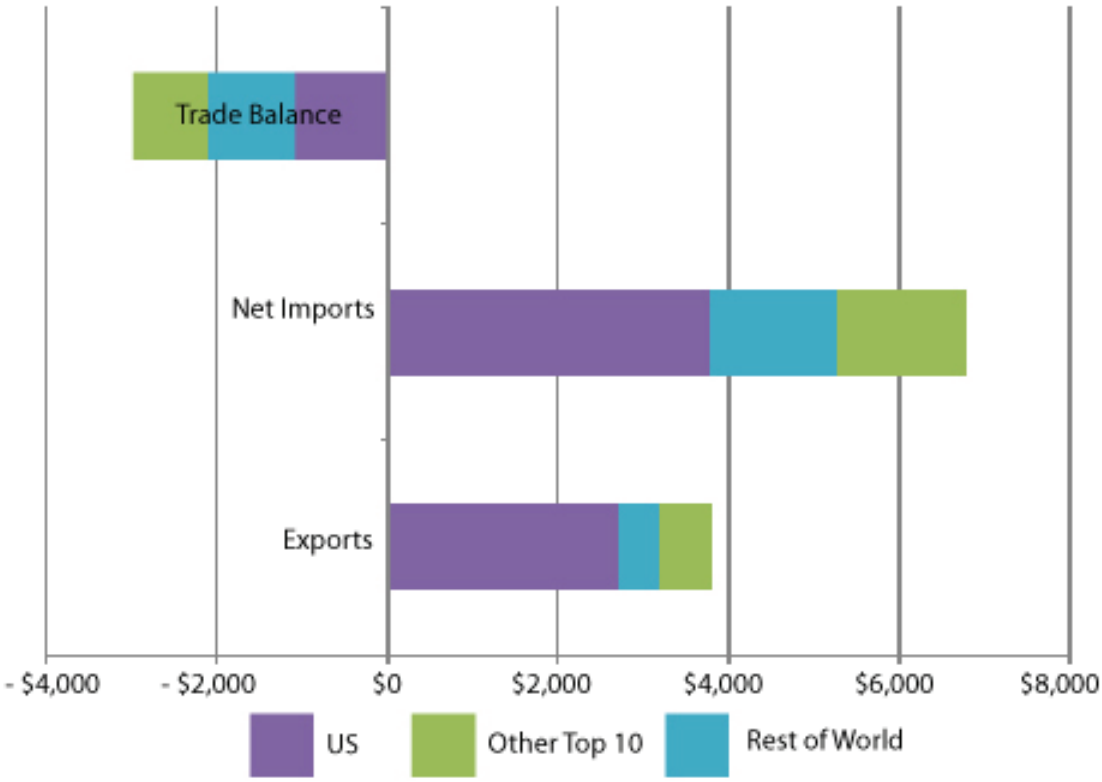
ENVIRONMENT AND ECONOMY

Emissions Intensity (Kg CO_2 / PPP $ GDP) for Select Jurisdictions and Country Groups (1990 – 2007)



Source: Environment Canada (2011), Canada's Emissions Trends.

Canada's Trade in Low-Carbon Goods in 2010 ($ millions)



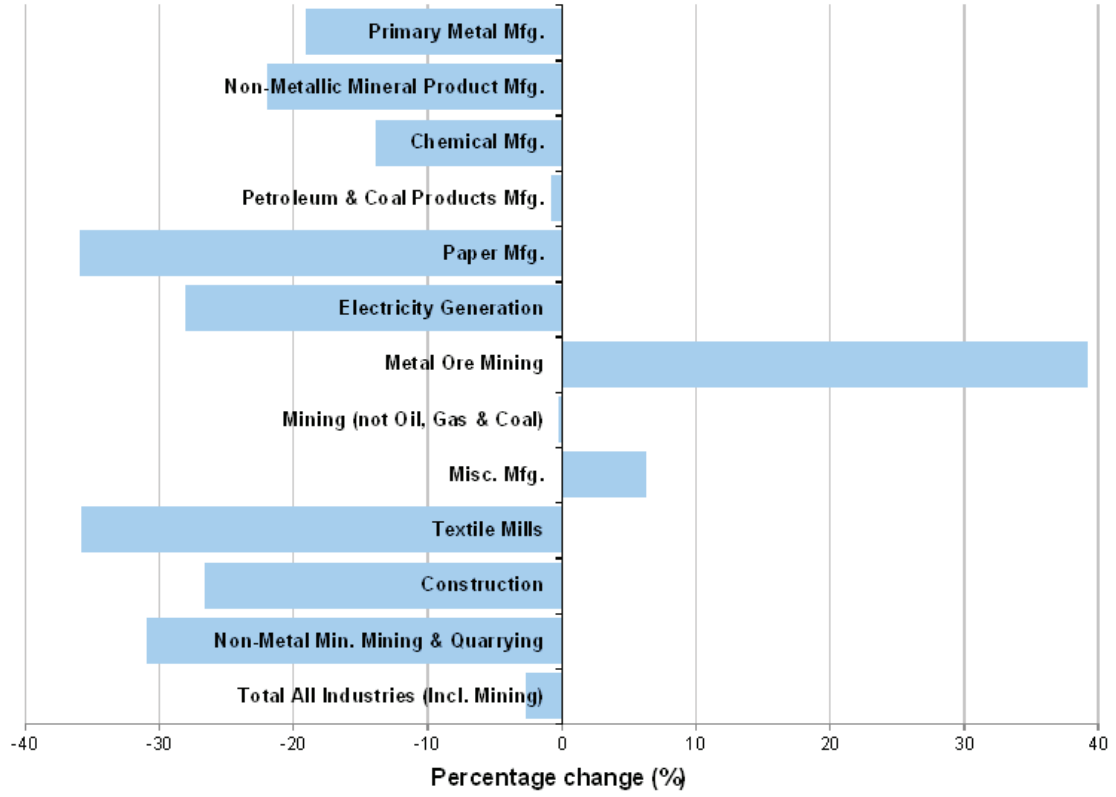
Source: Environment Canada (2011), Canada's Emissions Trends.

Change in Emissions Intensity of National Economies for Select Jurisdictions and Country Groups

	2000 – 2007	1990 – 2007	2007 GHG Intensity
China	-22%	-67%	0.89
World	-21%	-47%	0.47*
Canada	-28%	-47%	0.44
U.S.	-28%	-51%	0.42
OECD	-28%	-51%	0.33
Japan	-23%	-41%	0.29
Germany	-31%	-56%	0.27
E.U.	-29%	-56%	0.26
U.K.	-30%	-59%	0.25
France	-26%	-56%	0.18

**World economy GHG intensity only available for 2006.*
GHG intensity presented in units of Kg CO_2 / PPP $ GDP.
Source: World Bank. World Development Indicators.

Percentage Change in Canadian Industry Emission Intensities (kg CO_2e / PPP$ GDP) (2000 – 2009)



Source: Canadian Industry Energy End-Use Data and Analysis Centre, 2011.

END NOTES

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[2] http://bnef.com/PressReleases/view/142
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[10] Delphi Group & EnviroEconomics (2011). Research undertaken for NRT.
[11] Ibid.
[12] Government of Canada, The Skills Research Initiative, "Adjustments in Markets for Skilled Workers in Canada: A Synthesis of Key Findings and Policy Implications", 2008.
[13] HRSDC, "Looking-Ahead: a 10-Year Outlook for the Canadian Labour Market (2006-2015)", 2006.

Section TWO

IMPACTS OF A LOW-CARBON GROWTH PLAN FOR **WESTERN CANADA**

BACKGROUND

It is clear from the sections above that a global low-carbon transition is underway and that Canada as a whole will require a significant turnaround in performance to be carbon-competitive going forward. Nowhere is this more evident than in western Canada. Western Canada is currently an economic driver in the country but that economic strength is largely predicated on a natural resource based export economy that is extremely carbon-intensive. That is not to suggest, however, that a low-carbon growth strategy for Canada is all bad news for the West. Western Canada is one of the most innovative parts of the country with a skilled labour force and a burgeoning green economy with extensive hydro, wind, solar and other renewable resources at its disposal.

It is imperative to keep three things in mind with respect to western Canada's future in a carbon-constrained world: 1) western Canada is a significant, and growing, contributor to the national economy, which means that if a low-carbon growth strategy is going to work for Canada, it has to work for the West; 2) the West is not a homogenous region and the impacts of a low-carbon future will be different across the four western provinces; and 3) while carbon-intensive industries such as oil and gas extraction are a major contributor to economic activity in western Canada, a carbon-constrained future need not be viewed as a threat to the region's long-term economic prosperity. In fact, there are plenty of opportunities for western Canada to prosper in a carbon-constrained world.

THE WEST IN CANADA

Western Canada is a significant, and growing, contributor to the national economy. The region accounts for over one third (35.7%) of Canada's total economic output—a larger percentage than its share of the national population. In 2009, the economic output, or the nominal GDP, of western Canada was around $546 billion. This can be compared with Ontario

($578 billion), Quebec ($304 billion) and the Atlantic provinces ($92 billion).

Put another way, western Canada's economic contribution to the national GDP was only slightly smaller than that of Ontario in 2009 (37.9%), nearly double that of Quebec (19.9%) and was six times larger than the combined Atlantic Provinces (6.0%).

With the exception of the 2008-2009 recession, which hit the region much harder than the rest of the country, economic growth in western Canada has generally outpaced the rate of expansion for Canada as a whole. Moreover, economic forecasts suggest that western Canada's relative economic position in the country will continue to grow. This is due, in part, to the decline of manufacturing in central Canada and to increased investment and development in the energy resources of the West. In particular, the oil sands are forecasted to more than triple their production in the next 25 years, representing an estimated investment of $2.1 trillion.

It is important to emphasize that the benefits of energy production and development are felt across the country. Energy investments in western Canada generate spinoff effects in other provinces, creating jobs and economic growth. In addition, the energy sector is an important source of revenue for both provincial and federal governments. If a low-carbon growth plan stifles the western Canadian economy, the effects will be felt across the country, impacting job growth and the ability to provide quality health care, education services, infrastructure and much more. The bottom line is that if a low-carbon growth strategy is going to work for Canada, it has to work for the West.

REGIONAL VARIATIONS

Whenever speaking about the West, particularly with respect to the environment and the economy, it is imperative to keep in mind that it is not a homogenous region and the impacts of

a low-carbon future will be different across the four western provinces.

Broadly, the carbon intensive industries that are fueling both Canada's economic growth and high rates of greenhouse gas emissions are primarily located in Alberta and Saskatchewan. British Columbia, while heavily reliant on the forest service sector and home to a rapidly-developing natural gas industry, has a growing green economy that is starting to make its presence known in the province. The diversified economy and lack of fossil fuel resources in Manitoba suggest that it will be in a position of strength in a low-carbon world. Below is a breakdown of each of the four western provinces and how they might fare under a low-carbon growth plan:

Alberta

Alberta is unquestionably the province with the most at stake in a low-carbon growth plan for the country. The most significant industry in the province is mining and oil and gas extraction, which in 2007 contributed over $70 billion or 28.7% of the provincial GDP. This heavy emphasis on resource extraction (combined with a heavy reliance on coal-fired electricity generation) necessarily affects the province's emissions profile, and in 2009 Alberta was responsible for 34% of Canada's greenhouse gas emissions, a per capita rate of around 64 tons of CO_2 per person. This is perhaps not surprising as Alberta has almost all energy sources in abundance and is home to the Athabasca Oil Sands, the third largest oil reserve in the world.

British Columbia

British Columbia may be the province that has the most to gain with a low-carbon growth strategy for the country. The most important goods-producing industries in the province are manufacturing and mining and oil and gas extraction. In 2007, these accounted for 9.0% and 5.4% of provincial GDP, respectively. For a number of reasons, including a heavy reliance on hydroelectric power, BC had one of the lowest per capita rates of greenhouse gas emissions in the country in 2009, emitting just 14 tons per person and accounting for

only 9% of Canada's total GHG emissions. It also has an active, and growing, green economy sector that is developing low-carbon energy and infrastructure solutions. What is unclear is if BC's low emissions rate will continue indefinitely as production of shale gas and coal exports have both increased dramatically over the last few years.

Manitoba

With its vast hydroelectric production and potential, Manitoba is in a position of strength when it comes to a low-carbon growth plan for the country. The province is currently responsible for only 3% of the country's total GHG emissions, which works out to approximately 17 tons of CO_2 per person in the province. This is largely due to the fact that Manitoba generates 98.4% of its electric power from hydroelectric dams. Relative to the rest of the economy, Manitoba has the largest manufacturing sector in the region, which accounted for 13.7% of provincial GDP in 2007. It also has a provincially significant transportation and warehousing sector (6.1%). These are the sectors in the province that will be most affected by a low-carbon growth plan.

Saskatchewan

Similar to Alberta, Saskatchewan has a great deal at stake in any low-carbon growth strategy. Mining and oil and gas extraction accounted for 24.6%, or $11.8 billion, of the provincial GDP in 2007. This number is expected to grow as technology has liberated oil and gas reserves that were previously uneconomic. This can be compared to the historically significant agriculture sector, which accounted for only 5.5% of the provincial GDP in 2007. While the province's total emissions only accounted for 11% of the country's total in 2009, it has the highest per capita rate of emission of any province in the country at 71 tons of CO_2 per individual.

NOT THE ONLY STORY

Considering the importance of mining, oil and gas extraction and other carbon-intensive activities to the western Canadian economies, it is tempting for those in the region to view the notion of transition to a low-carbon economy as a threat, not only to long-term growth prospects, but also to the very livelihood of many western Canadians. Such concerns are especially pronounced in Alberta and Saskatchewan, where the oil and gas sector makes up such a significant share of overall economic activity.

However, it is important to stress that, far from undermining the economic competitiveness of the oil and gas sector in western Canada, a well-designed low-carbon growth strategy is necessary for the sector to continue to prosper. As the global economy begins its transition to a low-carbon era, the energy sector in western Canadian will need to adapt accordingly. Failure to adequately address growing concerns about the environmental impact of oil sands development, for example, could not only constrain future expansion of that resource, but could also tarnish the reputation of western Canadian mining and energy products more generally.

Furthermore, transition to a low-carbon economy creates significant opportunities for western Canadians. For one, a low-carbon growth strategy could be leveraged to promote the creation and implementation of new environmental technologies or process innovations that reduce the carbon intensity of fossil fuel production. Carbon capture and storage technology – an area where western Canada is already a world leader – is just one such example. Not only would such innovations represent a step towards a low-carbon future for western Canada, but they could spark the development of new industries and energy-related expertise within the region – expertise focused on the delivery of environmental technology and services to the oil and gas sector both at home and abroad.

Indeed, the development of environmental technologies and the green economy more generally is already significant in some provinces. For example, a Globe Foundation study of BC's green economy commissioned by the BC government

estimates that it contributed $15.3 billion to the province's GDP in 2008, accounting for about 10.2% of the province's GDP.[1] This is an industry still in the early stages of growth and is expected to become more significant with time.

In addition, a low-carbon growth strategy could accelerate development of the West's vast potential in low-carbon energy sources. For example, Manitoba is home to water resources that have twice the generating potential of Niagara Falls, but only half of its rivers have so far been harnessed for their generating capacity. For its part, Alberta leads the nation in wind-generated electricity capacity currently and is poised for additional growth. More generally, over half of western Canada is covered by forest suggesting significant potential for biomass energy production, and the region's geothermal energy potential remains largely untapped. It is conceivable that the measured, sustainable development of these resources has the potential to contribute significantly to western Canada's low-carbon transition.

While the oil and gas industry is clearly dominant in western Canada, that is not the only story western Canada has to tell and there are plenty of opportunities for the West to prosper in a carbon-constrained world.

SUMMARY

Western Canada is blessed with an incredible abundance of natural resources and the development of these resources has played a pivotal role in the region's economic success. The world is transitioning to a low-carbon future, though, and as a carbon-intensive, export-reliant economy the West needs to be at the forefront, rather than a passive observer, of that transition.

The need to shift to a low-carbon economy is both more acute and more difficult in western Canada than in any other region in the country as a result of the heavy reliance on natural resources. While this discussion has focused primarily on carbon emissions as a result of production, it is important to keep in mind that consumption is an equally—if not more—critical aspect of reducing western Canada's emissions intensity in the years ahead.

The challenge going forward is to find ways to leverage the West's resources and competitive advantages in ways that will capitalize and allow the region to prosper—not just cope—with the global transition to a low-carbon future.

DISCUSSION QUESTIONS:
WESTERN CANADA

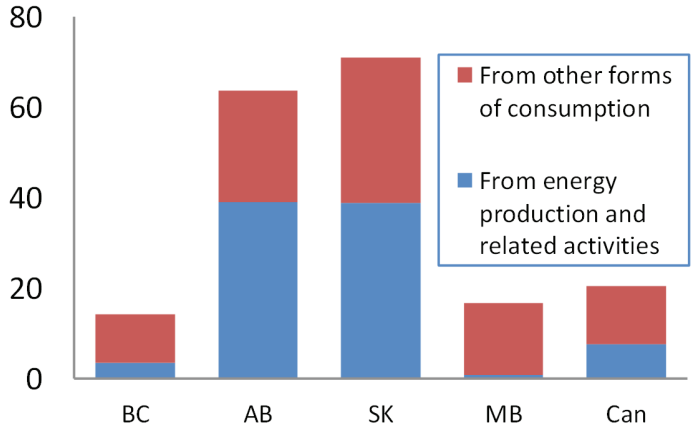
1. What low-carbon opportunities stem from western Canada's economic advantages / strengths? What is needed to move forward and capitalize on these opportunities?
2. What do you see as the most significant barriers / challenges to capturing these opportunities? How would you overcome these barriers?
3. What is the role of the private sector in capturing these opportunities? What do you see as the role of public policy?

SNAPSHOT: WESTERN CANADA AT-A-GLANCE

ENVIRONMENT

National Share: The West accounted for 57% of Canada's total GHG emissions in 2009 - 34% from Alberta alone.

Per Capita GHG Emissions by Province - 2009



Source: CWF calculations using data from Environment Canada

2009 GHG Emissions by Sector and Province

	BC		Alberta	
	MT of CO2 eq	T per capita	MT of CO2 eq	T per capita
Electricity & heat generation	1.2	0.28	48.3	13.16
Fossil fuels, mining-related	14.5	3.25	95.1	25.91
Transportation	24.6	5.52	35.2	9.59
Manufacturing/industrial	9.9	2.22	22.3	6.08
Commercial/residential	7.5	1.69	14.2	3.87
Agriculture	2.1	0.48	17.0	4.63
Waste	3.9	0.87	1.7	0.46
Other	0.0	0.00	0.2	0.05
Total	**63.8**	**14.30**	**234.0**	**63.75**

	Saskatchewan		Manitoba	
	MT of CO2 eq	T per capita	MT of CO2 eq	T per capita
Electricity & heat generation	14.8	14.38	0.2	0.13
Fossil fuels, mining-related	25.2	24.45	0.8	0.66
Transportation	14.2	13.80	7.0	5.76
Manufacturing/industrial	2.1	2.08	2.1	1.75
Commercial/residential	3.7	3.62	2.5	2.08
Agriculture	12.0	11.66	6.7	5.49
Waste	0.7	0.69	0.9	0.71
Other	0.4	0.35	0.1	0.06
Total	**73.1**	**71.03**	**20.3**	**16.64**

Source: CWF calculations using data from Environment Canada

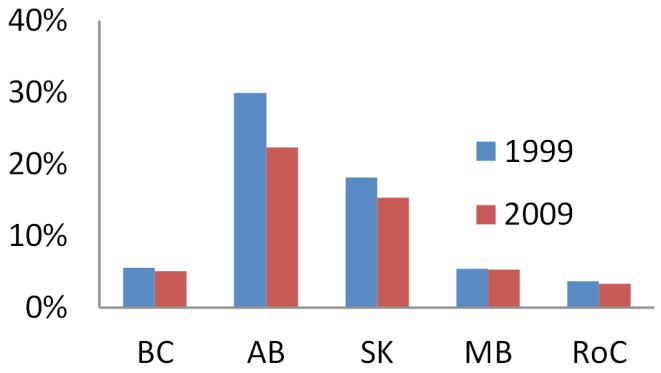
SNAPSHOT: WESTERN CANADA AT-A-GLANCE

ECONOMY

GDP: The energy sector accounted for 13.5% of GDP in western Canada in 2009, compared to 3.3% elsewhere in the country. At $38.0 billion, energy-sector GDP in Alberta was nearly as high as the rest of Canada combined.

Primary Markets: The US accounts for more than 99% of oil, gas and electricity exports from western Canada. Most coal exports go to Japan, Korea and China. Most uranium is sold in the UK.

Energy Sector as % of GDP



Source: CWF calculations using data from Environment Canada

Energy Production – 2009 (Petajoules and % of Canadian total)

	BC		Alberta	
	PJ	%	PJ	%
Coal	550.8	40.5	658.8	48.4
Crude oil	50.5	0.9	3,982.5	73.1
Natural gas	1,161.2	18.6	4,599.8	73.8
Natural gas liquids	37.2	5.9	585.3	92.1
Primary electricity	203.2	12.3	11.0	0.7
Total Primary Production	2,002.9	13.1	9,837.3	64.2
Secondary electricity	24.4	5.0	224.2	46.3

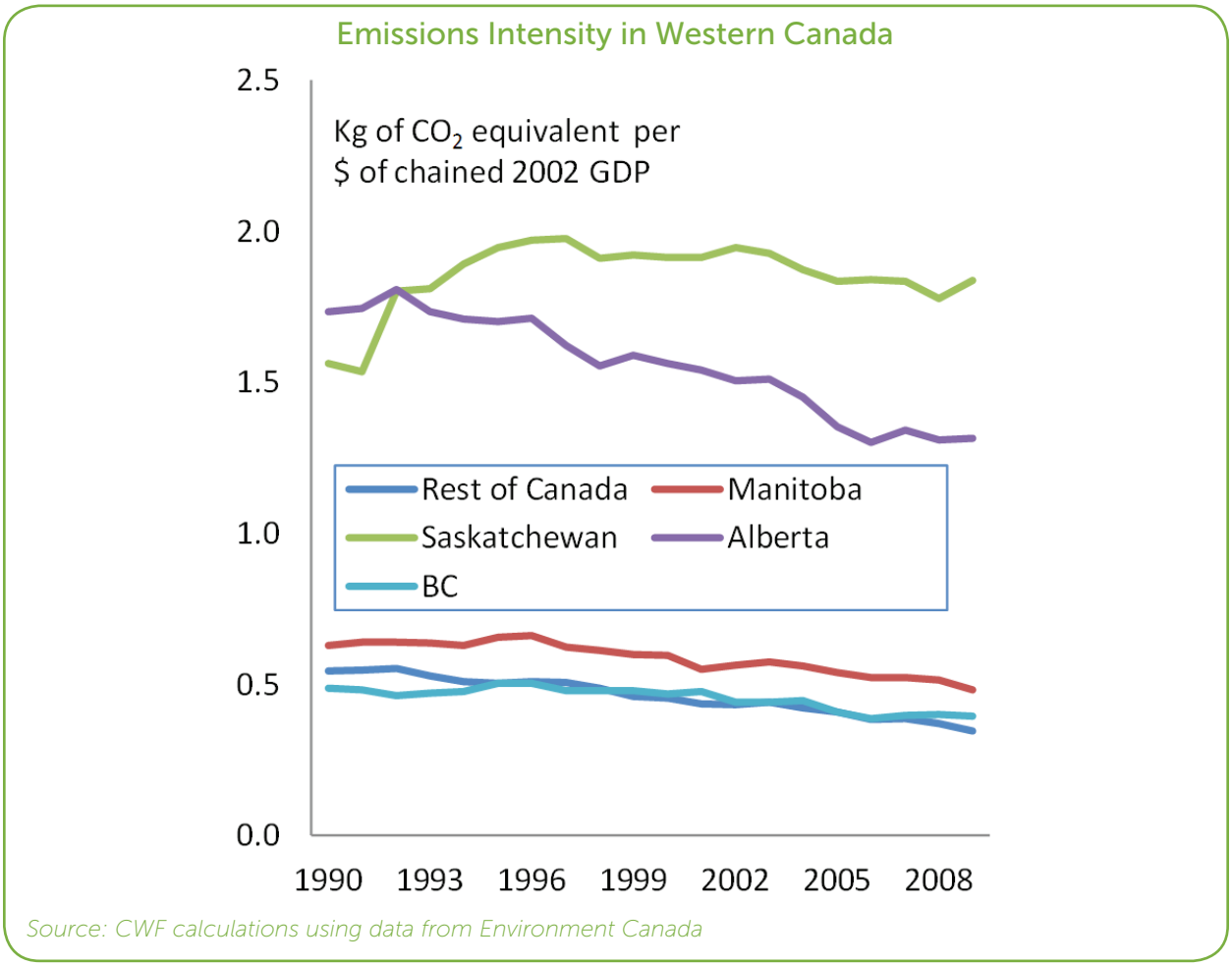
	Saskatchewan		Manitoba	
	PJ	%	PJ	%
Coal	147.5	10.8	0.0	0.0
Crude oil	639.7	11.7	36.6	0.7
Natural gas	291.2	4.7	0.0	0.0
Natural gas liquids	1.7	0.3	0.0	0.0
Primary electricity	12.7	0.8	122.1	7.4
Total Primary Production	1,092.8	7.1	158.7	1.0
Secondary electricity	62.0	12.8	0.9	0.2

Source: Environment Canada

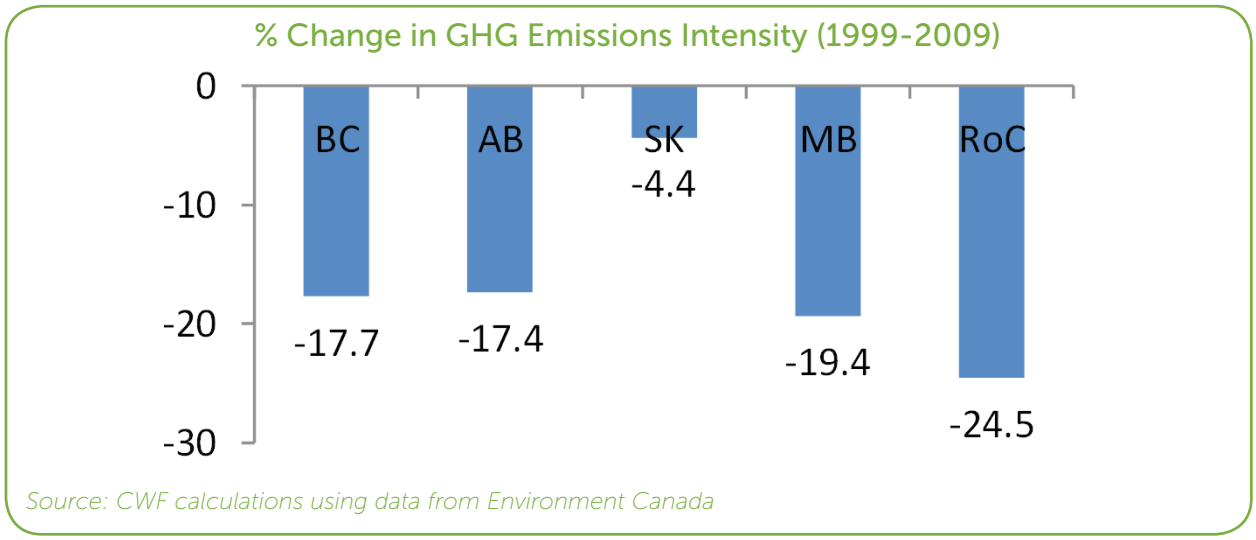
SNAPSHOT: WESTERN CANADA AT-A-GLANCE

ENVIRONMENT AND ECONOMY

Emissions Intensity: Saskatchewan and Alberta are the most emissions-intensive provinces in Canada. In Manitoba and BC, emissions intensity is comparable is comparable to the rest of Canada.



Source: CWF calculations using data from Environment Canada



Source: CWF calculations using data from Environment Canada

END NOTES

[1] Globe Foundation. *British Columbia's Green Economy: Building a Strong Low-Carbon Future*. 2010.