

CLIMATE CHANGE

WHITE PAPER



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EXECUTIVE SUMMARY

There is no denying it. We have a problem; a problem that has to be solved for the sake of current and future generations. Climate change is real. Science tells us it is caused by factors that can be divided into two categories: factors related to natural processes and factors related to human activity.¹ As we go about the business of feeding people and building an economy, we generate carbon and other gasses. That carbon causes the planet to warm, and the current rate of warming endangers our future.

We are made wise not by the recollection of our past, but by the responsibility for our future.

– **GEORGE BERNARD SHAW**

In the last decade, global temperatures have been higher 75 percent of the time when compared to the last 11,300 years. The global concentration of carbon dioxide in the atmosphere has reached 400 parts per million. This is the highest rate in recorded history. Carbon and water cycle scientists like Dr. Erika Podest say CO₂ concentrations have not been this high in millions of years.²

The release of other gasses are also presenting challenges. Methane is the second-most prevalent greenhouse gas. The United States Environmental Protection Agency estimates that pound for pound, methane's impact on climate change is 25 times greater than carbon over a 100 year period.

Methane levels from industrial activity are increasing. Measures by the Governments of Canada and the United States to control methane emissions in the oil and gas sector have been introduced with little in the way of input from industry and other levels of government. These measures are important. However, as is explored in detail later in this paper, they must be introduced in a way that minimizes trade distortion, cross-border competitiveness and costly alterations to industry practices.

We have to take steps now to limit climate change: this fact is indisputable. What is disputable, however, is the effectiveness of approaches being used by some governments to address this problem.

There is no doubt that the cost of inaction is far greater than the cost of smart, effective actions that actually reduce greenhouse gasses (GHG). The problem is that some of the actions being proposed are not smart or effective. This leaves us pursuing costly 'solutions' that do nothing to address the problem at hand – carbon in the atmosphere.

When it comes to climate change, we are having the wrong conversation in Canada. It is time to reframe the question. It is time for an innovation-based focus, with an international outlook. Pursuing this strategy will be challenging. However, it is the only way that we can truly deal with the problem of reducing global GHG emissions.

1 From "Causes of Climate Change," Government of Canada, available at: <http://climatechange.gc.ca/default.asp?lang=En&n=65CD73F4-1>. Natural causes include volcanic activity and changes in solar radiation. Human factors include burning fossil fuels and the conversion of land for forestry and agriculture.

2 NASA Global Climate Change, available at: climate.nasa.gov/400ppmquotes/

Saskatchewan Calls For a Fair and Balanced Approach

Any jurisdiction committed to acting responsibly on climate change issues can respond in three basic ways:

- An emphasis on mitigation through emissions reductions: taxation regimes that attempt to change consumer behaviour, cap and trade systems, levies on large emitters, new regulations for the oil and gas sector and new regulations for power producers.
- An emphasis on adaptation practices and technology: minimizing the impact of future climate events, reducing the vulnerability of provincial infrastructure, protecting community land and water resources, fostering an effective risk assessment and disaster recovery system, a better understanding of the risks associated with more frequent extreme climate events and improving our climate models to better predict the frequency and scale of these events.
- A focus on innovation and technological development for domestic and international markets.

In Canada, the priority of the federal and most provincial governments has been mitigation, primarily through carbon pricing. This approach would appear to have the least impact on global GHG emissions, while potentially doing the greatest harm to the Canadian economy.

While the Government of Saskatchewan is looking at all three approaches, we believe the third option—innovation and technological development—offers both the greatest potential for significant improvements in global GHG emissions, while causing the least harm to our economy.

Others seem to agree.

In June 2016, for example, the Interim Report of the Working Group On Clean Technology, Innovation and Jobs, established under the Vancouver Declaration, noted that:

“Canada produces approximately two percent of global GHG emissions and thus it must look beyond its borders and develop a strong export focus to maximize economic benefits and the country’s contribution to addressing climate change. Canada already has significant clean technology capacity and the potential to be a world leader in this area, providing made-in-Canada solutions to this global challenge. Clean technologies provide the pathway for emissions mitigation and more sustainable growth of all areas of the economy, including transportation, natural resources development, manufacturing, construction, utilities and others.

Canada’s strong industrial base and natural resources endowments can serve as a catalyst for new, sustainable clean growth, but Canada must act quickly and decisively to seize these opportunities to participate in and grow the global market.”³

3 Interim Report of the Working Group on Clean Technology, Innovation and Jobs, June 2016.

Saskatchewan believes that a focus on technology is fundamentally critical to balance the need for a sound GHG reduction policy with the importance of continuing economic growth. This is the path leading to long-term sustainable environmental results.

This White Paper is an attempt to gather together important information from within the Government of Saskatchewan on climate change, and outline future actions for both our province and the country. It makes 13 recommendations for future activity in the hopes of redirecting the national conversation in a more fruitful direction.

The position of the Government of Saskatchewan is that:

- Climate change is real, and is exacerbated by human activity.
- When it comes to climate change, Canada is having the wrong conversation. The ‘solutions’ currently being discussed play at the margins of the issue, considering that Canada’s share of GHG emissions is just 1.6 percent of the global total.
- Carbon taxes at the rate currently being contemplated will not modify behaviour. Raising them even higher may modify behaviour. However, that will have a minimal impact on worldwide GHG levels when compared to the significant harmful impact this would have on the economy.
- If the sole metric of success is cutting GHG emissions, a carbon tax does not appear to work.
- Saskatchewan believes there is a better way, and advocates placing real emphasis on developing transformational clean technology for use in Canada and around the world.
- Every step taken must take into account Saskatchewan’s existing obligations to feed and provide secure energy to its global customers.
- Saskatchewan is committed to contributing to national emissions reductions targets, and has already taken steps to generate significant GHG reductions in our province. In fact, by 2030, Saskatchewan will be one of the few Canadian provinces that will show an actual GHG reduction from current levels.
- Saskatchewan deserves credit and recognition for GHG reductions achieved through the use of uranium mined in our province, carbon capture and sequestration (CCS) activities at Boundary Dam, advanced agricultural practices and equipment that enhances and secures carbon sequestration both in our province and the world. Saskatchewan should receive credit for its carbon sinks in our forested areas. The carbon balance sheet must be accurate on both sides of the ledger. The language of the Vancouver Declaration recognizes these sources of carbon mitigation and calls for the establishment of systems that account and give credit for their contribution to climate change mitigation.

- Saskatchewan's major industries (potash, oil and gas, uranium, fertilizer and agriculture) are high emitting industries, dependent on moving their products to international markets. We are dependent on road, rail, air and sea to get our exports to market. Given that Saskatchewan's economy is the most trade-dependent economy in Canada, a carbon tax or other GHG mitigation plan would hit Saskatchewan especially hard. We must not be expected to shoulder a disproportionate burden of the costs associated with mitigating climate change.

SECTION ONE: THE PROBLEM

Introduction

Climate change is not an urban problem. It is not a rural problem. Climate change is not a problem solely of the developing or developed world. It is a global problem. However, there is an asymmetrical dimension to climate change that we must recognize.

On a global scale, there is no point in advancing a climate change plan that prevents poorer countries from feeding their people and creating jobs. We must be sensitive to these realities, recognizing the disproportionate burden developing countries face with respect to climate change, and their capacity to contribute to the solution. We must continue to recognize that each region brings its own natural advantages and unique characteristics to the table.

In Canada, we have a similar climate change asymmetry. Some of Canada's regional economies are built on carbon intensive, trade-exposed industries. Other regions are highly industrialized with concentrated populations. They each bring something different to the table. In solving this problem, one size does not fit all.

As noted in the recent report by the Office of the Parliamentary Budget Officer⁴, the emissions intensity per unit of Gross Domestic Product (GDP) in Saskatchewan and Alberta is roughly four times higher than the rest of Canada. Blanket measures taken nationally will have a substantially larger impact in these provinces. As the report notes, this unevenness is not necessarily an obstacle to a national abatement target, but it does make achieving any target a challenge.

The Vancouver Declaration

On March 3, 2016, Canada's political leaders agreed to the Vancouver Declaration on Clean Growth and Climate Change.⁵

This declaration commits governments to meeting or exceeding Canada's 2030 targets of a 30 percent reduction in GHG emissions, when compared to 2005 levels. It further calls for an increase in levels of ambition, and defines this more specifically as a drive towards greater GHG emissions reductions over time. Further, it rightfully recognizes that the cost of inaction will be far higher than the cost of our efforts to control GHG emissions.

4 Canada's Greenhouse Gas Emissions: Developments, Prospects and Regulations, Ottawa, April 21, 2016.

5 The full text of the Declaration can be viewed at: <http://www.scics.gc.ca/english/conferences.asp?a=viewdocument&id=2401>

The Vancouver Declaration calls on First Ministers to develop a pan-Canadian framework and implement that framework in early 2017. To that end, the Declaration established federal/territorial/provincial tables on a variety of subjects:

- The Working Group on Clean Technology, Innovation and Jobs is charged with developing mechanisms for stimulating economic growth, creating jobs and driving innovation during a transition to a low-carbon economy.
- The Working Group on Carbon Pricing Mechanisms will look at various carbon pricing mechanisms with an eye to factors like coverage, comparability and stringency.
- The Working Group on Specific Mitigation Opportunities is focussed on large industrial emitters, agriculture and forestry.
- The Working Group on Adaptation and Climate Resilience has the task of evaluating various plans for adapting to climate change and helping communities build climate resilience.

Given Saskatchewan's outlook and strategic priorities, our government will be placing specific emphasis on adaptation, resilience and clean technology as these national conversations develop. We strongly believe that these areas will pay the greatest dividends and achieve the best results in terms of GHG emissions, both in Canada and the rest of the world.

The details of the actual programs flowing from these processes are still being developed. As additional details surface, Saskatchewan's approach to leveraging an appropriate amount of federal support may need to be adjusted.

However, it is clear Saskatchewan has a viable case for requesting 15 percent of the federal funds available. The province's GHG emissions represent ten percent of Canada's total. However, Saskatchewan has a disproportionate share of trade-exposed industrial sectors. A significant portion of Saskatchewan's GHG emissions relate directly to getting our products to market. Many of the federal climate change targets therefore have a disproportionate impact on our province. Our geographically dispersed population also creates additional challenges.

Given this, Saskatchewan should be eligible for:

- \$20 to \$25 million (40 to 50 percent) of proposed funding from Natural Resources Canada (NRCan) for the oil and gas sector. NRCan's Energy Innovation Program (EIP) is expected to receive funding of up to \$50 million over two years, to support developing cleaner oil and gas technologies. Given that Saskatchewan is Canada's second largest oil producer, it should receive close to half of these funds.
- A significant portion of the funding for regional development agencies. For 2016-17, Western Economic Diversification's program budget for innovation and business development stands at \$152 million.

- A significant portion of the \$2 billion allocated over two years for the establishment of a Canadian Carbon Economy Fund. That funding was announced as part of the 2016-17 federal budget. However specific program criteria and delivery mechanisms have yet to be announced.

Agencies like Innovation Saskatchewan, as well as the Saskatchewan Ministry of Intergovernmental Affairs, are already beginning to work together on consulting with the oil and gas sector, the nuclear energy sector, mining, agriculture and those working in the field of electrical power generation.

Discussions will focus on where the best opportunities are for clean tech projects that could benefit from federal funding. These officials will develop a priority list of projects that will be presented to federal authorities.

Ten Percent of Two Percent

Canada has signed-off on a commitment to reduce our emissions by 30 percent or 224 million tonnes (Mt) by 2030 from 2005 levels.⁶ To put that into context, that is equal to taking more than all the gasoline and diesel-powered cars and trucks in the nation off the road. If this seems drastic, consider that Canada's national emissions represent less than two percent of the global total.⁷

In particular, the emphasis many have placed on the Canadian oil sands as a major contributor to GHG emissions and climate change is grossly disproportionate to their actual impact.

A few numbers can help put this into context. Emissions from China's coal-fired power plants are 4,000 Mt, roughly equivalent to 65 Canadian oil sands sectors. Emissions from United States coal fired power plants are 1,364 Mt, 22 times what Canada's oil sands emit. This misplaced emphasis on Canada's oil sands diverts attention away from positive solutions that can produce a meaningful reduction in worldwide emissions.

Since Saskatchewan's share of the national GHG emissions total is roughly ten percent of the Canadian total, it has been suggested that Saskatchewan's contribution to the national reduction total is in the order of 21 to 29 Mt.⁸

Meaningful work is being done in our province to reduce GHG emissions. Generating electricity accounts for roughly 20 percent of Saskatchewan's emissions. The oil and gas sector makes up about 30 percent of emissions. SaskPower's aggressive infrastructure investments and our commitment to double the percentage of renewable electricity generation by 2030 are tangible steps to address the impacts of climate change. New federal regulations to reduce methane emissions in the oil and gas sector will do the same.

When viewed as a whole, commitments already made and processes already underway are bending the curve in a positive direction. If you add in the benefits of Saskatchewan's natural carbon sinks (a commitment to quantify these credits is contained in the Vancouver Declaration of March 2016) this is an improving picture.

6 <http://www.cbc.ca/news/politics/paris-agreement-trudeau-sign-1.3547822>

7 "Canada's Emissions Trends," Environment Canada, available at: https://ec.gc.ca/ges-ghg/E0533893-A985-4640-B3A2-008D8083D17D/ETR_E%202014.pdf, pg. 1.

8 Government of Saskatchewan Estimate, ADM Consultation Findings, May 2016.

Provincial GHG Comparisons*⁹

	2005	2013	2014 (1990- 2014)	2020	2030	Change 2005 to 2020	Change 2005 to 2030	Change 2014 to 2020	Change 2014 to 2030
Newfoundland and Labrador	10	9	11	9	8	-1	-3	-2	-3
Prince Edward Island	2	2	2	2	2	0	0	0	0
Nova Scotia	24	18	17	15	14	-9	-10	-2	-3
New Brunswick	21	16	15	17	16	-4	-4	2	1
Quebec	90	83	83	85	90	-6	0	2	7
Ontario	211	171	170	171	181	-40	-30	1	11
Manitoba	21	21	21	22	24	1	3	1	3
Saskatchewan	70	75	76	75	73	6	4	-1	-3
Alberta	234	267	274	297	320	63	86	23	46
British Columbia	64	63	63	72	83	7	18	9	20
Yukon Territory	0	0	0	1	1	0	0	1	1
Northwest Territory	2	1	2	2	2	0	0	0	0
Nunavut	0	0	0	0	0	0	0	0	0
Canada	749	726	732	768	815	18	66	36	83

(Sources: 2016 Canada Biennial Report on Climate Change)

*All figures are expressed in million tonnes (Mt).

In a complex and often emotional debate, it is important to focus the analysis on the one meaningful goal: actual reductions of GHG emissions. By this metric, Saskatchewan's efforts will compare very favourably to other Canadian jurisdictions over the longer term. This is illustrated in the chart above, which uses the best available numbers from the Government of Canada. Saskatchewan, Newfoundland and Labrador and Nova Scotia will be the only jurisdictions posting actual GHG reductions from current levels by 2030. Anything said beyond this is just talk.

Saskatchewan takes particular note of Nova Scotia's recent leadership on the climate change file as an example of how jurisdictions can successfully manage this complex issue. Of particular note is Nova Scotia's commitment to renewables through their COMFIT program (Community Feed-In Tariffs). These tariffs provide eligible groups with an established price for electricity produced from renewable resources. Saskatchewan endorses recent media comments by Nova Scotia's Environment Minister, Margaret Miller, on the need for flexibility on the part of the federal government in its relationships with provinces and territories:

"We're showing a 17 percent reduction in GHG already, which is above where the national numbers are...we are going to have 40 percent renewables by 2020 when Muskrat Falls comes online, we have the COMFIT program, which has been very successful. We have a lot of wind energy. Now we have tidal energy that's in a new phase. We have a lot of things moving forward that we're really happy with. Things

⁹ As indicated below, the source of this chart is the 2016 Canada Biennial Report on Climate Change. It does not factor in the most recent announcements by Ontario, British Columbia and Alberta, nor does it reflect SaskPower's recent announcement on renewables. It represents the best available information until new figures are released, sometime in late 2016.

that really, Nova Scotians have already been paying for through their electricity costs...As a province, we need flexibility on how we reach the targets that the federal government sets out. We need flexibility to design our own policies so that we can meet federal emissions targets.”¹⁰

Saskatchewan’s Existing Contributions To Global GHG Reductions

Like Nova Scotia, Saskatchewan taxpayers have also contributed to the development of many industries and technologies that contribute to climate change mitigation. Unlike other Canadian provinces, Saskatchewan is also blessed with many natural features that absorb carbon and mitigate climate change. Yet our province remains a victim of a narrative suggesting Saskatchewan is somehow not doing its share when it comes to climate change action. This is not true, and this national conversation must change.

Through the development of CCS technology, Saskatchewan is reducing global GHG emissions by 3 Mt annually. This includes up to one million tonnes from Boundary Dam and CO₂ from Dakota Gasification.¹¹ According to NRCan, the Weyburn-Midale projects will store 40 Mt of CO₂ over its lifespan.¹²

The use of Saskatchewan uranium in nuclear reactors around the world also makes a major contribution to climate change mitigation—a contribution the federal government must quantify and recognize.

According to Cameco Corporation, nuclear energy helps avoid 2.5 billion tonnes per year of carbon dioxide emissions, as uranium supplants coal and other sources in the generation of electricity. Since Saskatchewan provides 15 percent of the uranium produced for global nuclear energy, Saskatchewan should be credited for displacing 375 Mt of global GHG emissions per year.

Saskatchewan’s agricultural soils absorbed 11.4 Mt of carbon in 2014. The 35 year average for the period from 2005 to 2030 is estimated by the Saskatchewan Ministry of Environment’s Climate Change Branch to be 9.3 Mt per year.

Saskatchewan’s forests also absorb carbon and help mitigate the effects of climate change. The Climate Change Branch estimates that commercial forests will sequester an average of 3.5 Mt per year between 2005 and 2030. This, of course, excludes the impacts of wildfires, which release carbon. Saskatchewan’s Forestry Branch confirms this is a reasonable estimate, based on the available data. However, given variance in soils and tree varieties, it should be considered a rough estimate.

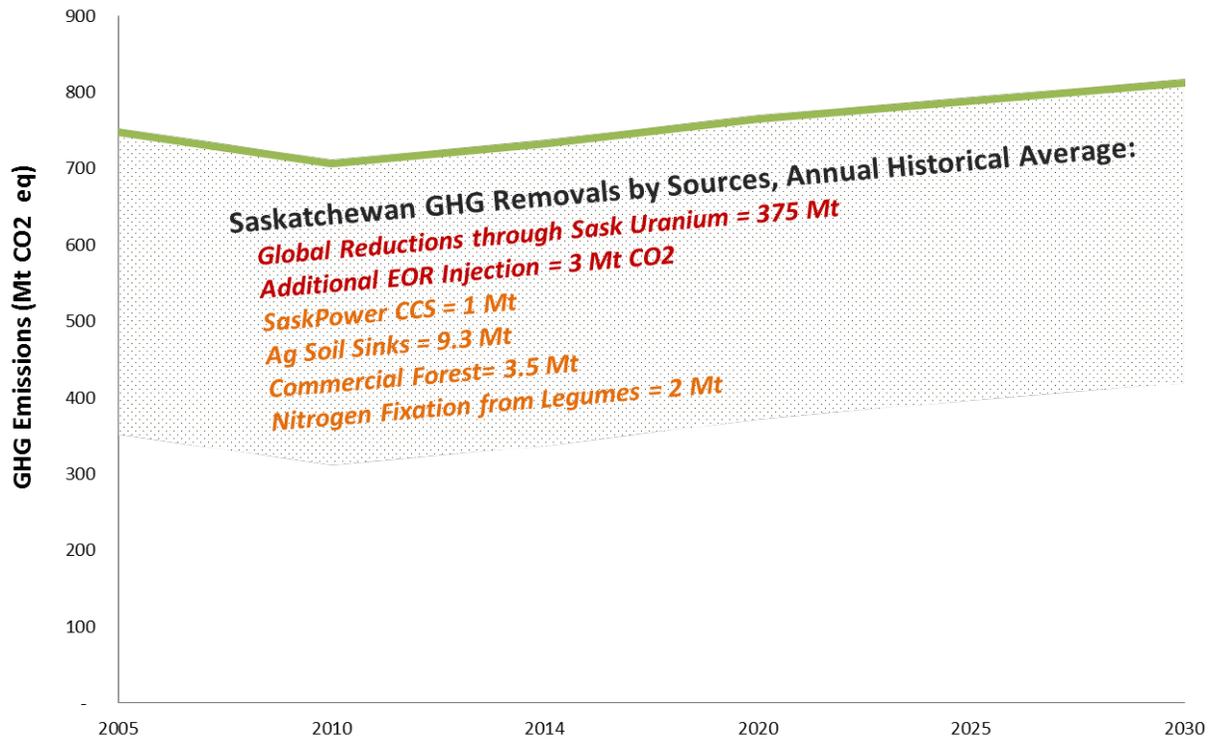
The shift in Saskatchewan from grains and oil seeds to pulse crops that fix nitrogen in the soil is also a factor that must be considered. The introduction of legumes is reducing carbon emissions by roughly 2.0 Mt annually.

10 “Atlantic provinces to pull together on climate change,” The Chronicle Herald, August 9, 2016.

11 Carbon Capture and Storage @ MIT, available at: <https://sequestration.mit.edu/tools/projects/weyburn.html>.

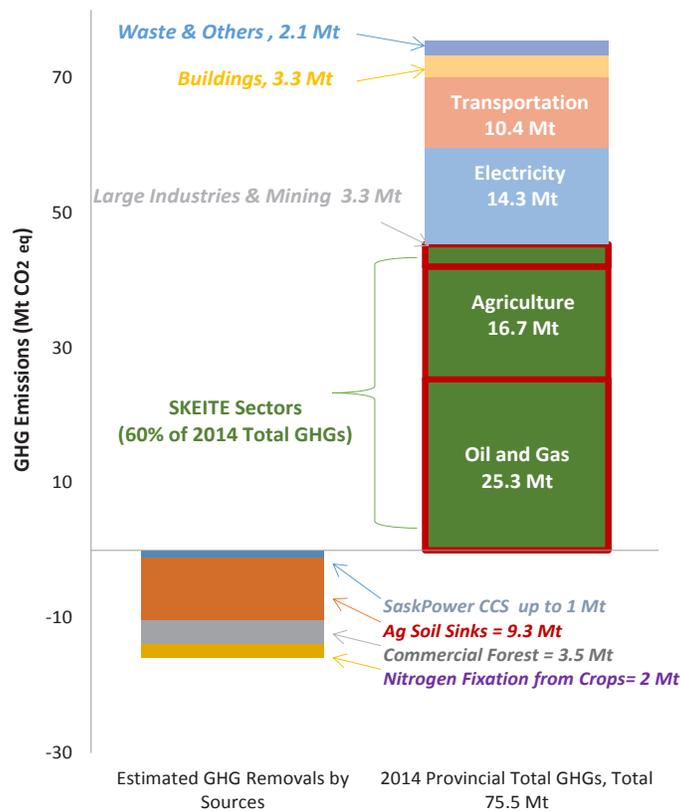
12 Carbon Capture and Storage @ MIT, available at: <https://sequestration.mit.edu/tools/projects/weyburn.html>.

Sask's Annual Contributions to National and International GHG Reductions



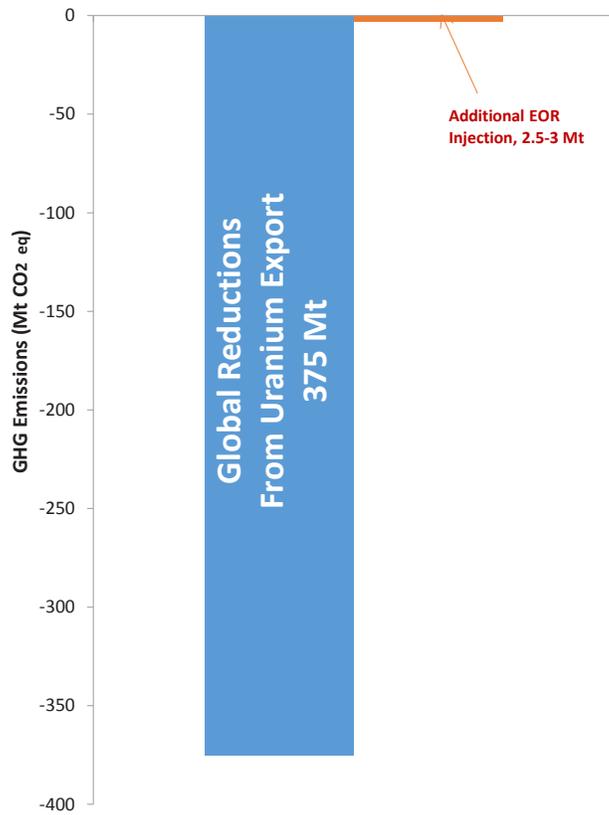
(Sources: Climate Change Branch Internal Assessment, Aug. 2016)

Estimated GHG Emissions Removals & 2014 Provincial Total GHG Emissions

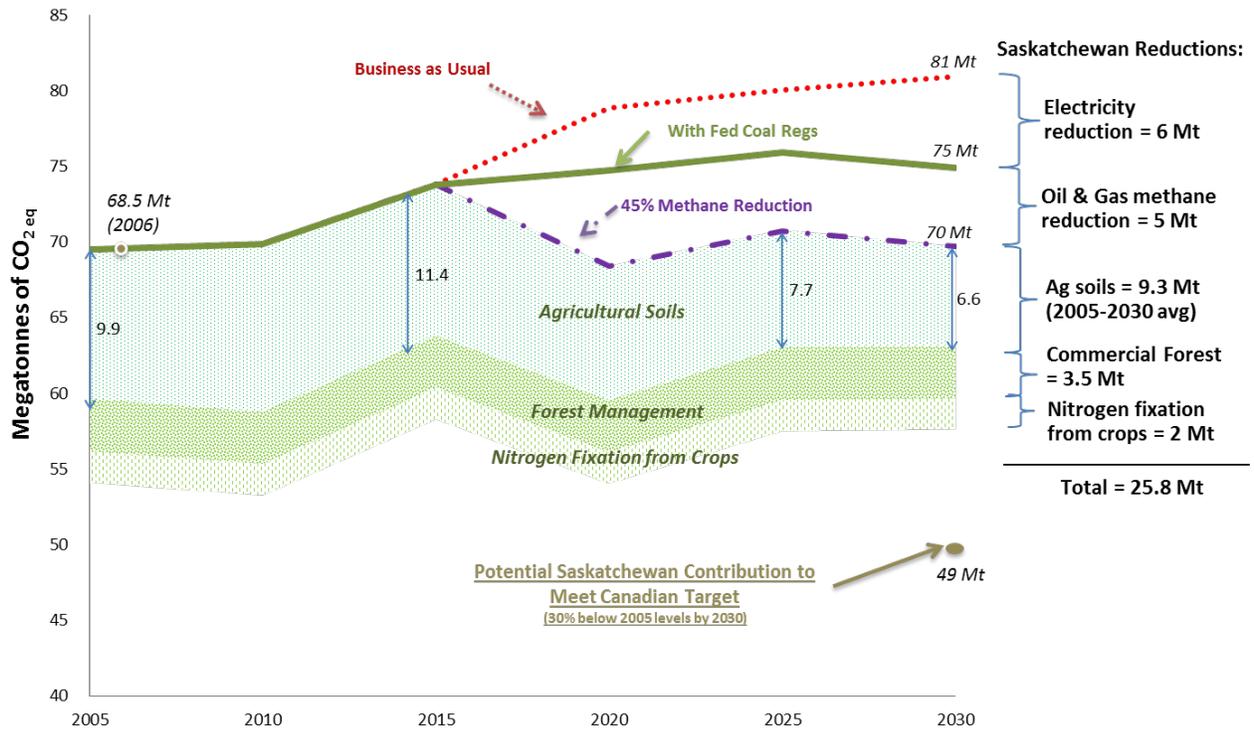


(Sources: Climate Change Branch Internal Analysis, Aug. 2016)

Avoided Global GHG Emissions (Annual) Due to Sask's Contributions



Potential Sask GHG Emission Reductions



(Sources: Climate Change Branch Internal Assessment, Aug. 2016)

Looking Beyond Our Borders: The Other 98 Percent

The Government of Saskatchewan is working on climate change initiatives to reduce GHG emissions across the economy that will focus on:

- Potential GHG emission reductions, timelines and costs to meet provincial and national targets;
- Identification of low-cost mitigation options in different sectors;
- Flexible policy measures to ensure that GHG reductions and economic objectives are met through energy-efficiency improvements, investments in low carbon technologies and offset projects;
- Acknowledging early actions to improve emission-reduction performance;
- Continue working with the federal government to ensure that Saskatchewan’s GHG policies meet or exceed requirements through the preparation of equivalency agreements on coal fired electricity regulations and other sector-by-sector initiatives; and
- Supports for industry and communities to adapt to climate change by reducing impacts of extreme weather events.

Saskatchewan fully understands its obligations to reduce GHG emissions within its own borders. While this curve is bending in the right direction, we must continue to be mindful that the biggest climate change challenges lie outside of Canada’s borders.

As was noted in the quotation on page five, Canada produces two percent of global GHG emissions. Our most productive role is to use our strong industrial base as a “catalyst for new, sustainable clean growth” and “seize opportunities to participate in and grow a global market.”¹³

There is no denying that access to energy is crucial to human well-being and to a country’s economic development.¹⁴ Currently, more than one billion people do not have access to electricity, and more than 2.7 billion people do not have clean cooking facilities. Without a dependable source of energy, the quality of life for these people will not improve.

Right now, about 40 percent of the world’s electricity is generated using coal. Those who do not have reliable power want it. So, demand will increase. This is where Saskatchewan can play a significant role. We can help the world clean up coal-fired electricity generation as the world shifts to newer technologies.

13 Interim Report of the Working Group on Clean Technology, Innovation and Jobs, June 2016.

14 <http://www.iea.org/topics/energypoverty/>

Further evidence of the impact new technology will have on climate change can be found in Bloomberg's 2016 New Energy Outlook, released in mid-June. The report concludes that the way the world gets electricity is about to undergo a profound change. Renewable energy is becoming much more effective and affordable. Battery storage for renewable power is also arriving more quickly than expected, along with changes to China's energy mix.¹⁵

The Bloomberg report projects global power markets for the next 25 years and finds that demand for electricity is still rising. Soon, investments in renewables will dwarf all other sources:

"Humanity's demand for electricity is still rising, and investments in fossil fuels will add up to \$2.1 trillion through 2040. But that will be dwarfed by \$7.8 trillion invested in renewables, including \$3.4 trillion in solar, \$3.1 trillion for wind, and \$911 billion for hydro power.

Already, in many regions, the lifetime cost of wind and solar is less than the cost of building new fossil fuel plants, and that trend will continue. But, by 2027, something remarkable happens. At that point, building new wind farms and solar fields will often be cheaper than running existing coal and gas generators. This is a tipping point that results in rapid and widespread renewables."¹⁶

Saskatchewan and Canada have to play an important role in these developing and maturing markets.

However, there is an urgent need to make the investments that guarantee Canada's competitive position and assure that all regions of our country can make the best possible contributions to the global marketplace.

If we fail to do this, the costs will be onerous.

For an example at a smaller scale, one need look no further than recent events in Wyoming. Media attention has focussed on the transformations currently taking place in Carbon County, Wyoming, where the last coal mine closed a decade ago.¹⁷ The county will soon be home to the largest wind farm in North America, and as the media observes, these changes in energy mix are taking place at hyper-speed.

Unfortunately for the people of Wyoming, the local miners are being laid off, yet the "new positions and financial opportunities offered by wind and other new-energy industries are not replacing all the jobs going up in coal smoke."¹⁸ Many of the current jobs are out-of-state, at wind turbine factories in Colorado and Iowa. Millions of dollars' worth of out-of-state investments are flowing into Wyoming's wind projects. However, much of the profit will flow out. The thousands of coal workers who will probably lose their jobs do not necessarily have the technical skills to operate the wind farms. In any case, new wind jobs will number in the hundreds, not the thousands.¹⁹

15 <http://www.bloomberg.com/news/articles/2016-06-13/we-ve-almost-reached-peak-fossil-fuels-for-electricity>

16 *ibid.*

17 "As wind power lifts Wyoming's fortunes, coal miners are left in the dust," New York Times, June 19, 2016, available at: <http://nyti.ms/200nyv>

18 *ibid.*

19 *ibid.*

The Wyoming experience is a serious warning for those who talk about the economic benefits of complete decarbonization. These are real human lives, and the implications for re-education, retraining and transferring to new communities must be taken into account. Further, while more jobs may eventually be created over-all through aggressive pursuit of renewables, the regional disparities created cannot be ignored and must be addressed.

The next question that must be answered is how well are we doing now to maintain Canada's market position in the clean energy sector, and what steps must be taken to secure and grow this sector?

Unfortunately, the most recent numbers available do not paint a positive picture. Largely due to a slowdown in the oil sector, revenue growth in our national clean-tech industries stalled in 2014. The figures are contained in the Canadian Clean Technology Industry Report, made available in April of this year. Combined revenues for 774 technology companies fell year over year, from \$11.7 billion to \$11.6 billion.²⁰

Other factors have also likely come into play when it comes to identifying the causes of the slowdown. One might be a lack of certainty in government policy regarding climate change. The federal government's plan, with its low carbon economy fund, may help turn this trend around. However at least one analyst, Celine Bak of Analytica Advisors, said while support for technology companies is welcome, the federal plan lacks certain key elements: "We are investing in innovation without any comprehensive market approach."²¹

20 "Canadian clean-tech sector stalls as global competitors take off," Globe and Mail, April 19, 2016.

21 *ibid.*

SECTION TWO: A CALL FOR MEANINGFUL ACTION

Re-Focus the Conversation

Virtually the entire national discussion so far on climate change has focussed on developing fiscal mechanisms like a carbon tax or cap and trade. These systems are designed to create an economic incentive for individuals to modify their behaviour. The desired outcome is getting individual Canadians to make low carbon choices as opposed to picking high carbon alternatives.

However, it is not at all clear that either a carbon tax at levels being discussed or cap and trade will work. One need look no further than British Columbia to see how the relationship between carbon taxes in that province and the achievement of actual GHG reductions is becoming tenuous, at best.

Recent media coverage of British Columbia's climate change white paper notes an observation by the Pembina Institute that British Columbia will not see a significant decline in emissions for almost 15 years, an observation buttressed by the provincial GHG comparison chart on page ten of this White Paper.

According to a spokesperson for the Pembina Institute, British Columbia's decision amounts to "simply leaving the hard work of addressing climate change for another day."²² Tim Pearson of British Columbia's Sierra Club was "perhaps the most blunt, describing the (British Columbia) government's climate change plan as a 'fraud'."²³

For these reasons, it is the position of the Government of Saskatchewan that talk about a carbon tax and cap and trade is the wrong conversation to be having.

Focusing on a ten percent reduction of two percent of the global problem is playing at the margins of the issue.

We need to have a different conversation; one that has a global perspective and a focus on innovation.

This requires Saskatchewan and Canada to take steps that develop and secure a robust clean technology sector, with healthy clean tech companies of all sizes making a national and international contribution to GHG reductions. Saskatchewan needs to manage and reduce its own emissions. However, Saskatchewan's larger contribution will be towards global solutions. This will be accomplished through innovation and clean technology development.

22 "BC's Climate Plan: What you need to know," Globe and Mail, August 19, 2016.

23 *ibid.*

Recommendation 1:

Saskatchewan calls on Canadians to re-focus the climate change conversation. Our new conversation must be deliberately global in its outlook. It must focus on the distribution of new technology that addresses climate change impacts while increasing over-all health and prosperity. Renewed emphasis must be placed on developing new technology locally and nationally that can be applied globally. We must stop playing at the margins of this issue.

An Emphasis on Innovation and Technology

Saskatchewan believes the most important and significant opportunity for carbon emissions reductions lies in development of transformational clean energy technologies. Saskatchewan endorses and echoes the words of the Interim Report of the Working Group on Clean Technology, Innovation and Jobs:

“Canada’s strong industrial base and natural resources endowments can serve as a catalyst for new, sustainable clean growth, but Canada must act quickly and decisively to seize these opportunities to participate in and grow the global market.”

Saskatchewan calls on all Canadian governments to introduce sound and effective policies that allow us to rapidly seize these new opportunities. This must be the clear priority and strategic direction for everyone.

The value of the global clean technology market doubled between 2005 and 2015 and is now worth over \$1 trillion. However, Canada’s market share fell from 2.0 percent to 1.3 percent during this period.

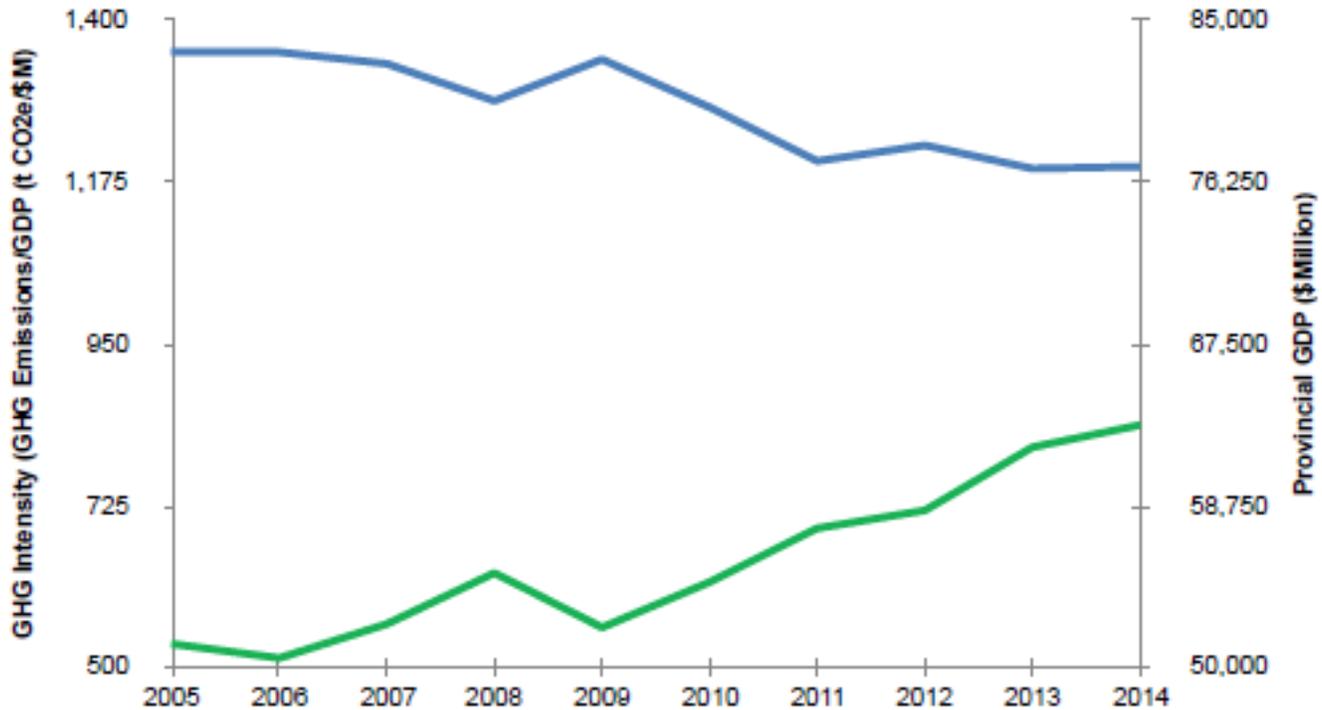
Saskatchewan believes support for Canada’s clean tech sector must include a comprehensive market approach, an approach which must be global in scope.

According to a report prepared by Innovation Saskatchewan, the clean tech sector has a growth rate four times that of the general Canadian economy. This high rate of productivity is due to the early adoption of innovative business practices. However, the industry in Saskatchewan is small and needs to be nurtured. Innovation Saskatchewan says there are fewer than 50 of these companies in Saskatchewan, with a combined estimated employment of 2,000 people.²⁴

Investments in clean technology have already started paying dividends in Saskatchewan.

24 Internal report, Innovation Saskatchewan, June 29, 2016.

GHG emissions intensity declined by 12 percent in Saskatchewan between 2005 and 2014. During this same period, GDP grew by 23 percent.



In terms of support for this approach, Saskatchewan sees much cause for optimism in the joint statement signed by Canada’s Prime Minister, the President of Mexico and the President of the United States. The Leaders’ Statement on a North American Climate, Clean Energy and Environment Partnership is dated June 29, 2016. It commits signatories to identifying joint research and demonstration initiatives to advance clean technology in priority areas like methane emissions, carbon capture, electricity grids and energy storage.

The leaders also call for using the North American Competitiveness Workplan to advance the North American Clean Energy Partnership Initiative (NACEPI) in support of developing linkages between clean energy technology companies. These companies will promote the use and export of North American clean energy and environmental technology.²⁵

A road map for speeding the development and distribution of transformational clean technology can also be found in the 2012 document “Winning in a Changing World.” The document was written by Derek Burney, Thomas d’Aquino, Leonard J. Edwards and Fen Osler Hampson following extensive consultations across the country.

The report, presented to the Prime Minister and each of Canada’s Premiers in the summer of 2012, called for a more serious and concerted effort to engage the world’s fastest growing economies.²⁶ The authors

25 The entire Leaders’ Statement is available at: <http://pm.gc.ca/eng/news/2016/06/29/leaders-statement-north-american-climateclean-energy-and-environment-partnership>

26 From the Preface of *Brave New Canada*, Burney, D. et al: McGill-Queen’s University Press, 2014.

call for a “new, enlightened partnership among all levels of government, and the private sector” in order to succeed in global markets²⁷, and say that federal and provincial governments must work more closely and more deliberately with each other and with the private sector. All parties must be committed to expanding Canada’s presence in emerging markets, including sharing information, analysis and success stories.²⁸

The report says governments and business must identify impediments to trade and investment, bringing tax and related policies into line with new challenges. The report goes on to say that governments should “nurture those sectors that are critical to our future prosperity,”²⁹ and recommends that:

“Trade negotiators...be guided by a clear sense of priorities and strategic direction and must have comprehensive authority to act in the national interest...Canada needs to tailor its approach and its negotiating strategy and tactics to each market opportunity and build the internal capacity in the federal government to support and sustain effective negotiations.”³⁰

As noted by the Working Group on Clean Technology, Innovation and Jobs, small-to medium-sized enterprises need relationships and market intelligence. Yet, they often don’t have the capacity to acquire this information.³¹ This is where a new federal emphasis could make a significant difference in improving climate change mitigation.

Innovation Saskatchewan has developed a four point strategy to assist in the growth and development of the clean technology industry in Saskatchewan. The first point calls for the establishment of a shared clean tech agenda between industry and researchers.

Over the past decade, Saskatchewan has invested heavily in the creation, maintenance and promotion of world-class research facilities. Organizations like the Petroleum Technology Research Centre, the International Minerals Innovation Institute, the Global Institute for Food Security, the Sylvia Fedoruk Centre for Nuclear Innovation and the Canadian Light Source are all well positioned to help develop new technology. Innovation Saskatchewan is focussed on leveraging the full potential of the work being done in these facilities. It will require a common research agenda and greater collaboration between the clean tech sector and Saskatchewan researchers. Innovation Saskatchewan says this common research agenda will:

- Identify existing capabilities and emerging opportunities by establishing a process for expert vetting of projects;
- Foster a sense of joint ownership between industry and researchers, while providing a venue for discussions on funding and future partnerships; and
- Common identification of existing limitations and future areas of growth.

Areas of particular interest for future research include new technology to address methane capture and liquefaction in the oil and gas sector. A Regina-based company has already started work on a methane destruction technology. The catalyst to much of this work is new regulations on methane in the oil and gas sector. These matters are discussed in more detail in a subsequent section of this White Paper. However, Saskatchewan notes with concern that these regulations were negotiated unilaterally by the Government of Canada, with little input from provinces and territories.

27 Winning In A Changing World: Burney, D et al, pg. 9. PDF available at: <https://www.cigionline.org/articles/2012/06/winningchanging-world-canada-and-emerging-markets>

28 ibid pg. 11.

29 ibid pg. 11.

30 ibid pg. 13.

31 ibid pg. 13.

Another area of promise is continuous improvement and lowering of the costs for carbon capture. New technology is also needed to clean the wastewater and solid residue generated from carbon capture processes and extending the life of solvents used in carbon capture.

Small modular reactor technology also holds some promise (see Nuclear section) as does work on high-voltage Lithium-ion batteries and durable coatings for solar cells, now in development at the Canadian Light Source.

The second point in the four point strategy focusses on the need to require accountability reporting from research projects in the clean technology area. This would ensure that deadlines are met and funding is used appropriately. Clear paths must be established for assuring new technology is transferred out of research and commercialized quickly.

The third point for the strategy focusses on assuring Saskatchewan receives the maximum possible dollars earmarked by the federal government for the commercialization of clean technology.

The fourth and final point in Innovation Saskatchewan's clean technology strategy deals with the nuts and bolts of supporting new clean technology enterprises. The current Innovation Skill Capacity Development Program in partnership with Saskatchewan's post-secondary institutions will need to re-focus programs which support the clean technology sector. Programs must be made available to support key business concepts like the development of sound strategy, financial management, human resources and investor relations.

Ontario has done some important work on the challenges companies face getting new clean energy technology introduced to the market, and has identified existing federal procurement processes as another problem.

Other impediments identified by the Government of Ontario in commercializing clean technology include:

- Lengthy environmental approvals that create a regulatory burden;
- Little cross-governmental cooperation in GHG reducing strategies; and
- Poor data collection and a lack of industrial classification codes for the clean energy sector which leads to jurisdictions recording similar activities in different ways.

The Government of Canada would be well-advised to clarify its plan for GHG reductions as they relate to specific areas like federal procurement practices and regulatory simplification. Making it easier to produce comprehensive, reliable and comparable data in the emerging clean technology sector would make it easier for everyone to appreciate the benefits of steps being taken.

A change in global technology advancement is required to transform the way in which the world produces and consumes energy, to reduce GHG emissions. Achieving this transformative change, perhaps with new, disruptive technology, will require vision and action by governments, industry and the public.³²

While discussing the development and commercialization of transformational clean energy technology, it is worth noting the efforts of Canada Cleantech: Alliance For a Prosperous and Sustainable Future.

32 Interim report of the Working Group on Clean Technology, Innovation and Jobs, June 2016, pg. 10.

The Alliance includes industry groups in British Columbia, Quebec, Ontario and Alberta. The Alliance is made up of hundreds of companies, employing tens of thousands of employees with substantial annual revenues. Notably, Saskatchewan businesses are not represented in this organization.

In a letter dated June 10, 2016, the Cleantech Alliance makes a series of recommendations to the Federal-Provincial-Territorial Working Group on Clean Technology, Innovation and Jobs. Those recommendations include the establishment of carbon transformation funds to help pay for clean tech deployment in government, including building retrofits, renewable energy generation and alternative transportation. However, the letter also notes that such efforts would require between \$500 million and \$1 billion to achieve. The source of these funds and the impact of their collection on economic growth and job creation would be important factors to consider.

Cleantech Alliance notes the domestic market for this technology is small, and there are a limited number of early adopters.

Recommendation 2:

Saskatchewan believes the main impediment to the development and commercialization of transformational clean technology is securing capital. We will work aggressively with other governments to develop better mechanisms to fund this important work. Here, Saskatchewan will use the findings of the Interim Report of the Working Group on Clean Technology, Innovation and Jobs, established under the Vancouver Declaration, as the foundation for further discussions and actions. Saskatchewan calls on the federal government to substantially increase its contribution to this research.

Carbon Tax

The Government of Saskatchewan continues to oppose the imposition of an economy-wide carbon tax for two simple reasons:

- It is an ineffective way of reducing carbon consumption; and
- The negative consequences of a carbon tax for Saskatchewan employment and the provincial economy would be significant.

“To appreciate the scale of the work required, the PBO report [suggests] there would have to be a carbon price as high as \$100 a tonne to force consumption of fossil fuels and the resulting emissions down dramatically.”

– CBC News, April 21, 2016

Carbon taxes are a widely-used and much studied mechanism for curbing GHG emissions. They are designed to counter a simple reality that economists call a ‘market failure.’

A carbon tax or cap and trade mechanism seeks to place a market value on the full environmental impact of using these fuels. The assumption is that a tax will act as an incentive for individuals and corporations to make decisions that are less carbon intensive and less harmful to our environment.

Carbon taxes are attractive to governments because they are lucrative propositions. They raise significant revenues. One United States estimate from 2013 predicted that a United States carbon tax starting at \$16 per ton of CO₂ in 2014, then rising four percent over inflation would raise more than \$1.1 trillion in the first ten years. More than \$2.7 trillion would be raised over a 20 year period.³³

Carbon taxes have been around for a while. Early examples include a tax of \$16.41 per metric ton of CO₂ introduced by Denmark in 1992 and the United Kingdom's 2001 tax applied to electrical and natural gas usage. The money generated is used for a variety of purposes. Some countries funnel those funds into general revenue. Others offer specific tax rebates to specific income groups. Some use these funds to help develop clean technology.

As many have noted, it is quite difficult for policy makers to know the level of GHG reductions that will occur when a carbon tax is introduced at a specific rate. In industry, firms will reduce emissions until it is cheaper to pay the tax. That business decision will include consideration of factors like competing fuel options, when new technologies are coming on stream and their cost, weather and market conditions.

When it comes to individuals, predicting a response to a carbon tax is even more difficult. A lot depends on where a person lives, how much income they earn, as well as their awareness and concern over climate change issues.

As Canada's Parliamentary Budget Officer points out, carbon taxes will likely need to be significantly higher than governments are currently contemplating in order to achieve meaningful reductions. Just how much higher is also in debate.

A report by The Sierra Club and the Canadian Centre for Policy Alternatives (British Columbia Office) states that Canada should be aiming for a carbon tax of \$200/tonne by 2020.³⁴ That would bring just the carbon tax component of the gasoline price to 44 and a half cents a litre, similar, as the report notes, to prices paid in Europe. At that point, concerns about curbing job creation and economic growth loom ever larger.

The Government of Saskatchewan believes carbon taxes offer the least potential for actual reductions to GHG emissions when compared to the introduction of new technologies on a global scale.

A 2011 report by the UK Parliament's Environmental Audit Committee explores at length the relationship between taxation, behaviour change and public perception, and states that:

"For environmental taxes to be effective, they need to be straightforward so that taxpayers understand the behavioural change signal being sent, and seen as fair so that political momentum can be gained for higher environmental taxation. In practice, however, many perceive them as just another means of raising revenue, and their growing complexity means that many businesses are unaware of the cumulative impact of the environmental taxes affecting them."³⁵

33 "Options and Considerations for a Federal Carbon Tax," Centre for Climate and Energy Solutions, February 2013, pg. 4.

34 Fair and Effective Carbon Pricing: CCPC January 2013 pg. 7 (From the Climate Justice Project)

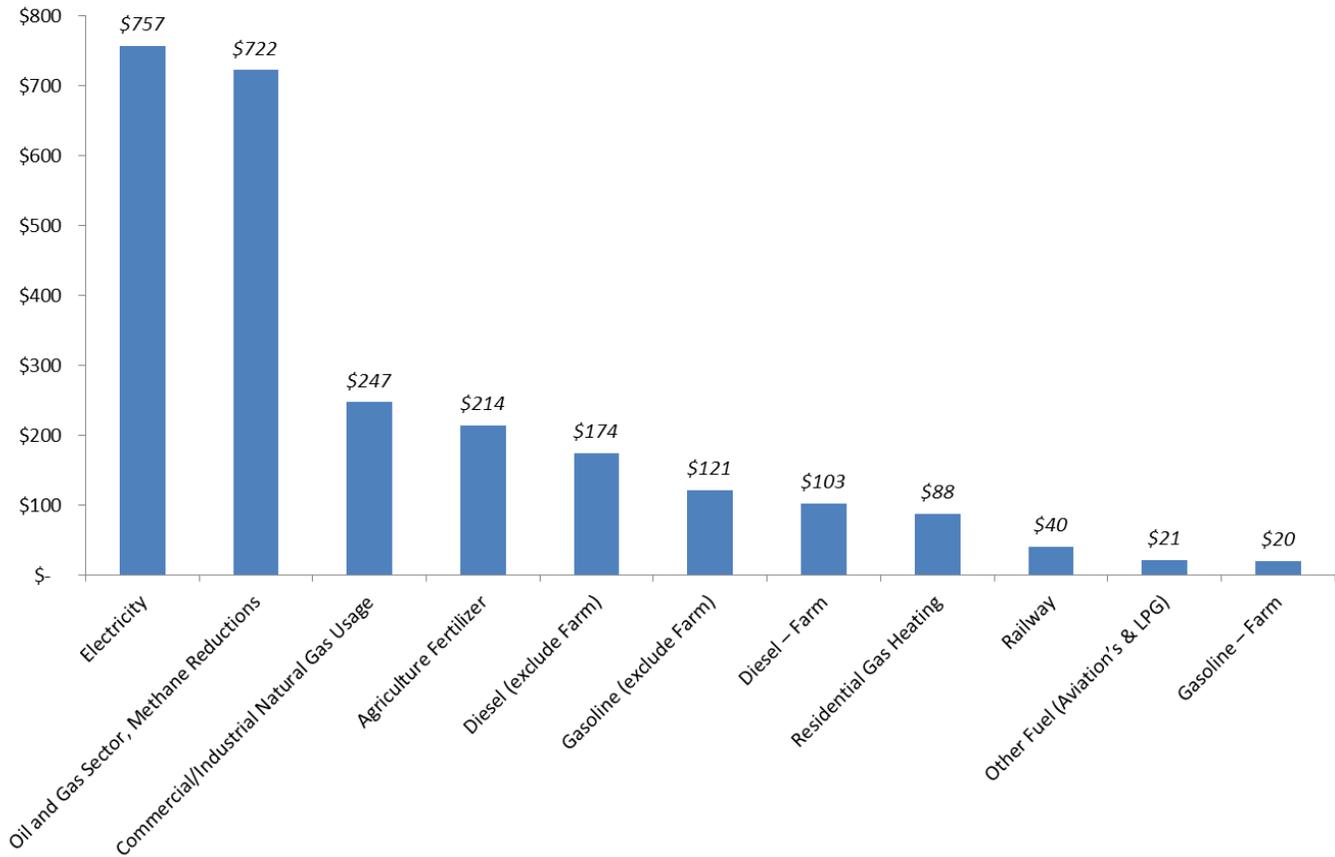
35 From the Summary of the UK Parliament's Environmental Audit Committee 2011 report. The entire report is available at: <http://www.publications.parliament.uk/pa/cm201012/cmselect/cmenvaud/878/87803.htm>

The Government of Saskatchewan opposes a national carbon tax for Canada because these taxes are ineffective in reaching their stated goal as well as being damaging to the economy.

Consequences of a Carbon Tax for Saskatchewan

Following the recent announcement from the federal government on carbon pricing, the Climate Change Branch of Saskatchewan Environment assessed the potential cost of a federal carbon tax on Saskatchewan³⁶, and determined that a \$50/tonne tax would cost the Saskatchewan economy in excess of \$2.5 billion annually. The breakdown by sector is illustrated in the chart below:

**Impacts of a National \$50 Carbon Tax on Sask’s Economy
(\$ millions)**



The estimate for the electrical sector is based on the total amount of electricity generated in Saskatchewan for 2014 (23,424 GWh) multiplied by the average carbon intensity factor for all of the plants in SaskPower’s fleet (646 tonnes GHG per GWh of electricity produced) times \$50 per tonne for a carbon tax.

What also becomes clear from this chart is the disproportionately large effect a carbon tax would have on Saskatchewan’s export-sensitive economy and how getting Saskatchewan’s goods to our customers

³⁶ Based on earlier work, the final estimate also included updates from Saskatchewan’s Ministry of Finance. It assumes a federal tax would cover methane emissions from the oil and gas sector plus emissions from all electrical power generation. Some sources like landfills and livestock emissions were not included in the estimate.

will become more expensive. As was noted in a recent internal document prepared by the Saskatchewan Ministry of Environment's Climate Change Branch:

"Saskatchewan's major industries are emission-intensive price-takers on world markets, with limited opportunity to transfer their GHG reduction costs to customers. Current market conditions have compounded the problem.

About 70 percent of the province's GHG emissions are generated by economic activities and energy usage outside of large emitters.

Transportation accounts for 14 percent or about 10 Mt annually of Saskatchewan's total GHG emissions. Freight movement is almost half of the province's transportation emissions."³⁷

Figures for the oil and gas sector are based on what the industry calls fugitive emissions. These are gasses from pressurized equipment caused by leaks or industrial activity. A 2005 study in Saskatchewan estimated fugitive emissions from the oil and gas sector were 15.7 Mt of CO₂. Roughly 92 percent of those gases were methane, amounting to 14.44 Mt. If a \$50/tonne carbon tax is applied uniformly across the entire provincial oil and gas sector, it would generate \$722 million in tax revenue.

Figures relating to the application of agriculture fertilizers in Saskatchewan are based on the annual total amount of nitrogen fertilizers sold in our province. Total emissions were estimated at 16.7 Mt in the agriculture sector. That amount is multiplied by approximately 25 percent, which is the assumed emissions caused by the fertilizers themselves. This yields the calculation of carbon tax revenues at \$214 million annually.

Taken as a whole, it is an understatement to suggest the impact of a federal carbon tax on Saskatchewan would be severe. Such harm may be justifiable to some, based on the belief these measures would actually cause GHG emissions to drop. Saskatchewan believes, based on the evidence previously cited, that such a belief would be at best overstated; at worst, misguided.

The current Alberta government has announced plans for a carbon tax on heating and transportation fuels. It is priced to equal \$20 per tonne of carbon emissions. That figure would rise to \$30 in 2018. It is anticipated the Alberta tax will raise \$1.2 billion in the first full fiscal year.³⁸

Roughly a third of that amount will be spent on rebates for middle and low income Albertans. The remainder of the funds are going to building green infrastructure, measures to improve energy efficiency and innovation in green technology.

Direct costs to an Alberta family with two children have been estimated at \$338 annually. Indirect costs are estimated at between \$70 and \$105 per year.³⁹

37 Internal strategy document, prepared by the Saskatchewan Ministry of Environment's Climate Change Branch, August 2016.

38 Article by James Wood, Calgary Herald, June 1, 2016.

39 *ibid.*

What is not known is whether the Alberta tax will actually cause consumers and business owners to alter their behaviour in ways that reduce their carbon footprint. Another uncertainty is what impact the proposed carbon tax will have on economic growth.

What we do know is that, based on the British Columbia experience, these are extremely important questions to ask.

The British Columbia Experience

In 2008, British Columbia introduced North America's first broadly-based revenue neutral carbon tax.

The British Columbia tax currently adds an extra 6.67 cents per litre on the price of gasoline. It also adds to the costs of other fuels for individuals and certain industries.

Few public policy initiatives have generated a wider range of opinion from environmental commentators; everything from adulation to rage.

Angel Gurría, Secretary General of the Organization For Economic Co-operation and Development, described the implementation of the British Columbia carbon tax as being "as near as we have to a textbook case, with wide coverage across sectors..."⁴⁰

The New York Times applauded the British Columbia carbon tax, saying it was environmentally effective and did not damage the economy. "In fact, the provincial economy grew faster than its neighbours' even as its greenhouse gas emissions declined."⁴¹

From Saskatchewan's perspective, the two most important questions to ask are:

- *has the British Columbia tax sent a price signal that is causing people and businesses to change their behaviour and reduce their carbon output?*
- *has this been done in a manner that fosters continued economic growth and job creation?*

For some critics, the answer to both questions is a resounding no.

Marc Lee is the Senior Economist for the Canadian Centre For Policy Alternatives. Lee states succinctly that the main problem with British Columbia's carbon tax is that it does not work.⁴²

"The reality is that since 2010, British Columbia's GHG emissions have increased every year; as of 2013, they are up 4.3 percent above 2010 levels."

"We see the recession-induced drop in 2009 and 2010, then increases from 13.5 tonnes per person in 2010 to 13.7 tonnes per person in 2013."

40 <http://www.oecd.org/about/secretary-general/the-climate-challenge>

41 <http://www.nytimes.com/2016/03/02/business/does-a-carbon-tax>

42 <http://behindthenumbers.ca/2016/03/03/dont-believe-the-hype-on-bcs-carbon-tax/>

Lee also notes that while British Columbia's economy did not collapse because of the carbon tax, it did not grow faster than neighbouring provinces (22 percent growth in Alberta, 15 percent in Saskatchewan, 11 percent in British Columbia between 2010 and 2014, similar to the gap existing in 2007).

Also, the low-income credit that is part of the British Columbia tax regime has failed to keep pace with the increasing tax rate. The tax has gone up, but the credit has not.

Lee's sentiments appear to have been echoed in April of 2016 by Sir David King, the United Kingdom Special Representative for Climate Change. In an interview following a climate change event in London, Sir David described carbon pricing as "too sluggish a weapon."

"I don't see India, China or South America coming in with a sufficiently high carbon price to drive them off coal."⁴³

The solution, according to King, is to make clean technology cheap enough to compete with traditional energy sources. He describes development of renewables as self-accelerating, in that increased demand brings prices down, which further encourages use.

It must be said that as new data comes in and economic conditions improve, these trends may also improve. As British Columbia's carbon tax is around for a while, more people may start making decisions that cut their carbon footprint with industry following along.

However, a recent federal report provides sobering evidence to the contrary. Even with a carbon tax, British Columbia's GHG emissions are forecast to increase 32 percent between 2013 and 2030.⁴⁴ British Columbia's latest climate plan skirts the issue by avoiding firm GHG reductions targets for 2030, promising instead to bring GHG emissions down to 80 percent of 2007 levels by 2050.

As one British Columbia MLA noted: "There's only one test of carbon leadership: whether your emissions are going up or going down."⁴⁵

Another fundamental question for Canadians is this: are the GHG reductions attributed to the tax significant, when compared to other mechanisms?

Dr. Mark Jaccard is a Professor of Sustainable Energy at the School of Resource and Environmental Management at Simon Fraser University. Dr. Jaccard has studied the British Columbia carbon tax. In a recent article⁴⁶, he asked readers which climate policy in Canada has reduced the most CO2 emissions over the last decade?

43 "UK Envoy: carbon pricing 'too sluggish' to meet climate goals," The Guardian, April 25, 2016.

44 "Christy Clark says British Columbia should be a model for carbon tax," by Ian Bailey, Globe and Mail, March 2, 2016. See also "BC's Climate Plan: What You Need To Know," Globe and Mail, August 19, 2016. This article notes the British Columbia government's decision to make developing the liquefied natural gas sector a major priority and British Columbia's decision to avoid making a firm GHG reduction target for 2030. This article also quotes comments from the Pembina Institute, which said British Columbia's new plan won't see emissions significantly decline for almost 15 years. According to the Pembina Institute, that "simply leave the hard work of addressing climate change for another day." Tim Pearson, a spokesman for British Columbia's Sierra Club was "perhaps the most blunt, describing the (BC) government's climate change plan as a 'fraud'."

45 ibid.

46 <http://policyoptions.irpp.org/magazines/february-2016/want-an-effective-climatepolicy-heed-the-evidence/>

Dr. Jaccard says many people put British Columbia's much-publicized carbon tax at the top of the list. In fact, British Columbia's carbon tax isn't even the measure that is responsible for the most CO2 emissions in British Columbia, never mind Canada.

Ontario's move out of coal fired power generation, a move made possible in part by Ontario's robust nuclear generating capacity, has reduced annual emissions by 25 Mt. This move, not a carbon tax, is Canada's most effective measure so far to reduce GHG emissions.⁴⁷

Nuclear and new technology that dramatically reduces coal-fired emissions to a standard cleaner than natural gas is Canada's answer to climate change, not a carbon tax that appears to do little to reduce GHG emissions.

As for British Columbia, Dr. Jaccard says:

*"The 2007 'clean energy' regulation forced BC Hydro to cancel two private coal plants and its own gas plant. This cut BC's projected annual emissions in 2020 by 12 to 18 Mt. The carbon tax is slated to reduce 2020 annual emissions by 3 to 5 Mt."*⁴⁸

Once again, it appears that when it comes to climate change talks in Canada, we're having the wrong conversation. Instead of talking almost exclusively about carbon taxes and cap and trade, much more emphasis should be placed on developing technology to clean-up coal fired power generation. And here, Saskatchewan is a world leader. Whether you view clean coal as a transitional technology or a permanent solution to climate change, it demands a higher profile.

As articulated in the recent Parliamentary Budget Officer report:

*"One measure that cuts across economic sectors is carbon capture and storage. A number of sectors would potentially benefit from its ongoing development and deployment."*⁴⁹

A final point on carbon taxes in the Canadian context. Saskatchewan takes note of the 07 June 2016 decision by the Government of Newfoundland and Labrador. With the *Management of Greenhouse Gas Act*, the Liberal government in St. John's rejected the more rigid carbon tax adopted by British Columbia.

Newfoundland's Environment Minister, the Honourable Perry Trimper, said his government is attempting to find a balance between taking action and blunting a competitive advantage for vital manufacturing sectors. Echoing the foundational principles of Alberta's 2007 Specified Emitters Regulation, the Newfoundland act sets out regulations for major industrial players, with flexible compliance built in.

In the words of Minister Trimper "We feel we're striking the right balance...This needs to be done with industry, not to industry."⁵⁰

47 The significant costs and problems associated with implementing this decision are discussed later in this paper.

48 <http://policyoptions.irpp.org/magazines/february-2016/want-an-effective-climatepolicy-heed-the-evidence/>

49 Canada's Greenhouse Gas Emissions: Developments, Prospects and Reductions, Office of the Parliamentary Budget Officer, Ottawa, April 21, 2016, available at: www.pbo-dpb.gc.ca, pg. 4.

50 "Newfoundland and Labrador introduces greenhouse gas legislation to cut emissions," Canadian Press, June 7, 2016.

Recommendation 3:

Saskatchewan calls on the federal government to abandon plans for a national carbon tax. These plans betray a one-size-fits-all mentality that fails to take into account the unique qualities and diversity of Canada's regional economies. They are of limited utility when it comes to actually reducing GHG emissions, and they offer grave risk to carbon intensive economies like Saskatchewan's. We cannot ask any one group of Canadians to bear a disproportionate share of the cost of addressing climate change.

Cap and Trade

One of the main criticisms of a carbon tax is that it does not provide emissions certainty. The tax is set at a specific, usually escalating, rate. Then, market forces come into play that are supposed to reduce carbon emissions based on the resulting decisions.

One way to increase emissions certainty is through a cap and trade regime. Here, a target for emissions is set and individual actors are given a portion of the target. Usually several years of grace are allowed to meet that target. Companies can implement new processes or equipment in order to achieve the target in a timely fashion. If capital is not available or the new technology has yet to mature, credits can be purchased that offset any emissions above the target.

While not as market-driven as a carbon tax, it does seem to make some intuitive sense. The goal of actual carbon reduction is objective and transparent. Cap and trade does seem to add certainty and transparency.

However, as with all systems, it does not work perfectly in the real world. Ontario and Quebec, for example, have joined a carbon trading system established by the California Air Resources Board. The Board conducts quarterly auctions for carbon credits.

The quarterly auction held in August of 2016 saw only 35 percent of the available credits being sold. This comes on the heels of the May 2016 auction where only 11 percent of the credits on auction were sold. The May credit auction was supposed to generate \$200 million in emissions revenue, but will likely yield Quebec something in the order of \$20 million.⁵¹ Ontario is set to join in January of 2017 and is hoping to garner \$1.9 billion a year from California credit auctions.

Duncan Rotherham is a carbon market expert and has prepared cap and trade modelling for energy firms in Canada. In a recent media interview, he noted:

"Thirty-five percent is definitely showing that there's a problem...and this is twice as scary as the first one because it's a trend."⁵²

51 "Ontario's rude awakening from its California carbon dreams," Terence Corcoran, National Post, June 1, 2016.

52 "Bombing cap and trade auctions in California, Quebec threaten Ontario's \$8 billion climate change plan," Brian Platt, Financial Post, August 24, 2016.

And, once again there is the nagging question of cause and effect: have jurisdictions with a cap and trade system actually seen reductions in emissions and were those reductions caused by the system or other factors?

An argument has been made that California's carbon pricing policy, signed on to by Ontario and Quebec, will have almost no effect by 2020. Up to 90 percent of California's current and future reductions can be traced to regulations on electricity, fuels, vehicles, buildings, appliances and equipment.⁵³

As Canadian commentators have said, it is far too early to declare the system a failure.⁵⁴ However, it is equally true that Ontario is on the cusp of embracing an "experimental carbon trading regime that faces severe problems."⁵⁵

There are legal challenges that have been launched, questioning the constitutionality of the California cap and trade system. There are also political questions about whether legislators have the resolve to extend the current system beyond its set expiry date of 2020.

Further, as the Wall Street Journal reminds us, the California example is not the first time cap and trade systems have encountered problems:

"The European Union launched its Emissions Trading System, which the Obama Administration and even some Republicans hoped to copy, before Rust Belt Democrats revolted. Europe's cap and trade bubble has since burst as sluggish economic growth and heavily subsidized renewables have produced a glut of credits. By 2013, the roughly 30 euro price per ton that was putatively needed to reduce use of coal had plummeted to a few euros. Politicians have been reluctant to withdraw credits to prop up the price because they don't want to handicap struggling businesses. Regulatory uncertainty has amplified price fluctuations."⁵⁶

Recommendation 4:

A national cap and trade mechanism for Canada that would place absolute limits on GHG emissions while allowing the trading of credits appears to carry considerable risk, given recent credit auctions in California. These mechanisms have experienced considerable growing pains when implemented on a large scale. While these problems may be resolved through further refinement of regulations, funds raised appear considerably lower than expectations. Therefore, Saskatchewan calls on Canada to reject a national cap and trade system as an option. We endorse recent comments made by Nova Scotia calling for maximum flexibility as provinces attempt to meet federal climate change targets.

53 "It's the same in any jurisdiction that has significantly reduced emissions. Experts show that the carbon pricing policy in California, which Quebec has now joined, will have almost no effect by 2020. Ninety percent of that state's current and projected reductions are attributed to innovative, flexible regulations on electricity, fuels, vehicles, building, appliances, equipment and land use," Jaccard, February 2, 2016.

54 "Ontario's rude awakening from its California carbon dreams," Terence Corcoran, National Post, June 1, 2016.

55 *ibid.*

56 "California's Cap and Trade Bubble: The carbon-credit market sputters, as it also has in Europe," Wall Street Journal, May 30, 2016.

Carbon Capture and Sequestration

Our province is taking a variety of measures in response to climate change. We have made considerable investments in becoming a leader in CCS technology. We are looking for ways to make better, safer use of our rich uranium resources.

We are undertaking research to prepare for the negative consequences of climate events by reducing risk to people, roads and buildings.

This is as it should be. As the previously cited report by the Parliamentary Budget Officer states:

“Lowering emissions will likely require a variety of coordinated approaches and it will be complex. This stems from the highly diverse nature of the sources of emissions, and the need to avoid placing much of the burden on particular regions or sectors. However, not surprisingly, the bulk of the reductions will come from the three sectors that contribute most to current emissions—transportation, oil and gas production and distribution, and generation of electricity.”⁵⁷

As mentioned earlier in this White Paper, 40 percent of the world’s electricity comes from coal. For developing economies, it is a cheap and reliable alternative. Coal is not going away any time soon.

The International Energy Agency estimates China will double its number of coal fired plants by 2040, leading CO2 emissions to double or even triple.⁵⁸ This is why the development of new clean technologies, like CCS, are so extremely important. This technology must be distributed around the world.

In October of 2014, the President of the International Energy Agency, Maria van der Hoeven said the launch of SaskPower’s Boundary Dam CCS project represented a “momentous point” in the history and development of this technology:

“CCS is the only known technology that will enable us to continue to use fossil fuels and also de-carbonise the energy sector. As fossil fuel consumption is expected to continue for decades, deployment of CCS is essential.”⁵⁹

The news release goes on to state that the International Energy Agency (IEA) believes CCS will have a central role to play, accounting for “one-sixth of the required emissions reductions by 2050”:

“IEA analysis has shown that without significant deployment of CCS, more than two-thirds of current proven fossil-fuel reserves cannot be commercialized before 2050 if the increase in global temperatures is to remain below two degrees Celsius.”⁶⁰

57 Canada’s Greenhouse Gas Emissions: Office of the Parliamentary Budget Officer, April 21, 2016, available at: http://www.pbo-dpb.gc.ca/web/default/files/Documents/Reports/2016/ClimateChange/PBO_Climate_Change_EN.pdf, pg. 4.

58 “Renewables Aren’t Enough,” Charles C. Mann, Wired, March 25, 2014.

59 “IEA hails historic launch of carbon capture and storage project,” October 1, 2014, available at: <https://www.iea.org/newsroomandevents/pressreleases/2014/october/iea-hails-historic-launch-of-carbon-capture-and-storageproject.html>

60 *ibid.*

Existing international agreements may already contain a path forward for distributing this CCS technology around the world. Further, Saskatchewan and Canada may be able to gain internationally recognized credits as part of this process.

Embedded within the Paris Agreement of the United Nations Framework Convention on Climate Change is something called an ITMO: an internationally transferred mitigation outcome. Language inside the Paris Agreement is complex and open-ended, making interpretation difficult. The language can be found in Articles 6.2 and 6.3 of the Paris Agreement, United Nations Framework Convention on Climate change.⁶¹

6.2. *Parties shall, where engaging on a voluntary basis in cooperative approaches that involve the use of internationally transferred mitigation outcomes towards nationally determined contributions, promote sustainable development and ensure environmental integrity and transparency, including in governance, and shall apply robust accounting to ensure, inter alia, the avoidance of double counting, consistent with guidance adopted by the Conference of the Parties serving as the meeting of the Parties to this Agreement.*

6.3. *The use of internationally transferred mitigation outcomes to achieve nationally determined contributions under this Agreement shall be voluntary and authorized by participating Parties.*

SaskPower and the mining company BHP Billiton have jointly created the Carbon Capture and Storage (CCS) Knowledge Centre based in Regina. The goals of the CCS Knowledge Centre are to raise awareness of CCS technology and promote its use worldwide.

The CCS Knowledge Centre has interpreted this language as an opportunity to market its CCS technology around the world, while gaining carbon credits that could be counted against Saskatchewan's mitigation targets.

In a recent internal document, officials at the CCS Knowledge Centre began expanding on the concept of using ITMOs to meet their goals while earning credits for Saskatchewan:

"To over simplify, if Saskatchewan helps reduce emissions in China with CCS technology, those emission reductions can be counted towards Canada's mitigation actions."

Japan is already in the midst of transferring technologies and services in areas like energy management and renewable energy. These arrangements are not officially called ITMOs, however they function in exactly the same way.

Since 2013, Japan has been acquiring carbon credits from two energy saving projects in Indonesia. The Japanese government has received a share of the tonnes reduced in Indonesia. So did the Tokyo-based company that provided the technology.

61 Full text of the agreement available at: https://unfccc.int/files/meetings/paris_nov_2015/application/pdf/paris_agreement_english_.pdf

Saskatchewan strongly encourages the Government of Canada to rapidly support and enhance efforts by SaskPower to establish an ITMO focussed on CCS technology. In this way, Saskatchewan can make a meaningful contribution to global GHG reductions while encouraging the development of clean technology.

According to the International CCS Knowledge Centre:

“By utilizing the internationally recognized mechanism of a technology transfer, Saskatchewan has the ability to go beyond provincial borders on climate action to help address climate change on a global level where it really counts. Utilizing ITMOs for Saskatchewan CCS technology transfer creates an opportunity for an international market effecting emission reductions in other countries whilst helping to decrease Canada’s national emissions inventory.”

Recommendation 5:

SaskPower has made the largest per-capita investment in clean technology in the world with its CCS technology at Boundary Dam in Estevan. CCS is the only known technology that will enable us to continue to use fossil fuels. This technology will be of significant benefit to countries like India and China which rely heavily on coal to generate electricity. Saskatchewan calls on the federal government for significant support in exporting this proven technology to countries where it can make a profound impact on climate change. Saskatchewan also calls on the federal government to work rapidly on using the language of the Paris Agreement (United Nations Framework Convention on Climate Change). Canada’s main focus should be on the rapid development of Internationally Traded Mitigation Outcomes (ITMOs). Canada’s goal must be to allow Saskatchewan to use all international mechanisms to meet its climate change targets by allowing the global marketplace to utilize important climate change technology.

SaskPower and Renewables

SaskPower is the province’s primary electricity provider. The Crown corporation is in the midst of making historic investments to maintain and upgrade Saskatchewan’s electricity system. Between now and 2024, SaskPower is investing \$10 billion for those upgrades, which include adding cleaner sources of generation capacity.

SaskPower’s goal is to reduce emissions by 40 percent from 2005 levels by 2030. This is above and beyond what is required by existing regulations and positions the corporation to operate in a new, carbon-constrained environment.

In November of 2015, SaskPower committed to doubling its percentage of renewable electricity generation by 2030 as it moves towards a more environmentally sustainable future. The portion of renewable electricity capacity will grow from 25 percent today to as much as 50 percent by 2030. The Minister Responsible for SaskPower at the time, the Honourable Bill Boyd, said the 2030 target is ambitious, but he expressed confidence that it can be reached.

SaskPower is using what it describes as an ‘all of the above’ approach to planning for future energy needs. This will include major expansion of wind power, solar, biomass, geothermal and hydro power. This is in addition to the Boundary Dam CCS project and its potential successors. More natural gas generating plants will also be required.

Right now, generating capacity from renewable resources accounts for roughly a quarter of SaskPower’s energy mix. Twenty percent of that total is from hydro. The rest (5 percent or 220 megawatts) is from wind. Three new wind projects are under development. They will add an additional 207 megawatts (MW) of renewable generation over the next four years.

To meet the target set in November of 2015, we are seeking approval to begin the addition of up to 200 MW in early 2017. The total installed wind capacity by 2030 would be as much as 2,100 MW, or 30 per cent of total generating capacity.

In a news release dated November 23, 2015, SaskPower’s Chief Executive Officer, Mike Marsh, said this was all made possible through improvements in technology that has made wind power much cheaper, and a better understanding of how wind power operates on the Saskatchewan grid.

Those improvements in technology have a dramatic impact on what is described in the utility sector as the capacity factor. This is defined as the percentage of a plant’s maximum potential that is achieved over time. The recent Bloomberg New Energy Finance reports cites examples of wind farms in Texas that are now achieving capacity factors of 50 percent:

“Improving capacity factors make renewables more attractive. But capacity factors of gas and coal plants are also changing. Once a solar or wind project is built, the marginal cost of the electricity it produces is pretty much zero—free electricity—while coal and gas plants require more fuel for every new watt produced. If you’re a power company with a choice, you choose the free stuff every time.”⁶²

Recommendation 6:

Through its Crown-owned electrical utility, SaskPower, our province will maintain a robust commitment to the introduction of renewable power sources and the new infrastructure. This will assure the distribution and use of power generated by renewables across our province. Here again, Saskatchewan is in accord with sections of the Vancouver Declaration and the Paris Agreement, calling for a high level of participation by Indigenous communities. Renewables offer Saskatchewan a tremendous opportunity to achieve that goal. Given this, Saskatchewan calls on the federal government to support Saskatchewan’s significant efforts to expand the use of renewables.

62 “The World Nears Peak Fossil Fuels for Electricity,” Tony Randall, Bloomberg.com, June 12, 2016.

Introducing Renewables: Ontario's Cautionary Tale

In 2006, Ontario's Ministry of Energy took a bold step. It issued a first-ever supply mix directive to the Ontario Power Authority.⁶³ The Ministry directed that all coal-fired generation be replaced with cleaner renewable energy sources like wind, solar, biomass and hydroelectricity.

The execution of that decision provides some valuable lessons for Saskatchewan and the rest of Canada.

Between 2003 and 2014, Ontario eliminated 7,546 MW of power that came from coal, adding 13,595 MW of new capacity.⁶⁴ About half of that new capacity came from renewables, the rest from natural gas.

In an attempt to encourage greater use of renewable energy sources, Ontario introduced the *Clean Energy Act, 2009*. As Ontario's provincial auditor notes:

"Compared to the previous program, the new guaranteed-price program was wider in scope and offered generators significantly higher prices."⁶⁵

The program was successful in increasing the amount of renewable energy produced. It was also expensive. According to Ontario's auditor, electrical consumers have paid \$9.2 billion more for renewables over the 20 year contracts signed under the guaranteed price renewable program than they would have paid under the previous competitive bidding process. To be fair, Ontario's Independent Electrical System Operator (IESO) which merged with Ontario's Power Authority in January of 2015, has come up with a lower estimate of the added costs: \$5.3 billion.⁶⁶

These added costs have coincided with technological improvements in wind and solar power systems that have helped drive down costs. Average costs in the United States have dropped 78 percent for solar and 58 percent for wind since 2009.⁶⁷ Ontario's guaranteed prices renewable program has seen price reductions of 48 percent and 5 percent respectively. In a dynamic environment, it is difficult for governments to keep pace, and consumers will pay more.

Increased renewable capacity is also changing how Ontario responds to peak electricity demand. According to the provincial auditor, in 2003 90 percent of the province's total generation capacity was available to contribute at times of peak demands. Now, that number is 80 percent and is projected to fall to 70 percent by 2032. The reason is that renewable energy supply is not constant.

"...wind and solar energy are not always reliable because wind and sunshine are intermittent by nature. In Ontario, wind and solar energy have capacity contributions of only 14 percent and 30 percent respectively. This means that wind and solar are only available 14 percent and 30 percent of the time, respectively, because of less windy and sometimes cloudy days during the summer when

63 2015 Annual Report, Auditor General, Ontario: Chapter 3, Section 3.05: Electricity Power System Planning, pg. 206. Available at: <http://www.auditor.on.ca/en/content/annualreports/arreports/en15/3.05en15.pdf>

64 *ibid* pg. 208.

65 *ibid*.

66 *ibid* pg. 214.

67 See "Historical U.S. Average Cost Versus FIT Guarantee-price Program Prices for Wind and Solar Energy," 2009-2014: Ontario's Independent Electricity System Operator and Lazard LTD, pg. 227 of the above referenced Ontario Auditor's 2015 Annual Report.

*electricity demand is highest. As a result, other resources with higher capacity factors, such as natural gas resources, are needed to meet Ontario's supply requirements. This, paired with Ontario's renewable energy costing more than other types of power generation because of high guaranteed prices, has contributed to higher electricity prices."*⁶⁸

Higher prices are also a result of excess electrical production in Ontario. The provinces' IESO can ask power generators to cut back. However, those generators still have to be paid. According to recent forecasts, Ontario's power production is expected to continue exceeding demand from 2015 to 2020, by a total of 52.3 million MW. That is enough power to run Nova Scotia for five years.⁶⁹

The Ontario experience clearly shows the complexities involved in planning for future energy needs. The laudable goal of increasing renewable power production can create a market place where savings produced by new technology are not passed on to consumers. Uncertainty over how much power renewables can provide to the grid and when that power can get there may lead to an overbuilding in base-load capacity. That means producing power that no one needs.

All of this speaks to the need for caution, and careful planning, something Ontario's auditor says appears to be lacking.

"But over the last decade, this power system planning process has essentially broken down, and Ontario's energy system has not had a technical plan in place for the last ten years. Operating outside the checks and balances of the legislated planning process, the Ministry of Energy has made a number of decisions about power generation that have resulted in significant costs to electricity consumers."

Saskatchewan must take steps to reduce GHG emissions. However, we can learn from the experiences of others.

Cogeneration Opportunities In Saskatchewan

Cogeneration is the production of electricity and heat energy from one source at the same time. Typically in Canada, this fuel source is natural gas. Cogeneration is also sometimes called combined heat and power.

In Canada, it is common to see cogeneration units that combine a natural gas turbine with a steam turbine. Hot air exhaust from the gas turbine provides most of the heat to create steam in the steam turbine. If extra heat is needed, a small amount of extra natural gas is burned.

Europe has a higher population with greater densities. This has allowed for different configurations for cogeneration. Waste heat from steam generators is piped into homes and commercial buildings. This is known as district heating. There are a small number of these facilities in Canada, mostly in individual office buildings in larger centres. A district heating system in Toronto uses dedicated steam generators to circulate hot water for heating in a number of buildings. Cool water from deep in Lake Ontario is used for cooling these buildings.

68 ibid pg. 229.

69 ibid pg. 225.

The electric capacity, in MWs, from cogeneration plants in Canada now reaches 9,300 MWs at 216 facilities. This represents 6.6 percent of Canada's 140,000 MWs of installed capacity.⁷⁰

Approximately 4,400 MWs is owned by the electricity sector and 1,900 MWs is owned by the oil and gas sector. These two sectors account for 67 percent of Canada's cogeneration capacity.

In terms of cogeneration technology, approximately 59 percent of this capacity is provided by natural gas turbines, and 37 percent is provided by steam turbines.

Saskatchewan has a number of cogeneration projects, primarily in the potash sector. All of these projects, save for the Mosaic Company's Esterhazy Expansion project, provide power to the SaskPower electrical grid.

The point of cogeneration is to reduce fuel consumption, reduce GHG emissions and to reduce operational costs. There is a trade-off: increased capital costs since a second activity (power generation) is added to heat-making.

The economic benefits of cogeneration may be frustrated by the realities of industrial production. The Potash Corporation of Saskatchewan's Cory mine project is extremely efficient. However, periodically, potash production shuts down due to demand fluctuation. That produces a lower demand for water heat, making the economics of cogeneration less attractive.

No jurisdictions in Canada have enacted similar cogeneration mandates. This may become a topic for discussion as Canada continues to examine climate change policy options. However, the potential conflict of such cogeneration mandates with other climate change targets like renewable generation makes the attractiveness of such discussions uncertain.

Given the size of Saskatchewan's potash mining operations, potential cogeneration opportunities are large. Only two of the existing 11 potash mines have cogeneration facilities. The 258 MW of current electrical generating capacity is a mere fraction of what's possible through cogeneration.

Saskatchewan's Potash Producers Association has issued no public position on cogeneration. Individual companies may have taken a hard look at these commercial opportunities. However, it is up to individual companies to weigh the substantial risk of business losses associated with engaging in non-core businesses.

Nuclear

Nuclear is an essential part of the world's future energy mix. About 11 percent of world energy production comes from uranium.

The uranium produced in Saskatchewan results in the avoidance of an estimated 375 Mt of carbon emissions annually.⁷¹ Since Saskatchewan's total emissions are 75 Mt, that avoidance alone is equal to

70 Natural Resources Canada, Environment and Climate Change Canada, and a long list of industry associations sponsor the Canadian Industrial Energy End-use Data and Analysis Centre (CIEEDAC). The site is hosted at Simon Fraser University in Burnaby, BC. Information for this report was obtained from CIEEDAC's latest report, dated March 2016. CIEEDAC also maintains a public database on cogeneration within Canada, available at: <http://www2.cieedac.sfu.ca>.

71 Saskatchewan's Ministry of the Economy.

four times our total annual emissions production. The carbon avoided by using Saskatchewan uranium would equal about half of all of Canada's 750 Mt of carbon emissions annually.

Canadian nuclear regulators need to be prepared for innovation. They need to make sure emerging technologies are safe, without stifling innovation.

"Advanced nuclear companies are being developed and funded because innovators see a chance to improve energy generation and investors see profit in creating an answer to the global energy paradox. Right now there are 1.3 billion people in the world without access to reliable electricity, but the climate crisis means they simply must not get it from dirty sources. Advanced reactors can provide scalable, affordable electricity without carbon emissions."⁷²

Recommendation 7:

Saskatchewan calls on the federal government to take a leading role in a program to develop a small reactor that could be deployable in Canada and all over the world. We endorse the call by the Canadian Nuclear Safety Commission for comments on regulatory strategies, approaches and challenges connected with development of this new and emerging technology, and urges these opportunities be acted upon expeditiously.

As the Canadian Nuclear Safety Commission (CNSC) notes in a recent news release:

"Over the past several years, many technology developers have expressed interest in the construction of SMRs (small modular reactors) in Canada. Consequently, the CNSC has been looking into the nuclear regulatory and licensing implications and challenges for SMR-related activities. The CNSC has met with technology developers and conducted outreach with the public and academic institutions at conferences."⁷³

Other nuclear industry observers have noted the need for regulatory consistency and a push to encourage innovation.

"The technical limitations of renewable energy, coupled with the need for rapid decarbonization of our energy system to combat climate change, requires a strong, consistent voice for other, even more radically innovative carbon reducing technologies. Wrongly, these technologies have largely been forgotten in what is too often a simplistic debate between those who are either for or against renewable energy. Technologies like conventional and advanced nuclear energy carbon capture and storage, waste to energy generation and innovative biomass cannot be left behind to pursue a vision of an energy system powered only by solar panels and wind turbines."⁷⁴

72 "Unleashing Innovation: A comparison of regulatory approval processes," pg. 1, at: www.thirdway.org/energy

73 CNSC News Release, May 31, 2016 re: Discussion Paper 16-04.

74 "The Climate Challenge: Can renewables really do it alone?" pg. 2, available at: <http://www.thirdway.org/issue/energy>, and "Clear Thinking Needed," The Economist, November 26, 2015.

“Renewables are improving, and their share of the grid can and must go up— hopefully reaching a substantial share of capacity. But we must also aggressively pursue other low-carbon sources that can bring large quantities of base-load power to the grid in the right places and in cost-effective ways.”⁷⁵

Sweden has an ambitious plan to have a 100 percent clean electricity system by 2040. This plan includes a robust nuclear component. The plan has widespread political support from Social Democrats, Green Party representatives and Christian Democrats.

A framework agreement for the plan allows for the construction of ten new nuclear reactors at existing sites, replacing plants as they retire. Utilities that run these Swedish reactors must adhere to strict safety requirements, including the establishment of independent core cooling. In June, Sweden’s political parties agreed to eliminate a production tax on nuclear power introduced in 1984. This will allow utilities more flexibility and predictability when investing in new technology.⁷⁶

Recommendation 8:

Saskatchewan calls on the federal government to introduce a nuclear regulatory regime that recognizes the potential of transformational change in reactor technology—one that recognizes the contribution nuclear power can make to clean power generation in Canada and around the world.

The Government of Saskatchewan applauds Canada’s recent decision to include nuclear energy under its definition of clean energy research and development investments. The announcement was made by Canada’s Minister of Natural Resources at the inaugural Mission Innovation Ministerial meeting in San Francisco on June 2, 2016.

Canada signed on to Mission Innovation in Paris on November 30, 2015. It is a global partnership, aimed at doubling investments made by governments in clean energy innovation over the next five years.

Another part of Mission Innovation is a partnership with 20 private sector investors, who have agreed to provide their financial support for clean energy technologies.⁷⁷

The inclusion of nuclear energy in this endeavour is a significant step in the right direction.

Oil and Gas

Saskatchewan is a global leader in energy and food production; the province intends to grow these important sectors to help feed and power the world. Carbon emissions will be managed, but within this important context.

75 “The Climate Challenge: Can renewables really do it alone?” pg. 11.

76 “Sweden Abolishes Nuclear Tax,” World Nuclear News, June 10, 2016.

77 “Canada’s Participation in Mission Innovation,” news release, Office of the Prime Minister of Canada, November 30, 2015.

The oil and gas sector⁷⁸ produces two main types of GHG emissions: methane and carbon dioxide. Since each is being dealt with differently in regulations by two levels of government, the distinction is important.

The federal government, through Environment and Climate Change Canada, intends to introduce regulations on methane emissions. Regulation of CO2 emissions will be left to Canada's provinces and territories.

In March 2016, Canada's Prime Minister visited the United States and signed a Joint Statement that included a commitment to reduce methane emissions in the oil and gas sector. The target set was 40 to 45 percent below 2012 levels by 2025. Regulations will start in 2018 and be phased-in over the following two years. We again note that the Government of Canada acted unilaterally when it signed this agreement with the United States, with little to no consultation with provinces and territories.

In the Saskatchewan context, roughly half of the oil and gas sector's emissions are made up of methane and other half is CO2. These emissions are spread out over 82,800 oil and gas wells situated in hundreds of fields and processing facilities. The CO2 is produced by natural gas flares and flue gasses from processing facilities that burn natural gas to generate steam or heat. For methane, emissions come mostly from the heavy oil sector as well as emissions from casings and other equipment. Older wells use the pressure from natural gas to power equipment. The gas is vented after use.

New, more up-to-date equipment has made the older technology obsolete. However, in some cases, it was not economical for industry to replace the older pneumatic devices with new controls.

The federal government's plan for regulating methane emissions represents a significant departure from past practices. Typically, a target is set in the form of a performance standard. In these cases, industry is allowed to determine the best way to comply with the performance standard.

In this case, Environment and Climate Change Canada is opting to follow a plan introduced by the United States Environmental Protection Agency (EPA). The EPA is introducing regulations that specify the types of equipment that industry can use to achieve the methane emissions reductions.

Those regulations will also prescribe a maintenance schedule the industry must follow. This will require detailed consultations with the oil and gas sector on how current equipment will be treated under the new regulations. Regulators will also have to carefully consider the implications and timing of replacing that equipment.

Needless to say, this adds an additional layer of complexity on provinces and territories who will not want to introduce regulations at variance with the federal government's plan. Uncertainty will be created over whether those regulations would qualify for an equivalency agreement. Nor would there be any desire to impose a second, different emissions reduction obligation on the oil and gas sector.

Federal officials have indicated that provinces will have an opportunity to sign equivalency agreements, replacing federal regulations with provincial ones. Draft regulations are anticipated in 2017, with final

78 For the purposes of this section, the oil and gas sector is defined as the upstream oil and gas sector. That includes oil and gas well drilling, production and processing prior to transportation. Upstream oil and gas does not include high volume pipeline transportation of oil and gas, nor does it include upgrading or refining.

regulations in place by the end of 2017. Those federal regulations will play a major role in determining what Saskatchewan and other provinces might do. However, as it stands, Saskatchewan and other provinces do not yet know what steps they will need to take to achieve the new federal methane standards.

For a practical example of how the new federal methane regulations alter the strategic environment, one need look no further than Alberta. Alberta had previously announced methane reduction targets very similar to the new federal targets for methane reduction. However, the newer targets must be achieved five years sooner than Alberta had anticipated, significantly altering plans for consultations with industry. Alberta has welcomed the federal announcement and has expressed confidence that a joint approach can be agreed upon.

The Canadian Association of Petroleum Producers (CAPP) believes there are a number of low cost options available to its members to reduce methane emissions. CAPP wants to begin reducing these emissions in advance of federal regulations taking effect. This would allow for the purchase of low-cost credits from other sources and access to technology funds. This approach may or may not be permitted by the federal government.

Some Saskatchewan producers have already expressed concern about the anticipated federal methane regulations and further consultations will be required.

CAPP is looking for western provinces to work together on aligning their methane emissions reduction regulations as much as possible. This would create a uniform standard for producers throughout western Canada.

Officials from Saskatchewan, British Columbia, Alberta and Manitoba are already meeting to determine if a joint position on methane regulations can be achieved. These provinces will also participate in discussions with the industry and the federal government, to better understand the industry's position.

Recommendation 9:

Saskatchewan expresses deep concerns with the manner and timetable for new methane regulations. These regulations must not be allowed to reduce the competitiveness of Canada's oil and gas sector. Saskatchewan calls on the federal government to consult closely with the provinces and industry. This is the only way to ensure that adverse impacts on industry are minimized and that competitiveness is maintained.

Recommendation 10:

Saskatchewan will continue to press the federal government for assurances that methane regulations in Canada are introduced at the same time and at the same level of intensity as actions taken in the United States. Otherwise, the industry will move investment dollars across the border to the jurisdiction where regulations are less onerous.

GHG emissions in the oil and gas sector will be reduced through improving industrial processes and by upgrading existing infrastructure. Saskatchewan has resolved to work with the industry to make these changes in a cost-effective manner that takes into account normal maintenance and replacement schedules. We call for federal cooperation and support in meeting this goal.

In a recent internal report, the Ministry of the Economy identified the significant risk associated with Canada's methane reduction plan becoming decoupled from actions taken in the United States. According to Ministry officials, Environment and Climate Change Canada confirms the federal government will be following its own timetable.

In the United States, regulations will be much harder to implement, given the dynamics of the political cycle and the likelihood of court challenges.

A concrete example is the fact that Canada is likely to impose methane emission reductions on the entire oil industry. The United States will only have regulations on new wells. In the words of the Ministry of the Economy:

*"It is likely that methane emissions from existing wells in Canada will be regulated for years before similar measures are imposed on existing wells in the United States. This could lead the industry to shift some investment in existing wells to better opportunities in the United States."*⁷⁹

This could produce significant adverse consequences for growth in the Saskatchewan economy. It cuts to the core of Saskatchewan's arguments that the impacts of measures to reverse climate change must not harm one region disproportionately.

Saskatchewan has many trade-exposed sectors and needs to ensure that international competitiveness is maintained.

The Ministry of the Economy notes these measures will be more onerous on the oil and gas sector than climate change regulations imposed in other sectors. For example, it is doubtful the steel industry or the cement industry will be asked to reduce their emissions to the tune of 40 to 45 percent.

Also, Saskatchewan will likely find it more costly than Alberta to reduce methane emissions from the oil and gas sector. Alberta's industry is larger and more concentrated. They have existing tools available for gathering methane. Saskatchewan's industry is smaller by comparison and more widely scattered. The methane-collecting infrastructure is not as well developed.

Saskatchewan believes Canada's emission reduction obligations must be distributed fairly and equitably. The only two areas carved-out for the most stringent federal emissions reductions targets—coal fired electricity and oil and gas—are both largely based in western Canada.

Saskatchewan is also concerned about the allocation of methane reduction targets amongst oil producing provinces. Each province is different. In British Columbia, for example, emissions are dominated by gas wells. They can be reduced by regulating the use of pneumatic controllers.

79 Ministry of the Economy, Internal Memo, June 2016. pg. 6.

In Alberta and Saskatchewan, most methane venting comes from heavy oil wells. New federal regulations must be sensitive to these facts.

The federal government has not yet indicated how much flexibility Saskatchewan will be afforded when it comes to introducing these regulations. There is a risk, for example, that methane emission factors used by the federal government may not accurately reflect actual emissions in our province.

Expensive and labour-intensive field work would be required to establish accurate standards that reflect Saskatchewan conditions. Saskatchewan notes the federal timetable is extremely aggressive. The plan is to fully regulate the industry by 2020. This will be very challenging. Right now, provinces do not require the reporting of all the data that will be necessary to accurately estimate methane emissions. This information would also be needed to evaluate the best opportunities for reducing those emissions.

On the good news side of the ledger, there are some potential revenue sources that could be tapped while reducing methane emissions. If natural gas from oil fields is transported to market instead of being flared, or if that gas is used to produce electricity, emissions will be reduced and money will be made. Methane normally vented could also be captured and sold, giving producers more methane to sell.

This would require the development of gas gathering and processing systems, where feasible. New technology could also be put in place using compressed natural gas and liquified natural gas systems. These may be the answer in situations where producers are dealing with smaller amounts of methane. Regulations may also be introduced to eliminate venting of methane from new wells which would encourage flaring as an alternative to venting, where methane capture is not economical.

Saskatchewan's Ministry of the Economy will work diligently with SaskEnergy and SaskPower to improve the economics of methane emissions reductions measures. This could include the construction of gas gathering and processing systems. Compressed natural gas systems or liquid natural gas systems could also be explored, along with the use of methane to generate electricity.

The sale of gas will likely not cover the complete cost of capturing the gas. However, taking these steps might be among the cheapest emission reduction measures available in Canada.

That being said, governments must be mindful of this hard reality: incremental costs and new restrictions will mean that some wells will not be drilled. Others may be abandoned sooner than they would otherwise. This places a premium on garnering accurate and timely information about methane emissions and the costs to industry of new regulations. The adverse consequences of new regulations must be kept to a minimum.

Carbon Dioxide Emissions in the Oil and Gas Sector

The oil and gas sector emits 12.1 Mt of carbon dioxide annually in Saskatchewan. This comes from natural gas flares and flue gasses from oil processing facilities that burn natural gas. Even though CO₂ emissions in oil and gas are larger than methane emissions, the federal government currently has no plans to regulate CO₂ emissions at this time.

Saskatchewan's emissions reduction plan will include measures to cut these emissions. Serious attention will be given to work on reducing carbon dioxide emissions from flue gasses at oil processing facilities. Husky Energy is currently testing four promising technologies that capture carbon dioxide from the flue gasses. That captured CO₂ could be used in enhanced oil recovery projects.

Agriculture

Saskatchewan has 40 percent of Canada's farmland and the country's second-largest beef herd. The sector accounted for approximately 22 percent of Canada's agricultural emissions in 2014. Agriculture accounted for about eight percent of Canada's total GHG emissions.

Saskatchewan's agricultural GHG emissions from farm livestock and crop production were estimated at 12.7 Mt in 2014, 16.8 percent of Saskatchewan's total. On the other side of the ledger, agricultural soils absorbed nearly 11.4 Mt of GHG in 2014. Agriculture in Saskatchewan is close to being a carbon neutral proposition.

Canada's agricultural emissions have been basically stable since 2005 and are projected to remain stable to 2030. However, distribution nationally is not equal.

Emissions in Saskatchewan can be traced back to two main sources: those from agricultural soils created by the application of fertilizer and emissions from the livestock sector.

Advances in beef genetic selection, genomics and food additives will significantly lower the rate of GHG emissions, even as Saskatchewan's cattle herd is rebuilt. A five to ten percent annual reduction by 2030 is thought to be a realistic goal.

The Production Problem: Cutting Emissions vs. Feeding the World

In the national climate change debate, agriculture must be treated differently as food production is a biological process. Demand is growing globally for our agricultural commodities. We are producing more and we are exporting more. People around the world need our high quality food. Policy actions which inhibit production in any way cannot be considered. A hungry world is counting on Canadian agriculture to meet their ever-growing food needs.

Saskatchewan's Growth Plan has set ambitious goals for agriculture. With 40 percent of Canada's arable farmland, we are aware of the demands that a growing global population will create and the challenges we will face in producing enough food in a sustainable manner. The Growth Plan calls for a 10 Mt increase in crop production by 2020. An increase in agri-food exports to \$15 billion and more value-added processing in Saskatchewan are also stated goals. Reducing GHG emissions while also trying to meet growing world demand for food will be a challenge as farming generates GHG emissions as part of many biological processes. Meeting the target of reducing emissions by 30 percent below 2005 levels while continuing to increase production will be a real challenge for the food sector. In Saskatchewan, annual emissions would have to drop to 8.9 Mt by 2030.

Agriculture is unlike other sectors—particularly the electrical sector. It has options to replace high emitting power plants with low or non-emitting sources of power while still maintaining the same levels

of production. In agriculture, significant GHG emissions reductions will likely produce a corresponding drop in food production.

On a farm, producers look for ways of reducing production inefficiencies. These produce a reduction in intensity, not an absolute reduction in GHG emissions over a specific period of time.

To make the distinction clear, the Saskatchewan Ministry of Agriculture defines intensity reductions as a reduction in GHG emissions per unit of production over a specific period of time. Unlike the absolute reductions seen in many global targets, the impact of intensity reductions can be mixed. Higher production levels can lead to an overall increase in total emissions. According to the Ministry, this is an example of what is called the Jevons Paradox.⁸⁰ Despite technological and efficiency improvements, overall fuel efficiency falls victim to an increase in total fuel consumption because of higher production rates.

There are further complexities to consider.

Agriculture is a biological process. As such, reduced emissions in one area could mean higher emissions in another. The Ministry uses the livestock sector as an example. One policy option that could be considered is to reduce the cattle herd and reduce emissions from livestock. If that happened, many acres of land that are now being used for forage and pasture could be converted into crop land. That means a decision to reduce the herd could, in actual fact, drive up total emissions. And, the gradual loss of fragile pasture land, grazed by cattle, could lead to soil erosion, lower water quality and the loss of critical wildlife habitation.

The Ministry has wisely suggested the following principles: lower cost alternatives should always be adopted first and every plan to reduce GHG emissions should include an estimate of the cost per tonne reduced, an estimate which factors in all of the negative and positive consequences of any individual decision.

The potential of pulse crops as a source of GHG mitigation deserves special mention. These crops extract most of their needed nitrogen from the air around them. This means less synthetic fertilizer is applied.

Further increasing the percentage of pulses from 14 percent of seeded acres in 2005 to 25 percent in 2030 would cut emissions from agriculture. This is a realistic goal, since Saskatchewan is a global leader in developing and growing pulse crops. Pulse acres in our province increased from 400,000 acres in 1990 to 6.2 million acres in 2015.

Also worth noting are the benefits of regular soil testing to measure existing nutrient levels. This allows producers to customize their synthetic fertilizer application and offers the potential for lower levels of nitrous oxide emissions.

In the national climate change debate, Saskatchewan agriculture must be treated differently. Policy actions which inhibit production in any way cannot be considered. A hungry world is counting on Saskatchewan farm families to meet their ever-growing food needs.

The Minister of Agriculture cites a 2011 Farm Environmental Management Survey suggesting soil tests have been conducted on about 84 percent of arable land in our province. However, only 25 percent

80 "Saskatchewan Agriculture Emissions Profile," pg. 6.

of arable acres are tested annually. According to the Ministry, increasing the frequency of soil testing “represents a great opportunity for producers to take an active role in reducing GHG emissions.”⁸¹ A follow up survey will take place in 2017, and policy makers in this area should take note of the results.

Saskatchewan is known around the world as a consistent and reliable supplier of safe, high quality food. We have 40 percent of Canada’s farmland, an enormously important resource as we become an increasingly important food supplier to a growing world.

However, to keep feeding the world while helping to reduce global GHG emissions, we are going to need more research and more data. In the words of Saskatchewan Agriculture:

“Given the innovation gaps, additional mitigation is challenging without increasing data and research. Improved science and data is needed to develop country and regional coefficients for indirect emissions to better represent real emissions and improve indirect emissions models. Research is required to increase nitrogen use efficiency and shift crop genetics. Genetic improvement has the potential to improve nitrogen-fixation in pulses and legumes, develop nitrogen fixation in grains and oilseeds, and lower fibre in oilseed flax to allow chopping and spreading of flax straw...Improved data is also necessary to support agriculture as a strong long-term soil carbon sink that is a solutions provider for the rest of Saskatchewan.”⁸²

Recommendation 11:

Saskatchewan is a major global exporter of food. The target is for crop production to increase by 10 Mt by 2020, and agri-food exports to increase by \$15 billion. Achieving these goals must be factored in when developing any national framework for emissions mitigation. For the sake of Saskatchewan’s global export customers, food production must never be jeopardized.

Carbon Sinks

The Vancouver Declaration of March 2016 calls on First Ministers to:

“...work together to enhance carbon sinks, including in agriculture and forestry, taking into account international best practices and accounting standards, to recognize their contribution to mitigating GHG emissions and towards the establishment of a pan-Canadian offset protocols framework and verified carbon credits that can be traded internationally.”⁸³

Over the past 40 years, forests have absorbed about 25 percent of carbon emitted by human activity. Forests reduce the rate of carbon going into the atmosphere slowing down the rate at which climate change takes place.⁸⁴

81 “Saskatchewan Agriculture Emissions Profile,” pg. 18.

82 ibid pg. 24.

83 The full text of the declaration is available at: <http://www.scics.gc.ca/english/conferences.asp?a=viewdocument&id=2401>

84 Natural Resources Canada “Forest Carbon” <http://www.nrcan.gc.ca/forests/climate-change/forest-carbon/13085>

Saskatchewan's agricultural soils also sequester carbon. CO₂ is transformed by plants into carbohydrates and sugars that meet energy needs.⁸⁵ Carbon is removed when plants are harvested. The rest stays in the ground. All crops absorb CO₂, but at different rates depending on climate, soil and type of plant.⁸⁶ Various farming practices can foster the sequestration of carbon in soil including decreasing the amount of land left fallow, low till and no till practices that do not disturb the soil, legumes and grasses in the crop rotation, converting marginal land to grasses and the restoration of wetlands.⁸⁷

Saskatchewan soils have an enhanced capacity to store carbon, given the widespread use of advanced tillage practices and reduced summer fallow acreage. In fact, we have seen a dramatic turnaround.

In 1990, Saskatchewan soils were considered to be a net emitter of carbon. As a result of these changing modern agricultural practices, our soils sequestered an estimated 11.4 Mt of carbon in 2014. The percentage of seeded acres in zero till went from ten percent in 1991 to 70 percent in 2011.⁸⁸ Another 20 percent of seeded acres in 2011 were farmed using minimum tillage practices. Summer fallow acres decreased from 14.5 million acres in 1990 to 1.7 million acres in 2015. Saskatchewan has a higher percentage of seeded acres in zero till in 2011 than Alberta.⁸⁹

There is a debate amongst scientists as to how much carbon can be absorbed by soils. As time passes, soils become saturated with organic matter and reach equilibrium. The annual amount of carbon sequestration will decrease over time. And as soils take on more carbon, the added crop residues naturally decompose, adding carbon back into the atmosphere.

Saskatchewan's Ministry of Agriculture and Agri-Food Canada estimate that by 2020, the annual amount of carbon that is sequestered in our soils will drop to 8.86 Mt. By 2030, that number will drop to 6.6 Mt. This makes it imperative to develop a system of accounting, verification and credits alluded to in the Vancouver Declaration. This is a declining resource. However, Saskatchewan deserves full credit for its significance in any accounting of GHG reductions.

In the words of the Ministry:

"For Canadian provinces outside the prairies, soils are actually an emitter of carbon. The dominance of soil sinks in Saskatchewan is highlighted by the fact that without Saskatchewan, Canadian soils are a contributor to emissions rather than a sink. The ability of Saskatchewan to take full advantage of carbon sequestration is going to depend on federal government policy."⁹⁰

The present federal policy of a 2005 baseline for calculating soil sinks penalizes Saskatchewan farmers in two ways. First, it creates a disadvantage for early adopters of farming practices that took carbon out of the atmosphere prior to 2005. Secondly, it will penalize producers who implement new carbon sequestration measures between 2015 and 2030.

85 "Carbon sequestration by Agricultural Soils," Parliamentary Research Branch (PRB 00-38E), January 2001, available at: <http://publications.gc.ca/Collection-R/LoPBdP/BP/prb0038-e.htm>

86 *ibid.*

87 *ibid.*

88 "Saskatchewan Agriculture Emissions Profile," Ministry of Agriculture, pg. 13.

89 Statistics Canada Cansim 004-0010, "Saskatchewan Agriculture Emissions Profile," pg. 13.

90 "Saskatchewan Agriculture Emissions Profile," Ministry of Agriculture, pg. 15-16.

The Ministry notes that carbon sequestration is a very attractive mitigation measure because from society's perspective, the cost is zero. The result (sequestration) is the by-product of agricultural practices that are being adopted in Saskatchewan for other reasons. By 2020, despite the time-limiting factors cited above, the magnitude of the effect will be significant.

It is important here to note the dissenting opinion of Allan Savory, a pioneer in the field of holistic grazing. Savory points to research suggesting the carbon storage capacity of soil has been underestimated:

“Very little attention has been placed on biological soil that can be created quite quickly through Holistic Planned Grazing (Jones, 2002). This has led to a dramatic under-estimation of soil organic carbon storage capacity in assessing sequestration potential with respect to global warming. Furthermore, there is the predominant assumption that soils have a carbon sequestration capacity that is limited. Both estimates, however, effectively remove new soil creation from the equation and thereby underestimate soil sequestration capacity by a yet unknown but potentially significant magnitude.”⁹¹

Important context for any future decisions over changing agricultural practices is the stark fact that food production will have to increase 50 percent by 2050, to keep pace with global population needs.⁹²

The Ministry says one of the best opportunities available to our province is the completion of the science associated with carbon sequestration on forage land. This is a very large land base: about 21 million acres. Carbon sinks on forage land are not included in the current national inventory. This is because of the lack of established science in this area.

Seeding marginal land, like problem soils or soil contaminated with saline, is another way to increase Saskatchewan's carbon sink. They can be sown with a permanent cover like legumes. The Ministry says some marginal soils may also be converted into forest stands that can sequester even larger amounts of carbon.

F. Larry Martin is a former Deputy Minister to the Premier of Saskatchewan. In a recent newspaper article, he said while most Canadians want a climate change response that is scientifically sound, environmentally sustainable and financially realistic, the current public discourse is driven by what Martin calls “a myopic, ideological obsession with carbon emissions alone.”

“A conservative estimate of Canada's existing carbon-absorption capacity, based on land area and the global carbon-absorption average, indicates that Canada could already be absorbing 20 to 30 percent more CO₂ than we emit. Using the same calculations, the ‘Big Four’ polluters of China, the United States, the European Union and India, which together are responsible for a whopping 60 percent of global CO₂ emissions, release ten times more CO₂ than their combined land area absorbs. Canada doesn't seem very dirty now, do we?”⁹³

91 “Restoring the climate through capture and storage of soil carbon through holistic planned Grazing,” Savory Institute, 2015, pg. 13. Available at: <http://savory.global/assets/docs/evidence-papers/RestoringClimateWhitePaper2015.pdf>

92 Millennium Ecosystem Assessment, 2005.

93 “Canada may already be carbon neutral, so why are we keeping it a secret?” F. Larry Martin (FP Comment), Financial Post, March 2, 2016.

Martin calls for the establishment of robust partnerships between Canada and other forest nations, like Russia and Brazil. Whether one accepts his numbers or not, one should not ignore the contributions of carbon sinks to climate change, and the important role they play in this conversation.

Recommendation 12:

Saskatchewan's forests and agricultural lands are significant carbon sinks. Zero till and low till farming practices play a significant role in increasing carbon absorption. The Vancouver Declaration calls for work on the establishment of accounting standards, a pan-Canadian offset protocol framework, and verified carbon credits that can be traded internationally. This work has been shuffled to the sidelines because for most of Canada, soils actually emit carbon. Saskatchewan believes this work, clearly articulated in the Vancouver Declaration, should be receiving a much higher profile and take on a new level of urgency. Before any decisions are made with respect to achieving targets to reduce emissions, the federal government must complete this important work.

Climate Adaptation

Saskatchewan will be impacted by climate change and needs to take steps to plan for and adapt to a changing climate.

The effects of climate change will likely be around for a while. Even as we continue to work to reduce GHG emissions, the impact of damage done so far will continue. Adapting to those changes, whether through land use planning, building codes or infrastructure upgrades, is essential.

Adaptation measures hold the highest potential for ensuring continued economic growth.

As cited in a report of the Working Group on Climate Adaptation and Climate Resilience, adaptation is about making smart, forward looking decisions while resilience is about being able to withstand and recover from impacts.⁹⁴

Improving infrastructure to meet the demands of a changing climate will improve resilience. Considering climate change factors when improving infrastructure may look expensive in the short term. However, it will save money and reduce risk over the long haul.

Planning for climate change is a shared responsibility. All governments, communities, professional organizations and the non-profit sector have a role to play.⁹⁵

In our province, the University of Saskatchewan's Global Water Futures program is an example of how governments and scientists can work together to explore how climate change is altering water in Canada's north. Global Water Futures is a \$237 million, seven-year program that is being supported by Saskatchewan and has recently been approved to receive \$83 million in funding from the federal government.

94 Interim Report of the Working Group on Climate Adaptation and Climate Resilience, June 2016, pg. 5.

95 ibid pg. 6.

The Global Water Futures program will use new monitoring and observation technologies, including satellites, drones, sensors and DNA analytics. These tools will gather massive amounts of new data on water flows and water quality through-out Canada. This data will be filtered using analytical tools and cloud computing systems developed at the University of Saskatchewan. In some cases, this will allow for real-time forecasting of water flows and water quality.

This brand new strategic information will help improve climate adaptation and disaster preparedness by giving earlier warnings of adverse events, reducing damage to communities and infrastructure from natural disasters. It will also provide scientists with a greater understanding of deep aquifers. This will make it easier to manage the supply of water needed in the oil and gas and mining sector. It will also provide better predictions of the human health risks posed by climate change, as it relates to existing and abandoned mines in Canada's north.

The Global Water Futures program will see the University of Saskatchewan establishing new observatories to support research in the Saskatchewan River Basin and the MacKenzie River Basin in the Northwest Territories. Some 52 instrumentation sites will be placed around North America's largest freshwater delta systems, providing a unique window into how we can adapt to climate change in Canada's north:

"No other country can offer a comparable research-based infrastructure for field hydrology studies in cold environments. We plan to enhance these observatories with new analytic capabilities based on biological and chemical fingerprinting of aquatic systems and new laboratories for developing drones and novel sensors to quantify cryospheric and hydrological processes, and monitor water quality continuously in old environments."⁹⁶

This will offer a unique window into the impacts of climate change on water and the environment.

Here in Saskatchewan, important steps are being taken in various ministries. The Ministry of Highways and Infrastructure is improving drainage to deal with sudden increases in rainfall. Culverts on National Highway System highways in Saskatchewan are being improved for efficiency and safety. Current design calls for culverts to withstand a one in 25 year high rainfall. The improved design will be capable of handling one in 50 year rainfall.

New technology is being used to provide early warnings of approaching weather and better road information. This improves response times and ensures plows are properly equipped for the approaching weather conditions, whether it be sand or sand and salt for ice.

Saskatchewan is in the process of developing a drought strategy. This includes research on water quality at Lake Diefenbaker. This research will delve into how climate change will change the availability of water. That will allow for the development of new water allocation strategies to better manage water shortages.

Also under development is an irrigation strategy. Water management officials will focus their efforts on the long term capacity of the irrigation sector. Work will continue with industry to assess the feasibility of new large-scale irrigation developments.

96 "Global Water Futures: Solutions to Water Threats in an Era of Global Change," University of Saskatchewan, Sept. 2016, pg. 8.

In agriculture, adaptation efforts include provincial support for plant breeding at the Crop Development Centre, housed at the University of Saskatchewan. Work with the public sector is focussed on creating and developing varieties of crops that can better withstand changing climate conditions. Saskatchewan's support will continue to centre on new crops best suited for future climactic conditions in our province. However, the export potential for this sector is significant.

Saskatchewan is also working with the federal government on adaptation initiatives. Our province has recently been given approval for a natural hazards risk assessment project under Canada's Natural Disaster Mitigation Program. This new project will focus on improving estimates for how climate change will change the risk of specific hazards. Once completed, this work could form the basis of new adaptation strategies.

Federal support is also crucial for the continued development of the existing set of business risk management programs in the agricultural sector. This includes crop insurance, which must predict and assess the impacts of crop yield declines related to increased extreme events.

Adaptation work in the Saskatchewan Ministry of Health includes increased monitoring of recreational water quality, so that people can make informed decisions about their recreational activities. Work is also being done on what is described in the field as "vector borne diseases" that could shift in location and intensity as a result of climate change. Lyme Disease is an example of a vector borne disease.

Recommendation 13:

Climate change mitigation is only half of the equation. A serious effort must be made to adapt to the changes to climate that will occur, regardless of the steps we take now. Canada must pay special attention to sensitive northern regions that are already experiencing the consequences of warming temperatures including melting of polar ice packs and changes to permafrost which damage northern buildings and roads. Programs like the University of Saskatchewan's Global Water Futures program are an example of how resources can be marshalled to better understand and better deal with the impact of these changes in Canada's north.

Conclusion

We must talk openly about the challenges posed by climate change and seek solutions that acknowledge and accommodate regional differences. While tackling this challenge, we must also continue taking steps which actually solve the problem.

The challenge we face is working towards solving a global problem with an eye towards fairness, jobs and economic opportunities for all. We must also be cautious about placing unreasonable limitations on Saskatchewan agriculture, which is playing a vital role in solving global hunger.

For a path forward on climate change, we can look to our national history.

Current federal programs in health and education are based on the understanding that equity must play a role in running our federation. A similar level of services should be available to all Canadians, regardless of where they live.

Our response to climate change must embody those same qualities. All regions must make their distinct contribution to reducing global GHG emissions. However, national programs that are appropriate in some regions, leaving others to bear a disproportionate part of the cost, cannot be pursued.

