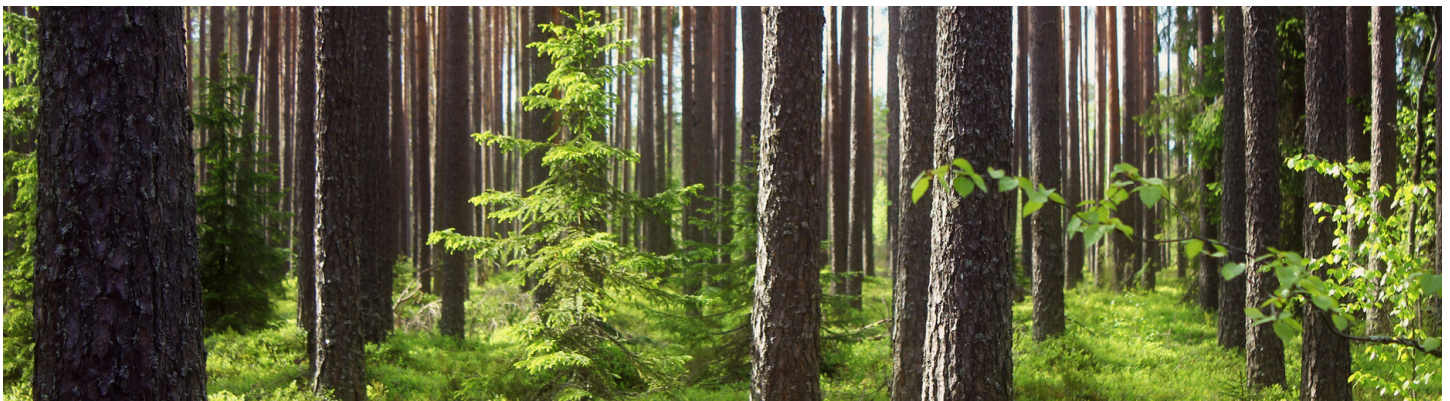


“PRAIRIE RESILIENCE” IS NOT ENOUGH



THE **SASKATCHEWAN ENVIRONMENTAL SOCIETY**'S RESPONSE TO
THE SASKATCHEWAN GOVERNMENT'S CLIMATE CHANGE PLAN





"PRAIRIE RESILIENCE"
IS NOT ENOUGH

"PRAIRIE RESILIENCE" **IS NOT ENOUGH**

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The **Saskatchewan Environmental Society** (SES) is a non-profit, registered charity that is committed to supporting sustainable living and sustainable resource use in Saskatchewan. SES's current action areas include sustainable energy and climate solutions, water protection, resource conservation, biodiversity preservation, and reduction of toxic substances. Our work in Saskatchewan spans Treaties 2, 4, 5, 6, 8, 10, and our office is located in Saskatoon on Treaty 6 territory, the traditional territory of Cree Peoples, and the homeland of the Métis Nation. Visit us online at: www.environmentalsociety.ca



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1. INTRODUCTION AND PURPOSE

Climate change is one of the most urgent issues facing human civilization. A widespread failure to successfully implement action will result in extremely damaging and long-lasting impacts. The 2015 Paris Climate Agreement highlighted the need for deep greenhouse gas emissions reductions by all levels of government worldwide—national, provincial, state and city.

The Saskatchewan Government recently adopted a provincial climate change plan—'Prairie Resilience.' The Saskatchewan Environmental Society has carefully analyzed the plan. The plan has some positive elements, but unfortunately falls well short of what is required for Saskatchewan to do its fair share in reducing greenhouse gas emissions and helping Canada meet its commitments under the Paris Climate Accord.

Saskatchewan's per capita emissions are approximately nine times higher than the global average. This means that Saskatchewan's emissions contribute disproportionately to the deepening climate crisis worldwide.

This publication discusses the acceleration in the global climate crisis, and in view of this acceleration, assesses the Saskatchewan context in regard to greenhouse gas emissions and climate change mitigation, examines Saskatchewan's current climate change plan, and outlines how Saskatchewan can optimize its contribution to climate change mitigation.

Saskatchewan's climate change plan, like that of any other jurisdictions, must be assessed in the context of the risks that climate change poses to both our own province and to the rest of the world. It must also be assessed in the context of the Saskatchewan government's record on climate change action over the past decade. Above all, Saskatchewan's climate change plan must be assessed on its own merits. This paper examines each of these questions.



2. CLIMATE CHANGE POSES GREAT RISKS TO HUMANITY’S FUTURE

The world faces an accelerating crisis driven by the release of enormous quantities of manmade, heat trapping greenhouse gases into the atmosphere. The atmospheric concentration of these gases is steadily rising. Current concentrations are already resulting in a sharp increase in extreme weather events, with tragic impacts around the world.

Of special concern is the rising atmospheric concentration of three greenhouse gases: carbon dioxide, methane and nitrous oxide. The atmospheric concentration of carbon dioxide is now 146% above pre-industrial levels, while methane is 257% above pre-industrial levels, and nitrous oxide is 122% above its level in the pre-industrial period (prior to 1750).¹ The vast bulk of these increases have occurred over the past 50 years. Stabilizing the concentration of these heat-trapping gases in the atmosphere can only be accomplished with very deep cuts to their manmade sources of release: most notably fossil fuel extraction, production and consumption.

The crisis is made more difficult by the long-lived nature of many greenhouse gases. When manmade sources of these gases are added to levels that naturally occur in the atmosphere, their concentration steadily increases well above naturally-occurring levels and does not easily come back down. Their long lifetimes make stabilizing or reducing the concentration of these greenhouse gases in the atmosphere extremely challenging.

Of the long-lived greenhouse gases, carbon dioxide accounts for the greatest radiative forcing (the amount of downward-directed radiant energy impinging on the Earth's surface). Its atmospheric concentration has risen from 340 parts per million in 1980 to over 405 parts per million today.² The spring of 2018 saw the monthly concentration of CO₂ in the atmosphere exceed 410 parts per million for the first time in human history, a very dangerous milestone.³ Some of this year's carbon dioxide emissions will still be trapping heat in the atmosphere more than one thousand years from now.⁴

As climate scientists had predicted, the global average temperature is rising as a result of these increasing concentrations of greenhouse gases in the atmosphere. The **four hottest years** since world-wide temperature records were first kept are 2014, 2015, 2016 and 2017.⁵ The global average temperature for the first ten months of 2018 is on a similar trajectory.⁶ Sixteen of the seventeen warmest years worldwide have occurred since the turn of this century. For context, instrumental global temperature data dates back to 1880.



2.1 Extreme Weather Events

A warmer atmosphere has translated into more extreme weather, including **more powerful hurricanes**. The prestigious medical journal *The Lancet* recently reported a **46% increase in the frequency of extreme weather events worldwide between the years 2000 and 2016**.⁷

The past two years provide strong evidence that this trend is continuing. North America, for example, was hit exceptionally hard by hurricanes in both 2017 and 2018. Estimated losses from Hurricanes Harvey, Irma and Maria in 2017 now sit at US \$265 billion. In just hours these three powerful storms caused enormous damage and loss of life in the United States, while also wiping out development gains that had taken decades to achieve in small Caribbean islands. Almost 3,000 people died in the aftermath of Hurricane Maria's landfall in Puerto Rico, a territory of the United States.⁸

In September 2018, Hurricane Florence brought record rainfall and flooding to the U.S. states of North and South Carolina.⁹ Then a few weeks later, the Florida Panhandle was hit by the most powerful storm in its history – Hurricane Michael.¹⁰ Wind speeds reached a maximum of 250 kilometres per hour.¹¹ Many communities in these states will take years to recover from the damage suffered.

These hurricanes were not caused by climate change. However, they were made more powerful and dangerous by **elevated ocean temperatures, record-high sea levels, and elevated water vapour content**, each a product of climate change. For example, higher sea levels make storm surges more dangerous and elevated water vapour content contributes to **exceptionally heavy rainfall events**. Hurricane Harvey set a new record for the largest amount of rain ever recorded in a hurricane in the USA: as much as 1,539 mm of rain fell between August 25 and September 1, 2017.¹²

2.2 Record Temperatures

Record high regional temperatures and heat waves are another consequence of rising global average temperature. Numerous records were set in 2016 and 2017. On July 21, 2016, Mitribah, Kuwait set a new high temperature record for the Eastern Hemisphere and Asia, with a reported temperature of 54° Celsius (°C).¹³ That same month the city of Basra in Iraq reached 53.9°C.¹⁴ On January 27, 2017, Puerto Madryn, Argentina recorded 43.4°C, the highest temperature south of 43 degrees south latitude in the world.¹⁵ Then on May 28, 2017, Turbat, Pakistan recorded the world's highest temperature for the month of May: 53.5°C.¹⁶



This pattern continued in the summer of 2018. One-hundred kilometres north of the Arctic Circle, the temperature soared to an unprecedented 32°C.¹⁷ Calgary set a new all-time record high of 36.5°C.¹⁸ Montreal recorded its highest temperature in history at 36.6°C and reported over 70 heat-related deaths during a week-long heat wave.¹⁹ Europe faced extended heat waves with temperatures in the mid-40s in Spain and Portugal.²⁰ Chino, just north of Los Angeles hit a new high of 48.9°C.²¹ With a population close in size to that of Saskatchewan, Nawabshah, Pakistan endured a national record high for the month of April: 50.2°C.²² Meanwhile, in Algeria, the temperature climbed to 51.3°C, the highest temperature ever reliably measured in Africa.²³ The summer of 2018 also saw the highest 'overnight low' ever recorded: 42.6°C in Oman.²⁴

Collectively, these heat records are consistent with the kind of extremes scientists predicted in a world impacted by climate change. Moreover, careful assessments of extreme high temperature events over the past few years have increasingly linked them to climate change. For instance, studies published by the Bulletin of the American Meteorological Society between 2011 and 2016 conclude that in some cases of extreme high temperatures, the probability of the event occurring was increased by a factor of ten or more because of anthropogenic (human caused) activities.²⁵

Not long ago, 50°C was considered an anomaly, but **temperatures over 50°C** are increasingly common in nations such as India, Pakistan and Kuwait. At these temperatures outdoor work is unbearable and the risk of heat-related deaths is high, especially where air conditioning is not common. Hospitals face a surge of admissions for respiratory problems, heat stress and other illnesses made worse by the high temperatures. At 50°C heat becomes toxic.²⁶

If this temperature trend continues upwards, some regions of the world risk becoming increasingly uninhabitable, including parts of densely populated South Asia.²⁷ Should this happen, it will almost certainly lead to new waves of **human migration**.

2.3 Forest Fires and Wildfires

Another consequence of the buildup of manmade greenhouse gases in the atmosphere is more intense **forest fires and wildfires and longer fire seasons** in some parts of the world. In North America, California exemplifies the danger. With an **unprecedented drought** during most of the past five years and record high summer temperatures, California experienced its very worst wildfire season in 2017, with fires striking many populated areas and the fire season extending into December.²⁸ The 2018 wildfire season is proving to be similarly devastating. September's Mendocino Complex was a blaze which spanned 4 counties and over 451,000



acres.²⁹ Then, in mid-November 2018, the Camp Wildfire struck the community of Paradise, California becoming the deadliest wildfire in state history.³⁰

In Canada, British Columbia has faced a similar pattern. 2017 marked BC's worst-ever forest fire season with over 1.2 million hectares burned, exceeding all past records. 2018 has broken the record set in 2017, with over 1.3 million hectares burned.³¹ In mid-August 2018, with more than 560 fires burning, the BC government declared a province-wide state of emergency.³² The fires severely impacted air quality and prompted numerous air quality warnings, as well as increased physician visits for respiratory and other related health risks.³³ Metro Vancouver and the Fraser Valley issued their **longest continuous air quality advisory** on record.³⁴ As the smoke spread across western Canada, Alberta, Saskatchewan and Manitoba, all issued health advisories. On August 22, 2018, Calgary set a new record for the number of hours of smoke in a single year. The previous record has been set in 2017.³⁵

In the southern hemisphere, the fire season across much of **Australia** has lengthened. For example, in the state of New South Wales, the fire season was traditionally between October and March. That start date has now been pushed forward to the 1st of September. In the northern and western parts of the state, the fire season now begins in August, a full two months earlier than had been the case in the past.³⁶

2.4 Sea Level Rise

Another serious threat to human civilization associated with our ongoing release of vast quantities of manmade greenhouse gases into the atmosphere is **sea level rise**, which threatens the viability of coastal communities around the world. The World Meteorological Organization reports that sea level rise is accelerating, with sea levels rising 3.5 mm per year over the period 2004-2015.³⁷ While this is being driven by a variety of factors, the most important one is a warmer atmosphere melting mountain glaciers and the great ice sheets on Greenland and Antarctica, with the resulting meltwater moving into the oceans. At the same time, warmer ocean temperatures result in thermal expansion of seawater. Thermal expansion alone accounts for more than a millimeter of sea level rise each year.

Sea level rise is already damaging the quality of life on many **island nations**—destroying homes, ruining agricultural lands through salt water intrusion, and sometimes displacing entire communities.³⁸ Unless greenhouse gas emissions are sharply curtailed in the coming decades, sea level rise will threaten many coastal communities in North America by mid-century. For example, statewide damage to California's coastline from sea level rise is expected to run into the billions due to inundation of residential and commercial buildings.³⁹



2.5 Ecological Impacts

Climate change is contributing to other **serious ecological consequences**. For instance, the warmer ocean waters of the past four years contributed to an unprecedented loss of coral on the Great Barrier Reef, the largest living structure on Earth.⁴⁰ Half of the coral cover on the northern portion of the Great Barrier Reef has been lost through a combination of mass coral bleaching related to elevated ocean temperatures and two severe hurricanes.

The International Union for Conservation of Nature recently reported that the number of **natural world heritage sites being damaged** and at risk from climate change has almost doubled (to 62) in just 3 years.⁴¹ Striking examples include Monarch Butterfly reserves in Mexico threatened by a rising number of wildfires. Alpine glacier ecosystems, including the Canadian Rockies and the Swiss Alps, are shrinking due to an accelerating rate of melting.⁴² Sea level rise is also threatening many wetlands in the Everglades with salt water intrusion, and is flooding the famous mangrove forests of the Sundarbans.

Climate change is also impacting the **viability of pollinators**. For instance, the journal *Science* reports that the geographical range of bumblebees is shrinking due to climate change. In both North America and Europe, the southern historical range of bumblebees has shrunk by about 300 kilometres. At the same time, the bees' northern range has not expanded.⁴³ This has serious consequences because bumblebees are a keystone species and help pollinate many crops such as blueberries, cherries, tomatoes and clover.

The decline of some pollinators is not the only threat to agriculture. For instance, researchers have warned that higher temperatures will increase the proportion of crops lost to insects. Global yields of maize, rice and wheat are projected to suffer, with significant implications for **global food security**.⁴⁴

There are other alarming trends. Increasing **ocean acidity** has dangerous implications for the health of coral reefs and the survival and calcification of key marine organisms.⁴⁵ **Sea ice is shrinking**, with 2017 setting a new record for the lowest winter maximum of Arctic sea ice in the satellite record.⁴⁶

The examples mentioned above only begin to capture the enormous scope of climate change impacts and provide a window into the escalating nature of the problem. These examples also illustrate why climate change must be taken very seriously by every level of government.



2.6 Climate Stability

Taken together, climate change impacts have profound implications for the future. In short, climate stability—a foundation for the success of human civilization over the past several thousand years—is at risk.

In order to reduce the potential for far more catastrophic economic, social and environmental damage from the climate instability resulting from climate change, deep reductions in greenhouse gas emissions need to be achieved by the international community by no later than 2030.⁴⁷ All jurisdictions, including Saskatchewan, need to fully participate.

Looking beyond 2030, it is imperative that a carefully planned, orderly phase out of fossil fuels be achieved worldwide. Carbon dioxide emissions from changes in land use, including deforestation, also need to be very sharply reduced. If we hope to avoid the worst effects of ever-rising concentration of carbon dioxide and other greenhouse gases in the atmosphere, this must be accomplished by mid-century.

3. THE SASKATCHEWAN CONTEXT

3.1 Climate Change Impacts in Saskatchewan

Given Saskatchewan's geographic location and cold winters, at first glance our province does not appear to be experiencing the extreme negative impacts of climate change being felt elsewhere. Nevertheless, significant changes are occurring, and they will continue to become more pronounced, unless a transition to a low carbon future is rapidly implemented.

One indicator of these changes is the acceleration in the number of **extreme weather events** in our province, as reflected in Saskatchewan government spending on disaster assistance. Fifteen years ago, the annual expenditure on the Provincial Disaster Assistance Program was regularly under \$3 million. Now, as the chart below illustrates, it is consistently 10 to 20 times that amount. These figures do not include crop insurance payments or firefighting costs.



**Annual Spending under the Government of Saskatchewan's
Provincial Disaster Assistance Program (PDAP)⁴⁸**

Fiscal Year Ending March 31st	Total Spending (\$)
2002	1,500,000
2003	1,675,000
2004	618,000
2005	276,000
2006	15,154,000
2007	9,866,000
2008	31,378,000
2009	14,486,000
2010	10,440,000
2011	48,150,000
2012	157,115,000
2013	72,597,000
2014	46,816,000
2015	110,433,000
2016	61,014,000
2017	32,795,000

Record high summer temperatures in several communities are another indicator of accelerating impacts in Saskatchewan. Just as heat records were set across the globe over the past four years, records are also being broken in this province. In 2018, for instance, three all-time heat records were set: Val Marie hit 40.9°C, Assiniboia recorded 41.1°C, and Broadview set a new all-time high of 39.4°C.⁴⁹

August 2018 saw four important monthly heat records broken in Saskatchewan. Moose Jaw hit a record high for the month of August at 42.3°C. Regina reached 41.0°C, a new August high for the provincial capital. Weyburn broke a monthly record for August with 40.9°C, while Swift Current did as well, recording 40.1°C.⁵⁰



A third indicator of climate change's impact on Saskatchewan is the **unprecedented forest fire** season our province experienced in 2015. As mentioned above, the forest fire season is intensifying and growing longer in much of western North America. In Saskatchewan, a record high 1.7 million hectares of forest burned in our province's north in 2015. By July 7, 2015, 13,000 residents in 51 northern Saskatchewan communities had been forced to leave their homes.⁵¹ Northern Saskatchewan had never before experienced the need for an evacuation at this scale.

Less than a year later, in May 2016, a devastating forest fire struck Fort McMurray. While Albertans bore the brunt of this exceptionally intense blaze, it rapidly spread east and ultimately moved across the border into Saskatchewan. This exceptionally intense fire destroyed more than 2,500 homes in Fort McMurray and forced the evacuation of over 80,000 people. It spread across 590,000 hectares before being brought under control.⁵² The Fort McMurray blaze underlines the risk to Saskatchewan communities that lie adjacent to forested lands as global average temperature and local spring and summer temperatures increase. Prince Albert, for instance, could become increasingly vulnerable.⁵³

A fourth indicator of the impact of climate change on Saskatchewan is observed changes in **disease vectors**. West Nile Virus is one example. Appropriate climate is one of several essential factors for the virus to become established in new territory. West Nile virus moved into Saskatchewan in approximately 2003. By 2004 Saskatchewan had registered the largest number of human cases in Canada at 935.⁵⁴ Lyme disease poses a similar threat to Saskatchewan residents. Lyme disease has spread into Canada and is moving steadily towards the province of Saskatchewan, following climate-determined geographic trajectories.⁵⁵ Four cases of Lyme disease were diagnosed in Saskatchewan in 2017, but only one of those cases was contracted in Saskatchewan.⁵⁶ Black-legged ticks, the species that carry Lyme disease, are being detected in Saskatchewan, but are currently not present in large numbers. However, their numbers are likely to increase over the coming decade. Other varieties of ticks, such as the American dog tick, are already spreading across our province due to climatic conditions that are more favourable to their survival.⁵⁷

Further evidence of the impact of climate change on Saskatchewan is that more communities are experiencing intense precipitation events that cause **serious flooding**. A warmer atmosphere can hold more water vapour, releasing it in more intense downpours. This was the case particularly over the 2010-2016 period. Some Saskatchewan communities were hit by multiple floods. While many Saskatchewan communities are used to dealing with flooding caused by rapid spring snowmelt, the flooding from recent heavy precipitation events is different in that it usually occurs in the summer months.



Southeast Saskatchewan was particularly hard hit. For instance, in June of 2011, several communities in southeast Saskatchewan faced severe flooding due to a combination of heavy rainfall, soils saturated with moisture, and the unavoidable release of water from major dams in the area.⁵⁸ The 2011 Souris River flood has been described as a one in five hundred year flood event.⁵⁹ Then just three years later, in late June of 2014, southeast Saskatchewan and parts of east central Saskatchewan were hit by a so-called one in one hundred year rainfall event, leading to even more widespread flooding than in 2011. So extensive was the damage that by the end of July 2014, 167 Saskatchewan municipalities had been approved for designation under the Provincial Disaster Assistance Program due to flood damage.⁶⁰

On the other extreme, some Saskatchewan communities have suffered **exceptionally dry conditions**. At a global level, the atmospheric warming caused by higher greenhouse gas concentrations in the atmosphere often results in historically dry areas of the world becoming even drier. This may be happening in Saskatchewan. Southwest Saskatchewan is no stranger to drought, but recent dry conditions have been exceptional. November 2016 to September 2017 was the driest 11-month period in a number of southern Saskatchewan communities. Swift Current broke a record for an 11-month dry span with only 133 millimetres of precipitation. Regina also set a record, experiencing only 125 mm of precipitation.⁶¹

2017 went on to be the second driest in Regina's recorded history with just 154.2 mm of precipitation. That same year, Assiniboia and Moose Jaw also broke records: at 181.6 mm of precipitation, Assiniboia only had 46% of its average annual rain and snowfall, while Moose Jaw recorded a record low 214.8 mm of precipitation over 12 months. An average year in Moose Jaw sees approximately 365 mm of precipitation.⁶²

In recent years, some drought conditions had enormous geographic scope, impacting not just Saskatchewan and western Canada, but large parts of North America. For instance, the 2015 summer drought stretched from parts of northwest Ontario all the way to the Pacific Ocean, affecting large parts of southern Saskatchewan, but also Alberta, British Columbia and Alaska. The 2015 drought also stretched down to California and Mexico, making it continental in scope. Dr. John Pomeroy, Canada Research Chair in Water Resources and Climate Change at the University of Saskatchewan, has observed that this scale of drought suggests climate change is very likely a contributing factor.⁶³

The risk that climate change will intensify droughts in our province should be of particular concern to Saskatchewan residents. A severe drought in Saskatchewan affects the availability of water for both urban and rural residents, and is almost certain to have major negative impacts on Saskatchewan's agricultural sector and provincial economy. It also has the potential to increase other hazards, such forest fires and grassfires.



The trends discussed above are not caused exclusively by climate change. Saskatchewan residents know all too well that our climate has great natural variability and we have long experienced a wide range of natural hazards. However, it does appear that climate change is enhancing or compounding these hazards, making them riskier and more severe.

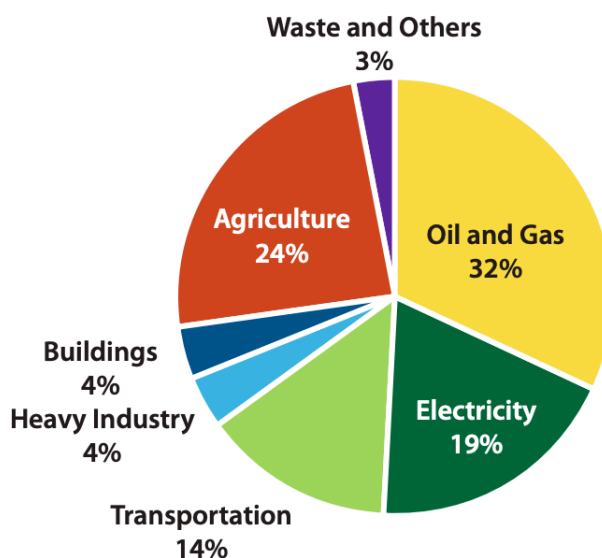
3.2 Saskatchewan's Greenhouse Gas Footprint

The Government of Canada's April 2018 National Greenhouse Gas Emission Inventory records the province of Saskatchewan's annual greenhouse gas emissions at 76.3 million tonnes carbon dioxide equivalent.⁶⁴ The data in this publication covers the calendar year 2016. Saskatchewan's per capita annual emissions are 69.46 tonnes carbon dioxide equivalent.⁶⁵ That makes Saskatchewan's per capita emissions among the very highest in the world.

Although Saskatchewan's population is only just over 3% of Canada's population, our greenhouse gas emissions make up 10.8% of Canada's emissions total.⁶⁶ Per capita emissions in Saskatchewan are thus more than three times the Canadian average.

The following illustrates greenhouse gas emission sources by percentage in Saskatchewan:

Saskatchewan's GHG Emissions by Economic Sectors (2015)



Adapted from *Prairie Resilience*:

<http://publications.gov.sk.ca/documents/66/104890-2017%20Climate%20Change%20Strategy.pdf>



A detailed breakdown of Saskatchewan greenhouse gas emissions by sector is in the submission Canada has made to the United Nations Framework Convention on Climate Change (UNFCCC).⁶⁷

Greenhouse gas emissions in Saskatchewan have risen 10.7% compared to 2005 levels.⁶⁸ This is significant because 2005 is the base year the Government of Canada uses for its greenhouse gas emissions reduction pledge to the United Nations and the international community.

3.3 Implications of the Paris Accord for Saskatchewan

The Government of Canada signed the Paris Climate Agreement in 2015 and ratified it in 2016, committing Canada to reduce manmade greenhouse gas emissions to 30% below 2005 levels by the year 2030. The United Nations refers to each country's greenhouse gas reduction pledge as a "Nationally Determined Contribution." Logically, each province and territory in Canada must now work towards this target within its own jurisdiction.

The goal of the Paris Agreement is to strengthen the response of the global community to the threat of climate change. To avoid the many dangerous consequences that would otherwise result, the Agreement commits signatories to work to keep the global average temperature increase "well below 2 degrees Celsius", as compared to pre-industrial levels.⁶⁹ It also calls for an international best effort to limit the increase in global average temperature to 1.5 degrees Celsius.⁷⁰ For context, global average temperature has already risen about 1.1 degrees Celsius above pre-industrial levels.⁷¹ Due to the exceptionally long lifetime of most greenhouse gases in the atmosphere, reaching the Paris Agreement targets requires achieving "a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century."⁷²

The United Nations Environment Programme has already made it clear to all signatories of the Paris Agreement that Nationally Determined Contributions to date are falling well short of what needs to be accomplished by 2030 in order to be on track to meet the Paris Agreement objectives.⁷³ If all nationally determined contributions made to date were fully met, and if comparable action continued to be taken afterward, the world would be on track for a 3.2° Celsius increase in global average temperature by 2100⁷⁴ – a very dangerous trajectory. Canada is likely to be asked by the UN to do more with respect to greenhouse gas emissions reduction, so Canada's current target is just a first step.

Thus, Canada cannot fail to live up to the commitment it has already made and its target of 30% below 2005 emissions levels by 2030 should be viewed as a minimum expectation.



Given this, what would logically be required of Saskatchewan between now and 2030, in order to help meet Canada's official 2030 target? Given that 2005 is the baseline year being used by the Government of Canada, a calculation of Saskatchewan's needed emissions reduction should start from there.

Saskatchewan's greenhouse gas emissions were 68.9 million tonnes per year in 2005.⁷⁵ A 30% reduction from 2005 emissions levels by 2030 would mean bringing provincial emissions down to 48.23 million tonnes per year.

Saskatchewan's annual emissions are currently sitting at 76.3 million tonnes. Achieving 48.23 million tonnes per year would require a reduction of approximately 28 million tonnes within 12 years, or a little more than 36% of the province's current annual manmade greenhouse gas emissions. This is the goal that the Government of Saskatchewan should work towards – at the very minimum.

3.4 Saskatchewan Government Climate Policy: 2009 to 2017

The Saskatchewan government's record in addressing greenhouse gas emissions provides insight into what will be required to move forward successfully on greenhouse gas emissions reductions. In view of this, this section briefly examines the historical context, with particular attention to how emissions reduction activities have been prioritized thus far.

In light of Canada's obligations under the Paris Climate Agreement, in March of 2018 the Auditor General of Canada and the Auditor Generals of each Canadian province (other than Quebec), published a joint report examining the responses to climate change of the Government of Canada and the responding provincial and territorial governments.⁷⁶ The participating audit offices developed a common set of questions related to each jurisdiction's progress in regard to both mitigating climate change and adapting to climate change.

Saskatchewan's audit report was completed in June of 2017.⁷⁷ At that time, the Saskatchewan government, led by Premier Wall, had no greenhouse gas emissions reduction target for 2020. Nor did it have an emissions reduction target for 2030.⁷⁸ Moreover, at the time of the audit, the Government of Saskatchewan had not implemented a provincial mitigation plan for greenhouse gas emissions or a provincial plan to adapt to climate change.⁷⁹ While the Saskatchewan Ministry of Environment was in the process of collecting risk assessment information, it had not yet completed a provincial risk assessment related to climate change.⁸⁰ Despite the Government of Canada having signed and



ratified the Paris Climate Agreement, the Saskatchewan government was moving slowly on formulating a comprehensive action plan of its own.

The Provincial Auditor's finding regarding the lack of a greenhouse gas emission reduction target or mitigation plan for Saskatchewan (as of mid-2017) does not fully capture the pertinent history during the previous decade. An emissions reduction target had, in fact, been established several years earlier, but enabling policies had not been implemented. The target appears to have been gradually abandoned.

The official greenhouse gas reduction target set by Premier Wall's government dates back to 2009. In the spring of that year Saskatchewan's Environment Minister announced that the provincial government would work to achieve a 20% reduction below 2006 greenhouse gas emission levels by the year 2020.⁸¹ The government also introduced *The Management and Reduction of Greenhouse Gases Act*. A centerpiece of the new legislation gave Cabinet the authority to adopt regulations setting stricter limits on greenhouse gas emissions by large industrial emitters. The Act also permitted Cabinet to establish a Saskatchewan Technology Fund to administer carbon compliance payments received from large emitters of greenhouse gases. The Fund was intended to finance investments in low-emitting technologies and other measures aimed at reducing emissions. *The Management and Reduction of Greenhouse Gases Act* also provided for the establishment of a Climate Change Foundation to promote research, development and demonstration of low-carbon technologies. The Foundation would also have been empowered to advance public education around climate change and encourage adaptation to climate change.⁸²

The Management and Reduction of Greenhouse Gases Act was adopted by the Saskatchewan Legislature in 2009. However, it was not proclaimed by Premier Wall's government, and the regulations necessary to implement the legislation were not adopted. As a result, the Saskatchewan Technology Fund was not made operational.

One climate change initiative that the Government of Saskatchewan did pursue during the past decade was a major investment in carbon capture and storage intended to demonstrate the viability of the technology. Carbon capture and storage was attractive to Premier Wall's government, because, if successful, it would permit the continued operation of the province's coal-fired power stations, provided they were equipped with the technology.

With this in mind, the Government of Saskatchewan retrofitted one of the units on the Boundary Dam Power Station, a large coal-fired power plant in Estevan, Saskatchewan. The 115-megawatt carbon capture and storage unit began operations in October of 2014.⁸³



It was the world's first commercial scale, clean-coal unit. Unfortunately, it experienced multiple initial start-up difficulties⁸⁴. For a time, it operated at only 45% capacity.⁸⁵ However, by March of 2018, it had prevented a total of slightly more than two million tonnes of carbon dioxide from entering the atmosphere over a three-and-one-half year period.⁸⁶

There was some merit in demonstrating carbon capture technology, but the required investment caused considerable strain on provincial resources. The Government of Saskatchewan spent nearly \$1.5 billion on the project.⁸⁷ While \$240 million came from the Government of Canada,⁸⁸ the majority of the remaining cost was shouldered by the people of Saskatchewan. In a province with annual greenhouse gas emissions in excess of 76 million tonnes per year, the Saskatchewan government spent a substantial sum of money to address only 1% of its emissions problem.

Further complications stem from SaskPower's sale of the captured carbon dioxide to Cenovus Energy, an oil development company that uses the gas for 'enhanced oil recovery', thus extracting more oil from the ground.⁸⁹ More oil extraction likely adds to the atmospheric greenhouse gas emissions burden, contradicting the primary purpose of the demonstration project, namely keeping carbon dioxide emissions out of the atmosphere. Adding to the project's environmental impact is the fact that the carbon capture project requires significant extra power consumption. At least a quarter of the electricity being produced by the retrofitted unit must be used to power the carbon capture system itself, as well as to compress the carbon dioxide.⁹⁰

Despite the limitations of the project, it must be acknowledged that the United Nations has encouraged countries to demonstrate carbon capture and storage technologies and that the Wall government stepped forward in this regard.

Nevertheless, the economics of carbon capture and storage (CCS) suggest that it is currently far too expensive for Saskatchewan to replicate.⁹¹ Yet, despite the unattractive economics this option has clearly not been ruled out by SaskPower and the provincial Cabinet. SaskPower's President has indicated that the next two units at Boundary Dam (Units 4 and 5) will not be retrofitted for CCS, but rather will be retired in 2021 and 2024 respectively. However, he has also made it clear that SaskPower will continue to assess the viability of applying carbon capture to larger coal-fired units in the future.⁹² In fact, a high-level carbon capture and storage feasibility study is being prepared for the Shand coal-fired power station in Estevan.⁹³

While the Saskatchewan government was prepared to invest heavily in carbon capture technology, it has not been prepared to endorse a much more widely accepted policy



mechanism for greenhouse gas emissions reduction, namely a price on carbon pollution. In contrast, the present provincial governments of Quebec, Alberta and British Columbia have all demonstrated a commitment to the principle of penalizing manmade greenhouse gas pollution. In the case of B.C. and Alberta, this takes the form of a direct tax on carbon dioxide emissions and other greenhouse gas pollutants. In Quebec, it takes the form of a cap and trade system aimed at driving down greenhouse gas pollution.⁹⁴ Unfortunately, the Wall government rejected both these policy directions.

Another signal of the degree to which greenhouse gas reduction was being prioritized during the Wall government years is the financial allocation provided to the institutional structure within the Ministry of Environment tasked with leading climate change mitigation work. Funds for climate change work were frequently budgeted for, but in reality never spent. For instance, in the period April 1, 2013 to March 31, 2014 the amount allocated for climate change work in the Ministry's budget was \$4,347,000.⁹⁵ However, according to Saskatchewan's *Public Accounts* for that fiscal year, only \$1,706,000 was actually spent.⁹⁶ That pattern continued in subsequent years. In the most recent year for which *Public Accounts* records are available - the period April 1, 2017 to March 31, 2018 - \$2,635,000 was allocated for work on climate change in the Provincial Budget; yet only \$1,656,000 was spent.⁹⁷ This pattern suggests that within the provincial government the climate change issue has not been viewed with the seriousness and urgency it deserves.

The overall result of the Saskatchewan government's efforts at greenhouse gas emissions reduction in the 2009-2017 period is not encouraging. The Saskatchewan government's goal of achieving a 20% reduction relative to 2006 emissions levels by 2020 is not on track to being achieved. No net reduction in Saskatchewan greenhouse gas emissions has occurred. Rather, province-wide greenhouse gas emissions have increased.

3.5 The Saskatchewan Government's 2018 Climate Change Plan

In the final weeks of Premier Wall's time in office, the Saskatchewan government published a document entitled *Prairie Resilience*, which lays out a Saskatchewan government plan for greenhouse gas emissions reduction, premised on the assumption there will be no provincial carbon tax.⁹⁸ The Saskatchewan Ministry of Environment conducted consultations on the plan with business and non-profit groups in the first months of 2018 to further refine the plan.

In February, 2018, as the Ministry of Environment consultations were underway, Premier Wall retired from the Premier's chair and as a Member of the Saskatchewan Legislature, and the Honourable Scott Moe became Premier of Saskatchewan.⁹⁹ Premier Moe and Environment Minister Dustin Duncan have signaled their intention to pursue the direction laid out in *Prairie*



Resilience.¹⁰⁰ They have also reaffirmed the Saskatchewan Government's opposition to carbon pricing and to any attempt by Ottawa to impose carbon pricing on Saskatchewan residents.¹⁰¹

The Government of Saskatchewan declined to sign on to the Pan-Canadian Framework on Clean Growth and Climate Change.¹⁰² Every other provincial government in Canada and the federal government had signed the document prior to the February 28, 2018 deadline.¹⁰³ A fundamental pillar of the Framework is an agreement to put a price on carbon pollution.

The response from the federal government to Saskatchewan's refusal to sign the Pan-Canadian Framework on Clean Growth and Climate Change was to bar Saskatchewan from accessing \$62 million in federal funding that would have been specifically designated for helping Saskatchewan move forward with low-carbon projects.¹⁰⁴ That decision was reaffirmed by federal government officials in a March 2018 briefing in Saskatoon on the Government of Canada's Low Carbon Energy Fund.¹⁰⁵

4. ASSESSMENT OF THE SASKATCHEWAN GOVERNMENT'S 2018 APPROACH TO CLIMATE CHANGE MITIGATION

The Scott Moe government intends to pursue the direction laid out in *Prairie Resilience*, while continuing to oppose carbon pricing. The following sections will assess the implications of these two cornerstones of the proposed approach to reducing greenhouse gas emissions.

4.1 The Saskatchewan Government's Position on a Price on Carbon

In the face of the Saskatchewan's government's refusal to levy a price on carbon pollution, the Government of Canada introduced legislation in Parliament in March, 2018 that will allow it to impose a carbon tax on Saskatchewan manmade greenhouse gas emissions sources, as well as in any other province that refuses to put an acceptable price on carbon emissions. In effect, Ottawa is insisting that there will be a price on carbon pollution across Canada.

The Saskatchewan government's immediate response was to question whether the Government of Canada has the authority to impose such a tax. Premier Moe's government has filed a suit against the federal climate change legislation by moving a reference case to the Court of Appeal in Saskatchewan.¹⁰⁶ At the time of writing, the Court has not yet ruled on



the constitutionality of the federal government's carbon pricing plan, although constitutional experts tend to agree that the federal government has that authority. The Court of Appeal will hear the Saskatchewan government's constitutional challenge in February of 2019.¹⁰⁷

The Government of Canada set a September 1, 2018 deadline for the Saskatchewan government and other provincial governments to file their climate change plans with Ottawa. The deadline passed with the Government of Saskatchewan refusing to submit its climate change plan for review by the Government of Canada.¹⁰⁸

Meanwhile, the summer and fall of 2018 brought added complexity to the debate over carbon pricing in Canada and the willingness of other provincial governments to support it.

In Ontario, the Wynne government, a strong supporter of carbon pricing, was defeated in a June provincial election.¹⁰⁹ The newly elected government of Premier Doug Ford announced it would oppose carbon pricing and would pull Ontario out of a recently signed cap and trade agreement with Quebec and California.¹¹⁰ Since his election, Premier Ford has worked closely with Saskatchewan's Premier to oppose the implementation of a federal carbon tax. The Ford government has also joined Saskatchewan's court case challenging the federal government's right to impose a carbon tax on provinces.¹¹¹

Then in late August of 2018, Premier Rachel Notley pulled the province of Alberta out of the Pan-Canadian Framework on Clean Growth and Climate Change.¹¹² The Alberta government's decision came in response to a Federal Court ruling quashing approval of the Trans Mountain Pipeline. Premier Notley made it clear that while Alberta would retain its current provincial price on carbon emissions (set at \$30 per tonne), the price on carbon emissions would not increase any further. This put Alberta in conflict with the federal government's carbon pricing plan, which was expected to require a \$40 per tonne price on carbon pollution by 2021.

Weeks later, in early October of 2018, the Government of Manitoba also changed direction on its carbon pricing policy. Premier Brian Pallister withdrew plans to levy a \$25 per tonne provincial carbon tax in Manitoba, and joined Saskatchewan and Ontario in their battle against a federal carbon tax.¹¹³ The Pallister government's disagreement with Ottawa appears to be over Manitoba's unwillingness to increase its carbon tax in future years beyond the \$25 mark.

Then on October 23, 2018, the Government of Canada rejected New Brunswick's carbon tax plan. The New Brunswick government had proposed shifting a portion of its existing gasoline tax into a climate fund to reduce greenhouse gas emissions. Ottawa found this



unacceptable because under the New Brunswick government's plan, there would have been no actual increase in the price of energy for the purposes of reducing greenhouse gas emissions.¹¹⁴

Days later, the Government of Canada officially announced its decision to levy a federal carbon tax in Saskatchewan, Manitoba, Ontario and New Brunswick starting on April 1, 2019. Prime Minister Trudeau stated: "Putting a price on pollution is the best way to tackle climate change."¹¹⁵ The federal carbon tax will kick in at \$20 per tonne of carbon emissions and rise to \$50 per tonne in 2022. This will translate into a 2019 increase in gasoline prices of 4.4 cents per litre. The tax will be levied on gasoline and diesel, and on natural gas and coal-fired electricity. The federal government will return 90% of the money it collects from a carbon levy in each province directly to the residents of that province. Federal estimates are that the average family in Saskatchewan will pay \$403 in the coming fiscal year in carbon tax costs, and receive a \$598 rebate from Ottawa.¹¹⁶ By 2022, the average Saskatchewan household is expected to pay \$946 and receive a rebate of approximately \$1,400. Those living outside of metropolitan areas will be given an additional 10% rebate to take account of geography and lack of access to public transit.

Saskatchewan Premier Moe responded bluntly to the federal announcement, calling the federal plan "a cynical attempt by the Trudeau government to buy your vote with our money", and promising to continue Saskatchewan's legal challenge against a federally imposed carbon tax.

4.1.1 The Need for a Price on Carbon Pollution in Saskatchewan

The Saskatchewan Environmental Society supports the adoption of a price on carbon pollution in Saskatchewan and across Canada.

Among the key principles enunciated in the Pan Canadian Framework on Clean Growth and Climate Change is that carbon pricing should be applied to a broad set of emissions sources, that carbon price increases should be implemented in a gradual and predictable way, and that carbon pricing policies should include revenue recycling "to avoid a disproportionate burden on vulnerable groups and Indigenous Peoples".¹¹⁷ The Saskatchewan Environmental Society endorses these principles.

Given the unwillingness of the Saskatchewan Government to levy a carbon price on Saskatchewan's greenhouse gas pollution sources, the Saskatchewan Environmental Society supports the Government of Canada's plan to do so.



Although the Government of Saskatchewan has questioned whether a carbon tax will be an effective tool for reducing pollution, there is growing agreement at the international level about the value of carbon pricing in the transition to a decarbonized economy.¹¹⁸ Many European countries have successfully used carbon taxes to reduce coal use and to encourage consumers and industry to switch to less carbon intensive fuels.¹¹⁹

Furthermore, experience in Australia has demonstrated the positive impact of adopting a price on carbon and the negative impact of removing it. During the period when a carbon levy was in effect in Australia, greenhouse gas emissions dropped by an average of 1.1% per year. When a change of government in Australia in July, 2014 resulted in its national price on carbon being repealed, greenhouse gas emissions rose. Since the repeal, national emissions in Australia have gone up an average of 1.3% each year.¹²⁰

Given the scale of emissions reduction required in Saskatchewan to achieve our share in achieving Canada's national greenhouse gas emissions reduction target, a tax on greenhouse gas pollution is an essential component of climate change policy. Without it, a 28 million tonne annual reduction in provincial greenhouse gas emissions by 2030 is very unlikely to be achieved.

It is important to note that a price on carbon is only one of the policy tools needed to drive down greenhouse gas pollution. To be most effective, it needs to be combined with all of the other emissions reduction policies discussed in this paper. It would be particularly helpful as a vehicle to encourage emissions reductions in sectors of the Saskatchewan economy that are not going to be subject to provincial government regulation of emissions.

One of the important arguments supporting a price on carbon is that the economic cost of inaction on climate change will over time become much greater than the cost of acting to reduce emissions. This cost of inaction has most effectively been highlighted by Lord Nicholas Stern of the London School of Economics, who emphasizes that if the international community does not act to curtail manmade greenhouse gas emissions, the losses to global GDP each year will be in the range of 5%, with the potential to go much higher.¹²¹

To be effective, the price on carbon pollution needs to be high enough to discourage current levels of fossil fuel consumption and to encourage consumers, businesses and industry to pursue economically prudent alternatives. The Saskatchewan Environmental Society therefore supports federal government plans to increase the federal carbon tax each year between 2019 and 2022. In our judgement, given the urgency of the climate crisis, further increases beyond 2022 are likely to be required.



4.2 Assessment of the Details of "Prairie Resilience"

Prairie Resilience: A Made-In-Saskatchewan Climate Change Strategy begins by stating that "Saskatchewan has a demonstrated long-standing commitment to action on climate change".¹²² That statement is debatable, given the Saskatchewan government's record over the past 10 years: not only is the Saskatchewan government not on target to meet the greenhouse gas emissions reduction goal it set for itself in 2009, namely a 20% reduction below 2006 emissions levels by the year 2020, but it has so far failed to make any progress in bringing emissions down below 2006 levels.

What is absent in the opening portion of *Prairie Resilience* is also notable. No context is set for why greenhouse gas emissions reduction must be pursued, other than an acknowledgement that climate change is real and that Saskatchewan is being impacted by increasingly more severe weather events. Strikingly absent is any discussion of the international consequences of climate change with respect to matters such as sea level rise, increased risk of heat waves, or negative impacts to global food and water security. Nor is there any explanation of the long-lived nature of greenhouse gases once they are released into the atmosphere. Perhaps most notable of all is the lack of any discussion about how deeply greenhouse gas emissions must be cut in order to stabilize the concentration of greenhouse gases in the atmosphere. The need for fossil fuel use to be phased out in the second half of this century is never mentioned.

Simply put, *Prairie Resilience*, while attaching importance to climate change, does not communicate any sense of urgency or explain the magnitude of greenhouse gas emissions reduction that will be required in order to meet the objectives of the Paris Climate Agreement.

Prairie Resilience goes on to outline the Saskatchewan government's plans for both greenhouse gas mitigation and climate change adaptation. It includes several important positive new initiatives, as well as containing numerous policy gaps. The following sections focus on assessing the proposed measures put forward in the mitigation portion of the strategy.

4.2.1 Reducing Emissions in the Oil and Gas Sector

The biggest commitments to greenhouse gas reduction made by the Saskatchewan government in *Prairie Resilience* pertain to Saskatchewan's oil and gas sector and Saskatchewan's electricity generation sector. The oil and gas sector currently accounts for



32% of province-wide greenhouse gas emissions, while electricity generation accounts for another 19%.¹²³ Given that these two sectors together release almost half of province-wide greenhouse gas emissions, a commitment to action on emissions reduction in these sectors is very welcome.

In Saskatchewan's oil and gas sector, the provincial government commits to creating a market demand for methane that is currently vented or flared, a move that should help reduce methane emissions to the atmosphere. Methane is a potent greenhouse gas. In *Prairie Resilience* and subsequently in the draft Oil and Gas Emission Management regulations (released in June, 2018) the Province of Saskatchewan signals its intent to reduce methane emissions from its upstream oil and gas industry by 40% by 2025.¹²⁴ It will use the year 2015 as a baseline, and commits to a 4.5 million tonne carbon dioxide equivalent annual reduction by 2025. It commits to regulatory oversight of these emissions, to supporting adoption of innovative emissions reduction technologies in the sector and to increasing the use of the methane for heating and electricity production.¹²⁵

Under the 2017 Pan-Canadian Framework on Clean Growth and Climate Change, signed by the federal government and all provincial governments but Saskatchewan, the Government of Canada committed to cutting methane pollution in Canada's oil and gas industry by 40% to 45% by 2025.¹²⁶ Although the Saskatchewan government did not sign onto the Pan-Canadian Framework, Saskatchewan is signaling a willingness to meet the federal government's methane reduction target in the oil and gas industry.

Nevertheless, initiatives to make even deeper greenhouse gas emissions cuts are needed to optimize the potential in the oil and gas sector. Optimizing the potential in this sector will help to offset sectors such as transportation and agriculture where achieving emissions reduction is more challenging because of the very large number of individuals, farms and businesses in each of these sectors. Action must go beyond the methane reduction initiatives contained in *Prairie Resilience*. Accordingly, in the oil and gas sector, the Saskatchewan Environmental Society urges the Government of Saskatchewan to:

1. Follow North Dakota's decision to **ban the venting of methane gas** during oil extraction.¹²⁷ In the future venting of methane should only be permitted in Saskatchewan when it is advisable for safety reasons.
2. Set strict regulations with respect to **monitoring for methane leaks and repairing those leaks**. Such regulations would need to take account of the limitations of doing repairs in bitter winter weather, but weather permitting, repairs should be done promptly.



3. Follow North Dakota's example of working to **enable in-province pipeline and other infrastructure** as a means to fully utilize the commercial products contained in solution gas. Without this infrastructure too much natural gas will simply be “burned off” as a waste product. There are particularly good opportunities to develop infrastructure to capture associated gas in the Swift Current/Sh Shaunavon area.
4. **Create greater incentives for using flare gas** for electricity generation purposes. This would involve encouraging companies to take waste flare gas from oil and gas operations and utilize it to produce electricity. By doing this, greenhouse gas emissions to the atmosphere would be reduced, and a resource that was previously wasted would be properly utilized. In this regard, it is encouraging to see SaskPower's announcement in May of 2018 that it will contract with the First Nations Power Authority to source 20 megawatts of flare gas power generation projects.¹²⁸
5. **Establish regulations** which require consistent decreases every 3 to 4 years in the amount of gas that can be flared at oil extraction sites. North Dakota has such regulations.¹²⁹
6. **Deny further permits to extract the heavy oil resources in the province with the highest carbon content** and the highest expected greenhouse gas emissions during the extraction process. Such policy reflects the reality that a very substantial portion of the world's fossil fuels will need to be left in the ground if the Paris Climate Agreement temperature targets are to be met.¹³⁰
7. **Apply a supplementary provincial tax to methane emissions** from the oil and gas sector, over and above the federal carbon tax. Methane is 25 times more potent in its heat trapping potential than carbon dioxide. Taxing methane emissions heavily would create economic incentives to stop releasing methane into the atmosphere. It would also create economic incentives to fully and wisely utilize natural gas.

4.2.2 Reducing Emissions in the Electricity Generation Sector

As mentioned above, Saskatchewan's electricity generation sector accounts for 19% of annual provincial greenhouse gas emissions. The sector is heavily reliant on conventional coal-fired power generation, and has also significantly expanded its natural gas-fired generation. Both are significant greenhouse gas sources.



Prairie Resilience commits to ensuring that 50% of the province's electrical generating capacity will come from renewable power sources by 2030.¹³¹ That is a significant increase from the current level of 25%.¹³² Second, it signals its intention to determine the viability of extending carbon capture and storage technology to Saskatchewan's remaining coal-fired power plants. Third, the provincial government commits to "investigating the feasibility of energy storage services to expand renewables capacity" and to "explore additional energy efficiency and conservation products and services to support emissions reduction targets."¹³³

These commitments are no doubt in part a response to the federal government's target to completely phase out conventional coal-fired electricity generation in Canada by 2030. In February 2018, Federal Environment Minister Catherine McKenna announced amendments to existing regulations in order to achieve that goal.¹³⁴ While the Saskatchewan government does not promise to fulfill that goal in its *Prairie Resilience* document, it does promise actions that will result in a 40% annual reduction below 2005 emissions levels from Saskatchewan's electricity generation sector by 2030.¹³⁵

As is the case with the oil and gas sector, it is well worth Saskatchewan formulating plans to make even deeper greenhouse gas emissions cuts in the electricity generation sector by 2030. The cost of renewable power is dropping rapidly and there are many cost-effective alternatives to using coal and natural gas for power generation. Accordingly, beyond those initiatives contained in *Prairie Resilience*, the Saskatchewan Environmental Society urges the Saskatchewan government to:

1. **Phase out all conventional coal-fired power stations** over the next 12 years. Saskatchewan's publicly owned utility, SaskPower, owns all existing coal fired-units in the province, several of which would need costly retrofits if their life were to be extended beyond 2030. Coal-fired generating capacity currently sits at 1,530 megawatts.¹³⁶ If Saskatchewan pursued this policy direction, it could benefit from the experience of several other jurisdictions. For instance, in 2014 Ontario's government completed the task of coal-phase out, a process it pursued over 11 years.¹³⁷ Coal-fired power went from being 25% of Ontario's electricity supply mix in 2003 down to zero in 2014.¹³⁸ In Alberta, the Notley government is intending to shut down all coal-fired power stations by 2030.¹³⁹ In the United Kingdom, the national government is implementing a wind-down of its coal-fired power stations, with the last coal-fired plants scheduled to be shut down by 2025.¹⁴⁰ In each of the above-mentioned cases, these policies have been pursued with the view to achieving the co-benefits of greenhouse gas emissions reduction and improved air quality.



2. **Invest heavily in electricity efficiency**, as a complement to the phasing out of coal-fired plants. Efficiency is a less expensive choice than building any new form of power generation. SaskPower achieved just over 100 megawatts of efficiency savings in the last decade.¹⁴¹ This was done with only a modest electricity efficiency program. Ramping that program up and targeting to save 300 megawatts of avoided generating capacity over the next 12 years is a realistic goal.
3. **Import more hydro from Manitoba.** Saskatchewan currently imports 25 megawatts of hydro from Manitoba under an agreement that lasts until 2022.¹⁴² In October 2018, it signed a term sheet with Manitoba Hydro that lays the groundwork for Saskatchewan to purchase an additional 190 megawatts of hydroelectricity from Manitoba starting in 2022.¹⁴³ The formal legal contract for this has yet to be finalized.

The time has now come to extend this approach even further: Saskatchewan should negotiate long term contracts that would increase hydro imports from Manitoba to 1,000 megawatts. Saskatchewan and Manitoba would need to work closely to build the associated transmission capacity. The Saskatchewan government should also ask Ottawa to share in the cost of this new transmission capacity in order to facilitate the movement of low-carbon electricity.

4. To support the replacement of coal, **expand co-generation of electricity** in Saskatchewan, particularly at potash mines. Experience at the 260-megawatt co-generation facility at the Cory Potash mine near Saskatoon has proven co-generation to be successful and reliable.¹⁴⁴ Instead of burning natural gas for only industrial heat purposes, as is done at most potash mines, the Cory facility simultaneously uses natural gas for electrical generation. Targeting at least 500 megawatts of additional co-generation capacity in Saskatchewan by 2030 could help replace the base-load electricity that coal currently provides.
5. **Expand renewable power** beyond the levels now being planned, and use it in concert with battery storage or other energy storage technologies. Operating the Lake Diefenbaker reservoir with complementary wind and solar sources of electricity would increase the reliability of renewables.

Current SaskPower plans for expansion of renewable electricity generation in Saskatchewan focus primarily on wind power. After a decade in which only 49 megawatts of wind power was added to the provincial grid (total grid capacity is 4,493 megawatts¹⁴⁵), the Saskatchewan government is targeting a major expansion, in which wind power would make up 30% of grid capacity by 2030.¹⁴⁶ To get this process rolling, the Saskatchewan government recently announced two contracts. One is for a 200-megawatt wind farm south



of Assiniboia, Saskatchewan.¹⁴⁷ The second is for a 177-megawatt wind farm near Herbert, Saskatchewan.¹⁴⁸ These are worthy projects.

The Saskatchewan government has also announced plans for 60 megawatts of solar power by 2021.¹⁴⁹ Here there is significant potential for expansion, especially given the rapid decline in the cost of solar technology. Southern Saskatchewan is blessed with the best sunlight resource in all of Canada. Moreover, solar is a nice complement to wind power, producing well during daylight hours, while wind turbines perform best at night. At least 500 megawatts of solar power should be brought on line by 2030. Solar power could play a major role in meeting summer air conditioning loads in Saskatchewan and in charging electric vehicles. If developed in concert with electricity storage, it could eventually help meet future base-load electricity requirements. Solar can deliver these services with greenhouse gas emissions that are 1/17 those of coal-fired generation and 1/10 those of electricity produced by burning natural gas.¹⁵⁰

To date, the Saskatchewan government's renewable power plan announcements have not included a serious investment in biomass (energy from renewable sources of biological origin), although SaskPower has signaled its intent to make some sort of announcement regarding biomass in 2019.¹⁵¹ There are significant biomass opportunities in Saskatchewan, particularly for the use of waste wood residue from Saskatchewan's forest.¹⁵² Electricity generation using biomass offers the benefit of base-load electricity from a renewable source. In cases where it is feasible to locate generating facilities near communities, biomass also offers the potential to use the waste heat for heating local buildings or for district heating. It should be possible to bring at least 80 megawatts of biomass on line by 2030.

Rather than investing further in exceptionally expensive carbon capture and storage, the Government of Saskatchewan should use all of the above-mentioned electricity supply sources to plan an orderly phase out of conventional coal-fired power over the next 12 years. By 2030, the only operating coal-fired power unit in Saskatchewan should be the carbon capture unit at the Boundary Dam Power Station. In the longer term, SaskPower should commit to being entirely free of hydrocarbon-based electricity generation by 2050.

4.2.3 Reducing Emissions in the Transportation Sector

Transportation accounts for 14% of greenhouse gas emissions in Saskatchewan.¹⁵³ The largest portion of these emissions relate to the movement of commercial goods.



Prairie Resilience proposes a number of measures to reduce transportation emissions. Plans include: (a) “create a freight strategy to improve delivery times, reduce fuel use and increase efficiency,” (b) “increase the use of idle time limiters in government trucks to reduce fuel usage,” (c) “evaluate government fleet vehicles for lower-carbon technology opportunities,” (d) “continue to support industry in expanding the size and usage of the short haul (short line) rail systems,” (e) “facilitate traffic data specific to Saskatchewan to mitigate emissions from congestion and idling,” and (f) “expand the Trucking Partnership Program to increase fuel efficiency in freight hauling.” The provincial government notes that current government-industry partnerships already result in a reduction of approximately 50,000 tonnes of greenhouse gas emissions (carbon dioxide equivalent) each year.¹⁵⁴

The measures proposed in *Prairie Resilience* have merit, but will not achieve significant emissions reduction. It is noteworthy that the document includes no target for emissions reduction in the Saskatchewan transport sector, and no estimate of how much of a reduction the above-mentioned proposed measures are expected to achieve.

In keeping with the national target for greenhouse gas emissions reduction, the Saskatchewan government should be seeking to cut carbon dioxide and nitrous oxide pollution in the transport sector by 36% by 2030. That would translate into a reduction in greenhouse gas emissions of approximately 3.8 million tonnes carbon dioxide equivalent annually.

The Saskatchewan government will be helped in achieving that goal by Government of Canada regulations announced in November of 2012 that require auto-makers to roughly double the fuel economy of their vehicles by 2025, when compared to 2008.¹⁵⁵ In 2014, Canada and the United States formally adopted similar regulations aimed at improving fuel economy. The Canadian regulations establish progressively more stringent greenhouse gas emissions standards for the 2017 to 2025 model years of Canadian vehicles.¹⁵⁶ Although, at the time of writing, the Trump administration is weakening U.S. regulations, the Government of Canada, to its credit, shows every sign of intending to keep its regulatory structure in place, aligning Canada with California and other U.S. states committed to better fuel efficiency and emissions reduction.

There are numerous additional measures the Saskatchewan government could take to complement federal policy. Accordingly, the Saskatchewan Environmental Society urges the Government of Saskatchewan to:

1. As a starting point, **establish financial incentives to encourage the purchase of hybrid vehicles and ultra-fuel-efficient vehicles.** This could be done by offering modest rebates at the time of vehicle purchase.



2. **Incentivize the purchase of electric vehicles** and the installation of solar panels for vehicle charging purposes. In Canadian provinces with a large hydro resource, electric vehicles can operate with very low greenhouse gas emissions. However, because the Saskatchewan grid is so heavily dominated by fossil fuels, electric vehicles in Saskatchewan still have a significant carbon footprint. Fortunately, this can be sharply reduced by charging electric vehicles using renewable power installations. Solar power is particularly well suited for this purpose. Solar installations can readily be located adjacent to or close by to electric vehicle charging stations. The provincial government should encourage widespread development of solar-powered charging stations in Saskatchewan.
3. One of the least costly means by which the Saskatchewan government could reduce emissions would be to **reduce speed limits** on provincial highways. The current speed limit on Saskatchewan's divided highways is 110 km per hour, and most motorists regularly travel at 120 km per hour. In contrast, the Manitoba divided highway speed limit is 100 km per hour. A speed limit reduction on Saskatchewan divided highways to 100 km per hour would result in an emissions reduction for 'divided highway travel' of at least 15%.¹⁵⁷

Further, the provincial government should reduce speed limits on all regular (undivided) highways from 100 km to 90 km per hour. There is risk that this would be an unpopular measure with the general public, but if it could be successfully implemented it would achieve at least a 10% greenhouse gas emissions reduction related to regular highway travel.¹⁵⁸ It is also likely to reduce the frequency and severity of injuries caused by vehicle collisions. To be effective, any speed limit reduction would need to be properly enforced.

4. Another low-cost initiative would be a **province-wide anti-idling campaign** that discourages vehicle idling during the spring, summer and fall months. Except during cold winter conditions, vehicle idling is a waste of energy resources and a completely avoidable source of greenhouse gas emissions. Municipalities across Saskatchewan should be encouraged to adopt bylaws to restrict idling when outdoor temperatures are above 0°C.
5. Encourage the use of **engine idle time limiters** by private sector trucking companies and bus lines. The *Prairie Resilience* strategy includes a reference to increasing the use of idle time limiters in government trucks in order to reduce fuel usage, but there is no proposal in the document to encourage the use of idle time limiters in the private sector.



6. Require **speed limiters on commercial trucks** and set a maximum speed limit for trucks on divided highways. Although many trucking companies are installing speed limiters, many others are not doing so.
7. In addition to reducing energy consumption in the trucking industry, work with the federal government and with private sector wholesalers and retailers to **increase commercial shipping by rail**. Shipping goods by rail is at least three times more energy efficient than shipping them by truck.¹⁵⁹
8. **Re-establish inter-city bus service** in Saskatchewan. The unfortunate decision in 2017 to shut down the publicly owned Saskatchewan Transportation Company is forcing Saskatchewan residents to rely even more heavily on cars for travel between communities. The decision is also making intercity travel very difficult for low income residents (who may not be able to afford to own a car) and those unable to drive due to poor health or a disability.¹⁶⁰
9. Encourage large employers to provide their own **bus service to worksites**, rather than having each employee drive their own vehicle. Some European jurisdictions have had success with this. In Saskatchewan, K & S Potash Canada provides a bus service from north Regina to its Bethune facility. As a starting point, the Saskatchewan government should open discussions with owners of large industrial facilities in Saskatchewan, many of which are located in rural areas, to see if they would be willing to provide a similar service as part of their plant's greenhouse gas emissions reduction strategy.
10. Provide targeted funding to towns and cities in Saskatchewan to support municipal infrastructure that **supports walking, cycling and other forms of active transportation** that have no associated greenhouse gas emissions.
11. Provide financing to accelerate strategic investments in **improved in-city bus service**. Such improvements would lead to reduced use of cars in Saskatchewan's larger cities. Saskatchewan is unusual among provinces in not providing provincial government support for urban public transportation. Although the Saskatchewan government provides municipalities with annual funding, none of it is specifically targeted for greenhouse gas emissions reduction. Targeted provincial funding to help reduce transport emissions in urban centres would be very timely.



4.2.4 Reducing Emissions in the Agricultural Sector

Agriculture accounts for 24% of Saskatchewan greenhouse gas emissions.¹⁶¹ However, Saskatchewan soils are also an important carbon sink, enhanced by zero till and low tillage practices. The Saskatchewan government estimates current soil tillage practices sequester approximately 9 million tonnes of carbon dioxide equivalent annually,¹⁶² although this may taper down with time. Although natural landscapes tend to sequester more carbon than agricultural landscapes, the latter can act as a carbon sink and accordingly *Prairie Resilience* emphasizes that Saskatchewan should get credit for "past and future land use and management decisions that help sequester carbon".¹⁶³

Prairie Resilience proposes that Saskatchewan will enhance wetland habitat conservation as part of its mitigation and resilience strategy.¹⁶⁴ This is a welcome proposal, but it will require very significant policy change, since over the past decade Saskatchewan has been losing wetlands at an alarming rate. Ducks Unlimited Canada estimates current wetland loss in Saskatchewan at approximately 28 acres per day.¹⁶⁵ Given that wetlands are an important carbon sink, their loss is resulting in added greenhouse gas emissions to the atmosphere.

It may be reasonable that Saskatchewan receive credit for agricultural practices that have sequestered carbon since 2005. However, Saskatchewan should also be held accountable for farm practices such as wetland drainage that have released large quantities of carbon dioxide and methane into the atmosphere since 2005. Moreover, low tillage practices often require significant inputs of energy in the form of nitrogen fertilizer, pesticides and diesel, all of which have significant associated greenhouse gas emissions. There is no mention of the latter considerations in *Prairie Resilience*.

Prairie Resilience proposes planting more nitrogen-fixing crops such as lentils and pulses. These crops are already estimated to sequester 2 million tonnes carbon dioxide equivalent annually in Saskatchewan.¹⁶⁶ Planting more nitrogen fixing crops would achieve further gains in emissions reduction. It could also help minimize the need for synthetic nitrogen fertilizers, the application of which are a source of nitrous oxide to the atmosphere.

Agriculture is a particularly difficult sector in which to reduce emissions, which speaks to the need to optimize reductions in other sectors to balance those produced by the agricultural sector. Despite this, there are a number of measures not mentioned by the provincial government in *Prairie Resilience* that should be considered. These include opportunities to:



1. Establish financial incentives to encourage the purchase of highly **fuel-efficient farm machinery**.
2. Support **precision farming technologies** that reduce farm machinery use and enable better fertilizer application.
3. Conduct **extension work** with farmers across Saskatchewan to support the reduction or better management of application of fertilizers which emit nitrous oxide into the atmosphere. Environmentally sustainable, ecological agriculture practices such as soil building, water conservation and increased biodiversity could also be supported.
4. **Discourage overgrazing** of prairie pastures. Overgrazing substantially reduces the capacity of pasture grasslands to sequester carbon dioxide. By moving from heavy grazing on grasslands to lighter grazing, 20% more carbon can be sequestered by plant roots.¹⁶⁷ Rotational grazing practices which allow grasslands to rejuvenate should be encouraged.
5. Support the use of manure for **biogas production**.
6. Promote the establishment of dozens of **new tree plantations** in Saskatchewan. A mature tree can absorb about 4 kilograms of carbon dioxide per year depending on climate, soil and precipitation.¹⁶⁸ If rates of payment for carbon sequestration through tree planting were competitive to the revenue stream farmers receive from selling trees, these plantations could offer Saskatchewan farmers options to grow and sustain tree plantations for the purpose of sequestering carbon dioxide and/or to sell trees to be planted elsewhere to sequester carbon dioxide.
7. Work with Ottawa to **stop** the process of **rail line abandonment** and grain elevator consolidation in Saskatchewan. That process is forcing farmers to haul grain longer distances by truck, adding to the rise in greenhouse gas emissions.
8. Promote widespread **adoption of solar power** by Saskatchewan's farm community.
9. Invest in measures to carefully monitor and measure **changes in soil carbon**.



4.2.5 Reducing Emissions in the Buildings Sector

The buildings sector accounts for 4% of Saskatchewan's greenhouse gas emissions. Although this sector composes a relatively small part of total provincial emissions, it is important because it touches every Saskatchewan resident. Addressing greenhouse gas emissions in buildings can support public awareness of other greenhouse gas reduction challenges.

Prairie Resilience signals the Saskatchewan's government's willingness to improve energy efficiency in new building design. This includes, for the first time, adopting energy efficiency standards in the Saskatchewan building code: on January 1, 2019, the energy efficiency standards for houses and small buildings contained in the 2015 National Building Code will take effect.¹⁶⁹ On that same date, Saskatchewan also intends to adopt the 2015 National Energy Code for Buildings applicable to large buildings.¹⁷⁰ Saskatchewan also commits to "facilitate provisions in the 2015 National Building Code that provide for increased use of wood in building construction in order to extend carbon storage."¹⁷¹

Other *Prairie Resilience* commitments pertaining to homes and buildings include exploring options to label buildings for energy performance, increasing the number of government buildings with a sustainability certification, and requiring new and renovated government buildings to exceed the energy performance requirements of the National Energy Code for Buildings by 10%.¹⁷²

These *Prairie Resilience* initiatives will be welcome improvements to energy policy in Saskatchewan. There are however, other opportunities to achieve even deeper emissions reductions in Saskatchewan's building sector. These include:

1. **Adopt a higher energy efficiency code** requirement than is currently being proposed. The Saskatchewan Home Builders Association has promoted 'Energy Star' home construction for over a decade. It would thus be logical to make 'Energy Star' the new building code requirement for house construction in Saskatchewan. Energy Star homes are more air-sealed than a typical new home, and walls and ceilings are well insulated. Energy Star homes also have very energy efficient windows, doors and skylights, and are generally equipped with an air exchanger to improve indoor air quality.¹⁷³

An energy efficiency provision in the building code based on 'Energy Star' should be just the first step in the road to more sustainable building design in Saskatchewan. The Saskatchewan government should upgrade the energy efficiency provisions in the Saskatchewan Building Code every 5 years, with the goal of implementing a minimum code requirement of 'net zero energy homes' by 2030. Net zero energy homes have such high levels of energy efficiency that they would not require a natural gas furnace,



even in Saskatchewan's cold weather conditions. The homes would further minimize their lifecycle greenhouse gas emissions by meeting their electricity needs from a renewable energy source such as solar power.

2. Revise training programs at SaskPolytechnic to ensure students graduating as **journeymen electricians and carpenters are fully qualified** to build to a standard which supports the building code target of 'net zero home construction' by 2030.
3. Facilitate and invest in **net zero energy home demonstration projects** in Saskatchewan's major urban centres. These demonstration projects would be designed to give all home builders in Saskatchewan practical experience with building a home to net zero energy standards. Demonstration projects could involve a cluster of new homes, each of which would be open for public viewing for several months. This would also support increased public awareness of the benefits of building to this level of energy efficiency.

The Saskatchewan government deserves credit for its attention to new building construction in *Prairie Resilience*. However, the document makes no reference to how emissions can be reduced in existing buildings. If emissions in the building sector are to decline, retrofits of existing buildings need to be prioritized as this stock of buildings will continue to operate and use energy for years to come. The provincial government's goal should be a 36% reduction in greenhouse gas emissions from existing buildings over the next 12 years. The Saskatchewan government should therefore:

1. Establish a financial incentive program to assist homeowners in making **energy efficiency upgrades** to their homes.
2. Work to accelerate energy efficiency improvements in **existing public buildings**.

4.2.6 Reducing Emissions in the Industrial Sector

Another key focus of *Prairie Resilience* is greenhouse gas emissions reduction in the industrial sector. The Saskatchewan government has developed new output-based performance standards that will be applied to more than 40 industrial facilities in Saskatchewan. **Each of these facilities emits more than 25,000 tonnes of greenhouse gas emissions (carbon dioxide equivalent) annually.**¹⁷⁴ Together these facilities currently emit 8.5 million tonnes of greenhouse gas emissions per year, or 11% of the province-wide total. The Saskatchewan government's stated goal is to achieve a 10% reduction in these overall emissions by 2030.¹⁷⁵

Saskatchewan's Environment Minister has indicated that these performance standards "will increase over an established schedule from 2019 to 2030, cumulatively reducing GHG emissions by 5.3 million tonnes."¹⁷⁶ By way of a performance standard, greenhouse gas



intensity reductions of 5% are being set for potash, coal mining, uranium mining, iron and steel mills, fertilizer manufacturing, pulp mills and ethanol production. A 10% reduction is being set for refining and upgrading, while a 15% reduction is being set for combustion in the upstream oil and gas sector.¹⁷⁷

The Saskatchewan government intends to provide the above-mentioned industrial facilities with a range of compliance options. Companies will be able to reduce emissions intensity to meet the performance standard. Alternatively, they can contribute to a provincial technology fund at an established rate or they can purchase an offset credit. An offset credit can be achieved by a project or facility that is not subject to emissions reduction regulations, and can constitute either an actual reduction in greenhouse gas emissions or the sequestration or capture of greenhouse gas emissions.¹⁷⁸ Industrial facilities will also be able to earn a "best performance credit" if they exceed their performance standard.

In addition, as part of its *Prairie Resilience* strategy, the provincial government is strengthening reporting requirements. As of September 1, 2018, obligatory reporting now applies to all facilities that emit more than 10,000 tonnes carbon dioxide equivalent per year.¹⁷⁹

Unfortunately, the 2030 targets for greenhouse gas emissions reduction for large industrial emitters lack ambition. Moreover, these targets are based on 'emissions reduction per unit of production', posing the risk that as industry production grows, total greenhouse gas emissions may decline even less than predicted.

Much tougher performance standards for greenhouse gas emissions reduction need to be set. One option would be for each large industrial facility to be expected to achieve emissions reductions that align with Canada's commitment under the Paris Agreement.

A second option would be for performance standards to continue to vary by industry category, but to be much more ambitious for each industrial category than is currently the case. Variation in performance standards may be necessary to take account of circumstances where Saskatchewan needs to avoid 'carbon leakage' – shifting production and the resulting emissions to another jurisdiction.¹⁸⁰ Caution must be exercised in instance where there is a well-documented risk that setting too high a performance standard could shift production outside of Saskatchewan to a jurisdiction that has weaker greenhouse gas reduction policies.

In addition, all industrial facilities in Saskatchewan that emit more than 10,000 tonnes carbon dioxide equivalent per year should have provincial government performance standards set for them. That would greatly increase the number of industrial facilities that are expected to meet performance standards.



4.2.7 Supporting Municipal Efforts to Reduce Greenhouse Gas Emissions

Prairie Resilience gives little attention to the importance of greenhouse gas emissions reduction by urban municipalities in Saskatchewan. This is unfortunate because urban municipalities, particularly cities, could play a major role in implementing the measures needed to cut emissions.

The Cities of Saskatoon and Regina have already set important emissions reduction targets, which the Government of Saskatchewan should support. In June 2017, for example, Saskatoon City Council set a community-wide greenhouse gas reduction target of 15% below 2014 emission levels by 2023, and 80% below 2014 emission levels by 2050. It also set an emissions reduction target for the City as a corporation (i.e. City-owned facilities and equipment). This target uses the City's 2014 emissions inventory as a baseline and aims to achieve a 40% reduction in emissions by 2023, and an 80% reduction by 2050.¹⁸¹

In October of 2018, Regina City Council voted unanimously in favour of obtaining all of Regina's electricity needs from renewable energy by the year 2050.¹⁸² Saskatchewan's capital city is clearly signaling its desire to move completely away from using fossil fuels for this purpose.

The Government of Saskatchewan should actively work with councils and officials in both Saskatoon and Regina to help advance their plans.

Similarly, the Province should prioritize working with other city governments in Saskatchewan that express a willingness to embark on important greenhouse gas reduction initiatives.

Cities are particularly well-positioned to help Saskatchewan meet ambitious greenhouse gas reduction targets in the buildings and transportation sectors. In the buildings sector, for example, city governments have authority to set and enforce energy efficiency provisions in the building code that exceed provincial standards. They could thus play a major role in accelerating the necessary shift to net zero energy home and commercial building construction. Cities also shape the design of new subdivisions, allowing them to advance environmental sustainability practices on multiple fronts. For example, city governments are well positioned to prescribe future street layout that would allow new construction to make maximum use of solar energy.

In the transportation sector, city governments are well positioned to support low-emission transport through measures such as improved public transit services and construction of bicycle paths to encourage cycling and ensure rider safety. City governments also have the authority to adopt their own idle-free bylaws and establish incentives designed to encourage the use of ultra-low emission vehicles.



Two Saskatchewan cities – Saskatoon and Swift Current – have their own municipal electrical utilities. This provides them with the unique opportunity to accelerate the adoption of solar power and other forms of renewable energy within the geographical limits of their electrical utilities. It also provides them with the ability to establish policies aimed at accelerating the adoption of good electricity conservation practices.

Support from the Government of Saskatchewan for the above-mentioned work could take at least two forms. One is direct **financial assistance to cities in order to increase the scale and impact of greenhouse gas reduction initiatives at the municipal level**. Second, and equally important is supportive policy changes. There are numerous opportunities in the latter category. By way of an example, as the Cities Act is currently written, Saskatchewan cities cannot make loans to their local property owners for the purpose of taking action to reduce greenhouse gas emissions. Under what is commonly known as a 'Property Assessed Clean Energy Model' (PACE), cities in Saskatchewan should be permitted to finance property owners to install solar panels or undertake energy conservation measures. Cities should then be allowed to add a special assessment onto a property owner's tax bill that would facilitate the property owner being able to gradually repay the loan as they pay their property taxes.¹⁸³ Cities in Saskatchewan have lobbied for this policy change, but the Provincial Government has yet to implement it.

5. A FAIR TRANSITION TO A LOW CARBON ECONOMY

Many of the greenhouse gas reduction strategies proposed in this paper would create new sources of employment for Saskatchewan residents. The widespread adoption of energy conservation measures and the large-scale deployment of renewable power are two such examples. However, some of the greenhouse gas reduction measures discussed here would negatively impact existing jobs. A phase-out of coal-fired power stations is a prime example.

In instances where greenhouse gas reduction measures result in job losses, affected employees need income protection, as well as assistance to train for and transition to other sources of full employment. The Government of Saskatchewan and the Government of Canada need to work closely together to ensure this is successfully achieved.

The Saskatchewan Environmental Society discusses this important matter in its 2017 publication *Planning for the Transition in a Carbon Constrained World: Lessons from the Literature for Saskatchewan*, by Hayley Carlson. For access to this paper please refer to: <http://environmentalsociety.ca/publications/2017/planning-for-the-transition-2017/>



6. CONCLUSION

In *Prairie Resilience* the Government of Saskatchewan has set out firm plans for greenhouse gas emissions reduction in the electricity generation sector, the oil and gas sector and the industrial sector. Saskatchewan Environment Minister Dustin Duncan has indicated the Province expects to achieve a 12 million tonne reduction in greenhouse gases (carbon dioxide equivalent) in these three sectors combined by 2030.¹⁸⁴ This represents a clear step forward over existing circumstances.

Unfortunately, no specific emissions reduction targets are provided in *Prairie Resilience* for each of the other key sectors of the Saskatchewan economy. The Saskatchewan government's plans for an actual net reduction in greenhouse gas emissions are weak for both the transport sector and the buildings sector. In the agricultural sector, the Saskatchewan government is relying heavily on getting credit for past land use decisions that sequester carbon, while ignoring past land use decisions, such as wetland destruction, that have added substantially to greenhouse gas emissions release.

While *Prairie Resilience* represents a step forward over past climate change mitigation practice in Saskatchewan, it falls far short of Saskatchewan "doing its fair share" to help Canada meet its obligations under the Paris Climate Agreement. Doing its fair share would require Saskatchewan to achieve a 28 million tonne per year reduction in greenhouse gas emissions by 2030, more than double the reduction that *Prairie Resilience* is likely to produce.

The greenhouse gas mitigation measures in *Prairie Resilience* fall far short of constituting a meaningful response to climate change, given the urgency of the problem, as outlined in this paper. *Prairie Resilience* does little to prepare Saskatchewan for the reality that our province, along with the rest of the world, will need to become carbon neutral by mid-century, if catastrophic effects from climate change are to be avoided.

Casting a further shadow over *Prairie Resilience* is the provincial government's failure to make any headway on greenhouse gas emissions reduction in Saskatchewan over the past decade. The Saskatchewan government will thus have to work hard over the next 12 years to demonstrate it has become serious about climate change mitigation. Climate change mitigation will need to become a high budget priority, and that will be a challenge within government departments and crown corporations that have not prioritized it up to now.

Saskatchewan has a great many additional options for greenhouse gas emissions reduction that are not currently part of the Saskatchewan government's climate change strategy. **The Saskatchewan Environmental Society has outlined more than thirty of these options in this report, including measures such as:**



- **phasing out conventional coal-fired power stations,**
- **expanding cogeneration of electricity in Saskatchewan,**
- **installing 500 megawatts of solar power onto the grid,**
- **introducing strict regulations to monitor for and repair methane leaks in the oil and gas sector,**
- **incentivizing the purchase of ultra-fuel-efficient vehicles,**
- **lowering the speed limit on divided highways,**
- **restoring a provincial inter-city bus service,**
- **supporting extensive tree planting programs for carbon sequestration,**
- **establishing a comprehensive building retrofit program and more ambitious energy efficiency standards in the provincial building code,**
- **instituting more ambitious performance standards for large industrial emitters, and**
- **introducing a price on carbon in line with the Government of Canada's plans.**

If the full suite of measures the Saskatchewan Environmental Society has recommended were to be implemented, they would take Saskatchewan a long way towards being fully compliant with Canada's commitments under the Paris Agreement.

7. IMPLICATIONS OF THE 2018 IPCC SPECIAL REPORT: "GLOBAL WARMING OF 1.5°C"

This report presents the Saskatchewan Environmental Society's analysis of what is required for our province to do its fair share to help Canada meet its climate change pledge to the United Nations: a 30% decrease below 2005 greenhouse gas emission levels by 2030. In Saskatchewan, this translates into achieving a 36% reduction below our current greenhouse gas emissions levels over the next 12 years.

However, as previously noted, much deeper greenhouse gas emissions reductions are required of Canada and the international community if the objectives of the Paris Climate Agreement are to be achieved, namely keeping global average temperature rise well under 2° Celsius, with a preferred target of no more than 1.5° Celsius.

In October of 2018, as the Saskatchewan Environmental Society was completing this publication, the Intergovernmental Panel on Climate Change (IPCC) issued a special report in which it compared the impacts of allowing global average temperature to increase by 2°C with the impacts of limiting the increase to 1.5°C. The IPCC special report was prepared by 91 authors and review editors from 40 countries and contains over 6,000 scientific references. Input was received from thousands of experts and government reviewers



worldwide.¹⁸⁵ The result was a renewed warning to the global community of the enormous risks posed by climate change. The report analyzed the difference that a half a degree Celsius in global average temperature will make to life on Earth, and addressed what must be done if limiting global average temperature rise to 1.5°C is going to be achieved.

Comparing a future with a 1.5°C higher global average temperature (when compared to the pre-industrial era) versus a 2°C higher global average temperature, the IPCC concluded the following:

- “Climate-related risks to health, livelihood, food security, water supply, human security and economic growth are projected to increase with global warming of 1.5° C and increase further with 2°C.”
- “Limiting global warming to 1.5°C compared with 2°C, could reduce the number of people exposed to climate-related risks and susceptible to poverty by up to several hundred million by 2050.”
- “Limiting global warming to 1.5°C compared to 2°C may reduce the proportion of the world population exposed to a climate-change induced increase in water stress by up to 50%....”
- “Any increase in global warming is projected to affect human health, with primarily negative consequences. Lower risks are projected at 1.5°C than at 2°C for heat-related morbidity and mortality....Risks from some vector-borne diseases, such as malaria and dengue fever, are projected to increase with warming from 1.5°C to 2°C, including potential shifts in their geographic range.”
- “Risks from droughts and precipitation deficits are projected to be higher at 2°C compared to 1.5° global warming in several northern hemisphere high-latitude and/or high elevation regions, eastern Asia and eastern North America.”
- Reductions in projected food availability are larger at 2°C than at 1.5°C of global warming in the Sahel, southern Africa, the Mediterranean, central Europe and the Amazon.”
- “Heavy precipitation associated with tropical cyclones is projected to be higher at 2°C than at 1.5°C global warming.”
- “By 2100, global mean sea level rise is projected to be around 0.1 metre lower with global warming of 1.5°C compared to 2°C.” The IPCC analysis concludes that avoiding a 0.1 metre rise in global sea level would help 10 million people avoid related risks. It also emphasizes that because of the increase in global average temperature, sea levels will continue to rise well beyond 2100. The extent of that increase will depend heavily on future greenhouse gas emissions pathways.
- “Increasing warming amplifies the exposure of small islands, low-lying coastal areas and deltas to the risks associated with sea level rise for many human and ecological systems, including saltwater intrusion, flooding and damage to infrastructure. Risks associated with sea level rise are higher at 2°C compared to 1.5°C.”



“PRAIRIE RESILIENCE” IS NOT ENOUGH

- “On land, impacts on biodiversity and ecosystems including species loss and extinction, are projected to be lower at 1.5°C of global warming compared to 2°C. Limiting global warming to 1.5°C compared to 2°C is projected to lower the impacts on terrestrial, freshwater and coastal ecosystems and to retain more of their services to humans.”
- “Of 105,000 species studied, 6% of insects, 8% of plants and 4% of vertebrates are projected to lose half their climatically determined geographic region for global warming of 1.5°C compared with 18% of insects, 16% of plants and 8% of vertebrates for global warming of 2°C.”
- “Impacts associated with other biodiversity-related risks such as forest fires and the spread of invasive species are lower at 1.5°C compared to 2°C of global warming.”
- “The level of ocean acidification due to increasing CO₂ concentrations associated with global warming of 1.5°C is projected to amplify the adverse effects of warming, and even further at 2°C, impacting the growth, development, calcification, survival and thus abundance of a broad range of species, e.g. from algae to fish.”
- “Limiting global warming to 1.5°C compared to 2°C is projected to reduce increases in ocean temperature as well as associated increases in ocean acidity and decreases in ocean oxygen levels. Consequently, limiting global warming to 1.5°C is projected to reduce risks to marine biodiversity, fisheries, and ecosystems and their functions and services to humans...”
- “Global warming of 1.5°C is projected to shift the ranges of many marine species to higher latitudes as well as increase the amount of damage to many ecosystems. It is also expected to drive the loss of coastal resources and reduce the productivity of fisheries and aquaculture... The risks of climate-induced impacts are projected to be higher at 2°C than those at global warming of 1.5°C.”
- “Coral reefs ... are projected to decline by a further 70-90% at 1.5°C (projected with high confidence) with larger losses (greater than 99%) at 2°C (projected with very high confidence).”
- “Limiting global warming to 1.5°C compared to 2°C is projected to prevent thawing over centuries of a permafrost area in the range of 1.5 to 2.5 million square kilometres.” (The thawing of permafrost releases more carbon dioxide and methane into the atmosphere, making the impacts of climate change even worse.)
- IPCC warns that heavy precipitation when aggregated at a global scale is projected to be higher at 2°C. The fraction of the global land area affected by flood hazards is also projected to be larger.
- IPCC emphasizes that “high-latitude tundra and boreal forests are particularly at risk of climate change-induced degradation and loss...”
- IPCC also warns that marine ice sheet instability in Antarctica and/or irreversible loss of the Greenland ice sheet could be triggered at around 1.5°C to 2°C global warming.¹⁸⁶

Based on this IPCC report, it is very clear that there are enormous advantages to human civilization limiting the rise in global average temperature to 1.5°C, and there are enormous dangers associated with allowing global average temperature to increase 2°C.



What then must be done to limit the increase in global average temperature to 1.5°C? The Intergovernmental Panel on Climate Change estimates that global average temperature due to global warming is currently increasing at a pace of 0.2°C per decade.¹⁸⁷ It concludes that limiting the increase to 1.5°C requires a reduction in global manmade carbon dioxide emissions of about 45% by 2030 (when compared with 2010 emissions levels). Net-zero emissions need to be achieved by around 2050.¹⁸⁸

Put simply, the world has almost used up its carbon budget. Fossil fuels need to be rapidly phased out. Deforestation needs to stop.

IPCC states the implications very clearly: "Pathways limiting global warming to 1.5° with no or limited overshoot would require rapid and far-reaching transitions in energy, land, urban infrastructure (including transport and buildings), and industrial systems (projected with high confidence). These system transitions are unprecedented in terms of scale, but not necessarily in terms of speed, and imply deep emissions reductions in all sectors, a wide portfolio of mitigation options and a significant upscaling of investments in these options (medium confidence)."¹⁸⁹

Clearly, for Saskatchewan to respond fully to this latest IPCC report, the provincial government would need to provide the leadership needed to achieve a greenhouse gas emissions reduction of at least 45% province-wide by 2030. This implies going even further than the 36% reduction by 2030 that the Saskatchewan Environmental Society has proposed in this report. Moreover, the Canadian government (in conjunction with the provinces) would need to set a similar goal and put in place national policy measures to achieve it. The Saskatchewan Environmental Society would be fully supportive of such an initiative.

In early December 2018, as she prepared to depart for a UN climate change summit in Poland, Environment Minister Catherine McKenna signaled that by 2020 the federal government is prepared to adopt a more ambitious target for greenhouse gas emission reduction in Canada.¹⁹⁰ However, no specifics have been provided at this point in time.



8. ABOUT THE AUTHORS

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¹²² *Prairie Resilience: A Made In Saskatchewan Climate Change Strategy*, page 2, <http://publications.gov.sk.ca/documents/66/104890-2017%20Climate%20Change%20Strategy.pdf>

¹²³ Ibid. Refer to the chart entitled: Saskatchewan GHG Emissions by Economic Sectors (2015).

¹²⁴ *Prairie Resilience: A Made in Saskatchewan Climate Change Strategy*, page 9. *Prairie Resilience: Output-Based Performance Standards*, <http://publications.gov.sk.ca/documents/66/107966-Prairie%20Resilience%20Backgrounder%20-%20Performance%20Standards.pdf> Refer to the section entitled: Overview of Legislation and Regulation

¹²⁵ *Prairie Resilience: A Made in Saskatchewan Climate Change Strategy*, page 9.

¹²⁶ *Pan-Canadian Framework on Clean Growth and Climate Change*, page 21, http://publications.gc.ca/collections/collection_2017/eccc/En4-294-2016-eng.pdf Refer to the sub-heading entitled: 'Reducing Methane and HFC Emissions'.

¹²⁷ August 7, 2015 letter from the North Dakota Industrial Commission to the Saskatoon Chapter of the Council of Canadians. The letter states: "It is important to note that venting is prohibited in North Dakota. By only allowing flaring, the gas is converted from methane to carbon dioxide, which reduces greenhouse gas emissions 25 fold."

¹²⁸ "SaskPower and First Nations Power Authority Sign Opportunity Agreement Worth An Estimated \$300 Million", SaskPower May 11, 2018 news release.

¹²⁹ <http://www.nd.gov/ndic/ic-press/dmr-blm-43CFR.pdf>

¹³⁰ "The geographical distribution of fossil fuels unused when limiting global warming to 2 degrees C", Christophe McGlade and Paul Ekins, *Nature* 517, January 7, 2015, <http://www.nature.com/articles/nature14016>

¹³¹ *Prairie Resilience: A Made in Saskatchewan Climate Change Strategy*, page 6.

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¹³⁴ 'The Government of Canada outlines next steps in clean-energy transition', February 16, 2018, https://www.canada.ca/en/environment-climate-change/news/2018/02/the_government_ofcanadaoutlinesnextstepsinclean-energytransition.html

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¹³⁶ <https://www.saskpower.com/our-power-future/our-electricity/electrical-system/system-map>

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¹³⁸ Ibid.

¹³⁹ 'Phasing out coal pollution', *Government of Alberta* web site, <https://www.alberta.ca/climate-coal-electricity.aspx>

¹⁴⁰ "UK Runs Without Coal Power For Three Days In A Row", *The Guardian*, April 24, 2018, <https://www.theguardian.com/business/2018/apr/24/uk-power-generation-coal-free-gas-renewables-nuclear>

¹⁴¹ *SaskPower Annual Report* for 2016-17.

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¹⁴³ 'SaskPower to buy more renewable electricity from Manitoba Hydro', SaskPower news release, October 29, 2018, <https://www.saskpower.com/about-us/media-information/news-releases/saskpower-to-buy-more-renewable-electricity-from-manitoba-hydro> Note: A term sheet generally serves as a template for developing more detailed legal agreements.

¹⁴⁴ Cory Cogeneration Plant, <http://www.atcopower.com/Our-Facilities/Our-Power-Technologies/Cogeneration/Cory>

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¹⁴⁹ <https://www.saskpower.com/about-us/media-information/news-releases/2018/03/the-path-to-2030-saskpower-updates-progress-on-renewable-electricity>

¹⁵⁰ ‘Emissions of selected electricity supply technologies (gCO₂eq/kwh)’ in *Climate Change 2014: Mitigation of Climate Change*, Intergovernmental Panel on Climate Change, page 1335 (Table A.111.1). Grams of carbon dioxide equivalent per kilowatt hour of electricity produced are 41 to 48 for solar generated electricity versus 490 for natural gas and 820 for coal-fired power. ‘Median level numbers’ are cited for each electricity source.

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