



Climate Resilience in Saskatchewan

2019 Report

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Minister's Message



Dustin Duncan
Minister of Environment

The Government of Saskatchewan released its *Climate Resilience Measurement Framework* in November 2018 – a first-of-its-kind initiative designed to measure and report on how our province is building resilience to the climatic, economic and policy implications of a changing climate. The framework supports commitments outlined in *Prairie Resilience*, the comprehensive provincial climate change strategy that Saskatchewan released in December 2017.

We are now following up with our first report, to provide the status and the target for each of the framework's 25 measures.

I'm pleased to note that we are seeing some positive trends in the measures. We continue to sequester significant amounts of soil organic matter, an indicator of soil productivity and carbon sequestered in Saskatchewan soil. We are increasing the number of culverts on the national highway system to meet a new provincial flood standard – this helps ensure that the province's transportation network is more resilient to extreme weather events. We are reducing the intensity of greenhouse gas emissions per unit of GDP, which indicates our industries are becoming more environmentally efficient and cost effective. We are increasing the area of Crown land with wildfire fuel management work, which reduces the risk of wildfire to northern communities.

The report also identifies areas we need to keep an eye on, and where we need to complete further work to help Saskatchewan adapt and respond to a changing climate. We will continue to increase the amount of renewable energy as part of our electricity mix by up to 50 per cent generated from renewable sources, contributing to reduced emissions of 40 per cent below 2005 levels by 2030. We will increase the number of communities with active surveillance for mosquito- and tick-borne disease, both indicators of changing climates and conditions. We also have an opportunity to reduce energy consumption and greenhouse gas emissions from government-owned buildings.

These are just a few examples of how the province is applying this innovative framework to proactively measure and improve resilience in the face of changing environmental conditions, in addition to the significant emission reductions we will achieve through provincial legislation and regulation. I encourage you to learn more about *Prairie Resilience* at saskatchewan.ca/climate-change.

Resilience is the ability to cope with, adapt to and recover from stress and change.



Executive Summary

Climate change is a multifaceted issue requiring an approach that allows Saskatchewan to increase resilience in its natural landscapes, physical infrastructure, economy and communities. *Prairie Resilience: A Made-in-Saskatchewan Climate Change Strategy* takes a resiliency-based approach to significantly reduce greenhouse gas emissions while strengthening the province's ability to adapt and thrive in a changing climate.

Saskatchewan's *Climate Resilience Measurement Framework* was released on November 29, 2018 to track and annually report on 25 resilience measures across five key areas: natural systems, physical infrastructure, economic sustainability, community preparedness and human well-being. This is the first report, to present the targets, baselines, historical trends, and current status (as of January 2019) of 25 measures. These measures provide a picture of how Saskatchewan is strengthening its ability to adapt and thrive in a changing climate.

The overall status of all measures is encouraging. Fifteen measures are in good status and are demonstrating the intended trends. The status of seven measures is considered fair, providing opportunities to further the province's efforts. There is currently no information on historical trends for three measures; the status of these measures will be monitored and reported in the future. The present report shows that all of the measures under natural systems and economic sustainability are in good standing. The province will continue to track and report on the climate resilience measures to better understand Saskatchewan's resilience to climate change, and to help identify areas of further focus and improvement.

Snapshot of 25 Resilience Measures

Measures	Target	Current Status ¹	Trend ²
Natural Systems			
1. Total area of agricultural land under permanent cover in Saskatchewan	Maintain permanent cover (native prairie, tame pasture, and tame hay) at 19.93 million acres (8.06 million hectares)	19.93 million acres in 2016 (2016 census)	Slight decrease in 2011 and 2016 but increases in 2001 and 2006
2. Total amount of soil organic matter sequestered in cultivated land	Maintain sequestration at 5.60 million tonnes (Mt) soil organic matter per year	5.59 Mt of soil organic matter in 2016	Maintained
3. Percentage of agricultural land area with 4R nutrient stewardship plan	By 2025, 25% of Saskatchewan's cropland under 4R designation	Approximately 153,000 acres (0-0.4%) of cropland in 2018	Maintained
4. Number of Forest Management Plans (FMPs) that incorporate Values, Objectives, Indicators, and Targets (VOITs) related to forest age class distribution for the licence area	By 2020, 100% of approved FMPs will contain a VOIT that identifies approved age class profile target, by area on the managed forest land base	Three FMPs (out of six) approved as of 2018	Increasing
5. Total protected areas in Saskatchewan	By 2020, 7,809,629 hectares (12%) are protected	Approximately 5.7 million hectares (9% of land area protected as of 2018)	Slightly increasing
Physical Infrastructure			
6. Total number of provincial culverts on the national highway system meeting new provincial flood standard	Increase the total number of provincial culverts on the national highway system meeting new provincial flood standard	Total of 200 upgraded culverts from fiscal year 2014-15 to 2017-18	Increasing (cumulative)
7. Renewable energy generation capacity	By 2030, up to 50% of electricity generation capacity from renewable energy sources ³	25.4% of electricity from renewable sources as of 2018	Maintained
8. Total greenhouse gas (GHG) emissions from electricity sector	By 2030, 8.52 million tonnes CO ₂ e emissions from electricity sector (40% reduction of 2005 levels)	15.96 million tonnes CO ₂ e emissions from electricity sector in 2017	Decreasing
9. Total amount of energy savings from SaskPower's Energy Efficiency and Conservation Program	In 2030, 14 megawatts (MW) peak demand reduction and 87 gigawatt hours (GWh) energy savings ⁴	14 MW peak demand reduction and 56 Gwh of energy savings in fiscal year 2017-2018.	Maintained
10. Area of SaskPower power line right-of-ways (ROWs) widened	By 2030, 10% of ROWs cleared to maintenance standard per year	5.8 % of power line ROWs widened in wildfire management areas in 2018	Maintained
11. Total energy consumption for government-owned buildings ⁵	By 2020, reduce energy consumption to 1.494 GJ/m ²	1.57 GJ/m ² energy consumption in 2017	Maintained
12. Total GHG emissions from government-owned buildings ⁵	By 2020, reduce GHG emissions to 85,489 tonnes CO ₂ e	96,277 tonnes CO ₂ e emissions in 2017	Maintained

¹ Some measures have a one or two-year lag in data availability.

³ The target for renewable energy generation is consistent with the recently published Canada-Saskatchewan Equivalency Agreement conditions.

⁴ Energy efficiency programs rely on market conditions, customer awareness, and other factors influencing customer participation, and as impact of these programs depend on the incremental energy savings from new technologies, targets are subject to change based on market sentiment, relative adoption benefits, and efficiency measures undertaken independently.

⁵ "Government-owned buildings" refers to executive government buildings only; excludes Crown buildings.

⁶ Communities in the wildland-urban interface rated with moderate or high risk of wildfire, based on community wildfire risk assessment.

²Trend:

The trend indicates whether values are increasing, decreasing or maintained, and if the status is good. For example, a downward arrow in green is reflected for a decreasing trend in GHG emissions. In contrast, for a measure on area of fuel management, a green upward arrow indicates an increasing area managed for wildfire, and is considered a good status (green) since it increases resilience. Data only available for 2019; no trend

Measures	Target	Current Status ¹	Trend ²
Economic Sustainability			
13. Total GHG emissions from gas produced in association with oil	By 2025, reduced GHG emissions to 6.4 Mt CO ₂ e (4.5 Mt CO ₂ e reduction from 2015 emissions)	9.1 Mt CO ₂ e emissions from gas produced in association with oil in 2018	Decreased from 2015 baseline emissions 
14. Emissions intensity of Saskatchewan's economy (GHGs per unit of GDP)	Continued decrease in the emission intensity of Saskatchewan's economy	912 tonnes CO ₂ e per million of GDP (Chained 2012 Dollars) in 2016	Decreased GHG emissions per unit of GDP 
15. Realized net farm income	No greater than 50% decrease in realized net farm income from the previous five-year average	\$2.6 billion in 2017 (5% less than the previous five-year average)	A greater than 50% decrease has not occurred since 2004 
16. Percentage of cultivated land in different types of crops	No one crop type to rise above 50% of the cultivated area	No one crop type above 50% of the cultivated area in 2018	Crop diversity maintained 
17. Incorporation of natural forest disturbance patterns in provincial forest harvest design	Beginning April 1, 2019, 100% of forest harvest designs incorporate natural disturbance patterns	Three Forest Management Plans approved as of 2018 incorporate natural disturbance patterns	Increasing 
Community Preparedness			
18. Floodplain mapping completed for communities identified as being at risk of flooding	By 2030, 100% of communities at risk of flooding have completed floodplain mapping	Baseline being determined	
19. Number of communities with a standardized and ratified emergency preparedness plan	target to be set in 2019	238 communities (82%) out of 290 survey respondents have an emergency preparedness plan	Data only available for 2019; no trend available
20. Number of wildfire operational pre-plans completed for "at-risk" ⁶ northern communities	By 2030, all 86 at-risk communities have wildfire operational pre-plans completed	Completed pre-plans for 49 (57%) at-risk communities by 2018	Increasing since 2010 
21. Total Crown land with wildfire fuel management work completed	By 2030, complete remaining 747 hectares adjacent to communities	Completed 800 hectares wildfire fuel management in provincial Crown Land (2000 to March 31, 2018)	Increasing 
Human Well-Being			
22. Number of communities reliant on water supplies vulnerable to drought	Decrease the number of communities reliant on water supplies vulnerable to drought	26 communities have water supplies vulnerable to drought, 15 with backup water supply, and 19 with a water conservation plan in 2018	Measurement taken from 2018, no trend available
23. Average municipal water consumption per capita and total municipal water consumption as a measure of water use efficiency	Efficient use of water by municipal populations as characterized by a decrease in per capita water consumption and a stable or reduced rate of increase in total consumption relative to population growth	364 litres/person/day; About 138 million cubic metres total municipal water consumption in 2017	In the past 30 years, general stability in total municipal use with a marked decrease in per capita use (Overall increase in water use efficiency) 
24. Number of communities (with suitable habitat) where active surveillance for West Nile Virus and other mosquito-borne diseases occurs	By 2020, increase to 20 communities	16 communities with surveillance in 2018	Maintained 
25. Number of active surveys at suitable habitat sites for Lyme disease and other tick-borne diseases	By 2020, increase to 60 survey sample sites	46 survey sample sites in 2018	Maintained 

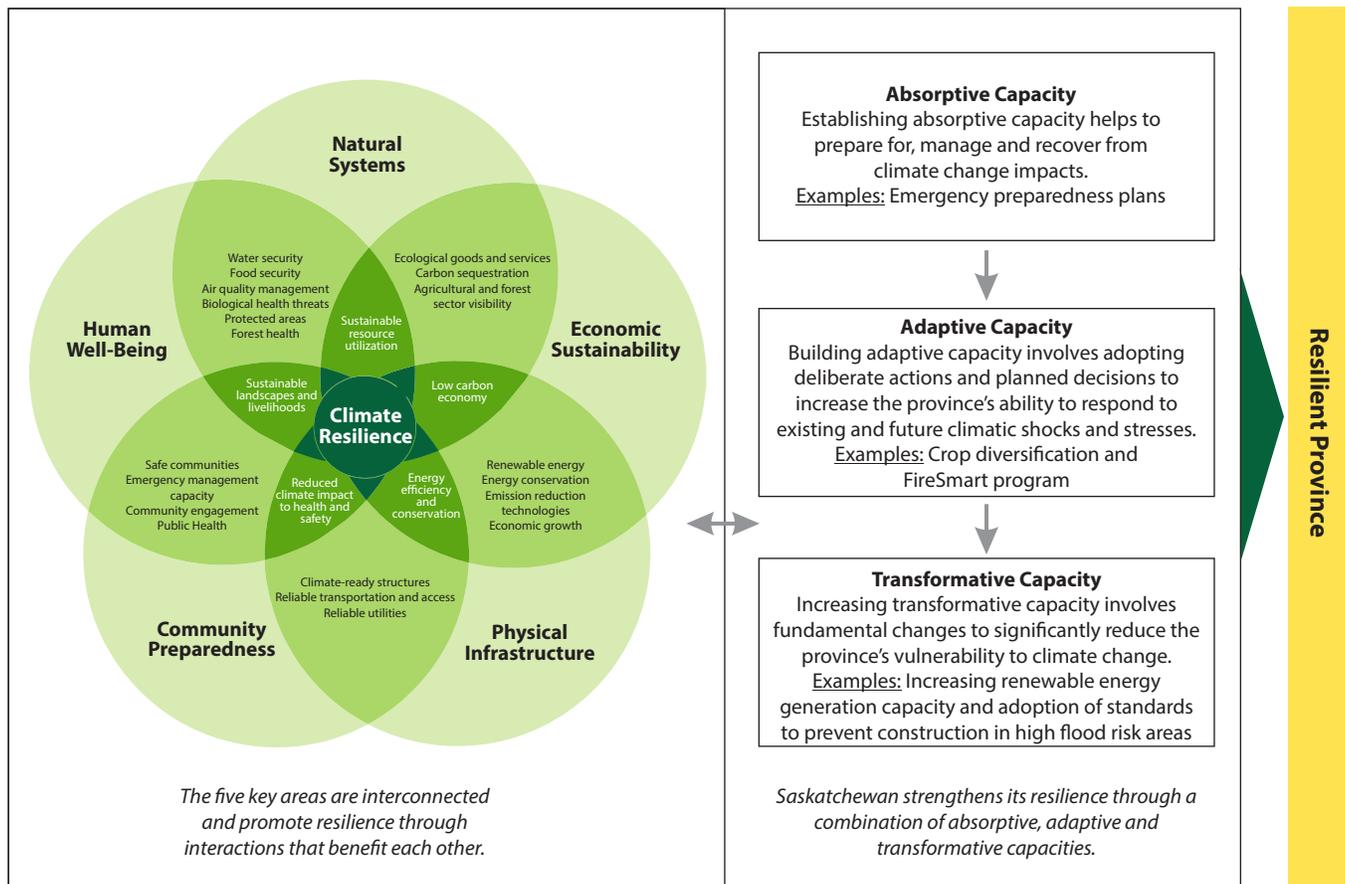
Introduction

Saskatchewan released its *Climate Resilience Measurement Framework* on November 29, 2018. This government-wide plan includes 25 measures across five key areas: natural systems, physical infrastructure, economic sustainability, community preparedness and human well-being. The Government of Saskatchewan is committed to tracking and annual reporting on all 25 measures. This approach provides a better understanding of Saskatchewan's resilience to climate change, and may help to identify where, in future years, alternative or additional policies and programs may enhance resilience.

This initial report is presented to provide the baseline and current status of each measure in relation to the targets as of January 2019.

What does it mean to be resilient?

Resilience is the ability to cope with, adapt to, and recover from stress and change.



Saskatchewan is building resilience to the impacts of climate change by focusing on its natural systems (including land, water and forests), physical infrastructure, the economy, and its communities and people. Saskatchewan's approach involves strengthening its absorptive, adaptive and transformative capacities to adapt and thrive in a changing climate and diversify to a lower-carbon economy.

Five key areas and measures

The framework includes the following five key areas to promote resilience.

Natural Systems refers to maintaining the integrity of land, water and forests in Saskatchewan. Management of natural systems determines not only the ecosystem's resilience to climate change, but also the ecological goods and services derived from them, such as food, fuel, water, air purification, carbon storage and maintenance of wildlife habitat. Natural systems also inherently support mitigation through sequestration of carbon in soils, forests and wetlands.

Physical Infrastructure refers to the production and movement of goods, and the management of the built environment. It includes maintaining reliable transportation and utility

services, and water resource management. This also means increasing capacity for renewable energy generation and building more energy-efficient buildings.

Economic Sustainability refers to the ability to remain competitive in a global marketplace and encourage investment, while reducing greenhouse gas emissions. Economic sustainability ensures that Saskatchewan businesses and industries enjoy the support they need to develop marketable innovations to address climate change.

Community Preparedness refers to the resilience of Saskatchewan communities to climate change impacts. It includes provision of necessary information to the public, responding and recovering from extreme weather events, understanding the risks of flood, drought and wildfires, establishing emergency preparedness and management plans, and adopting appropriate standards and practices to reduce risks.

Human Well-Being refers to the resilience of Saskatchewan residents to climate change impacts. It ensures that residents are healthy and have stable jobs to provide for their needs and families.

The resilience measures in the five key areas

Natural Systems	Physical Infrastructure	Economic Sustainability	Community Preparedness	Human Well Being
				
<ol style="list-style-type: none"> 1. Total area of agricultural land under permanent cover 2. Total amount of soil organic matter sequestered in cultivated land 3. Percentage of agricultural land area with 4R nutrient stewardship plan 4. Number of Forest Management Plans (FMPs) that incorporate Values, Objectives, Indicators and Targets (VOITs) related to forest age class distribution for the licence area 5. Total protected areas in Saskatchewan 	<ol style="list-style-type: none"> 6. Total number of provincial culverts on the national highway system meeting new provincial flood standard 7. Saskatchewan's renewable energy generation capacity 8. Total GHG emissions from Saskatchewan's electricity sector 9. Total amount of energy savings from SaskPower's Energy Efficiency and Conservation Program 10. Area of SaskPower power line right-of-ways widened 11. Total energy consumption for Saskatchewan government-owned buildings 12. Total GHG emissions from Saskatchewan government-owned buildings 	<ol style="list-style-type: none"> 13. Saskatchewan's total GHG emissions from gas produced in association with oil 14. Emissions intensity of Saskatchewan's economy (GHGs per unit of GDP) 15. Saskatchewan's realized net farm income 16. Percentage of cultivated land in different types of crops 17. Incorporation of natural forest disturbance patterns in provincial forest harvest design 	<ol style="list-style-type: none"> 18. Floodplain mapping completed for communities identified as being at risk of flooding 19. Number of communities with a standardized and ratified emergency preparedness plan 20. Number of wildfire operational pre-plans completed for "at risk" northern communities 21. Total Crown land with wildfire fuel management work completed 	<ol style="list-style-type: none"> 22. Number of communities reliant on water supplies vulnerable to drought 23. Average municipal water consumption per capita and total municipal water consumption 24. Number of communities (with suitable habitat) where active surveillance for West Nile Virus and other mosquito-borne diseases occurs 25. Number of active surveys at suitable habitat sites for Lyme disease and other tick-borne diseases



Natural Systems

Measure 1.

Total area of agricultural land under permanent cover in Saskatchewan

This measures the total area of native prairie, tame or seeded pasture, and tame hay.

How the measure contributes to building resilience

Lands in grass, especially on marginal lands, are more resilient against drought and flood events than lands in annual cropping. Grasslands contribute to carbon sequestration and provide habitat for wildlife, which helps maintain biodiversity, especially on native prairie. Permanent cover also helps buffer against the spread of weeds.

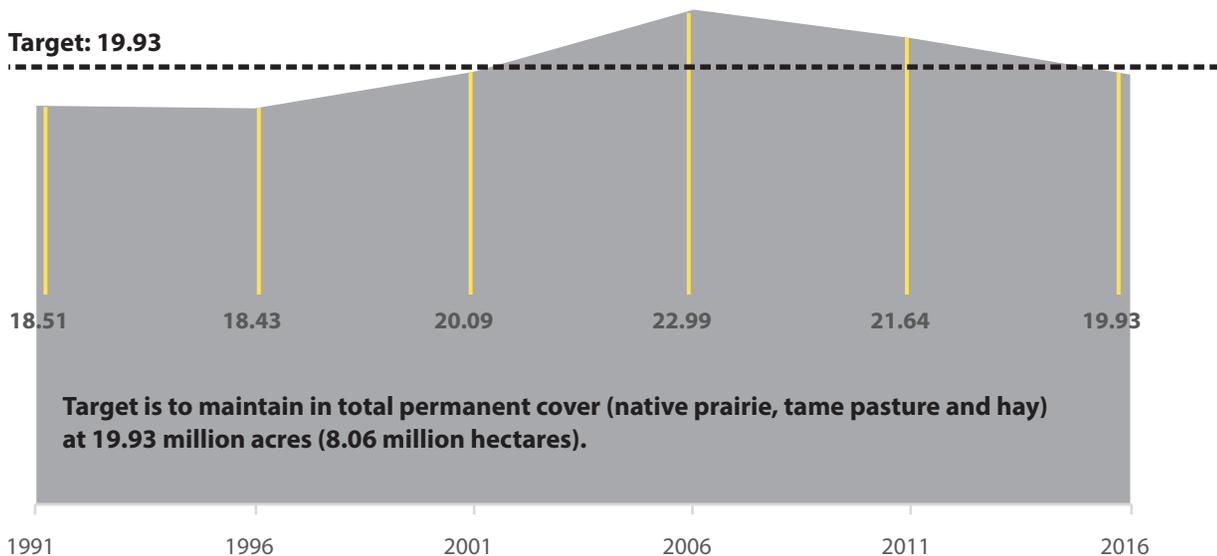
What is the target for this measure?

Maintain at 19.93 million acres (8.06 million hectares).

What is the status of this measure?

Saskatchewan's total area of agricultural land under permanent cover (includes native prairie, tame pastures and tame hay) slightly decreased within the last 10 years. Total forage acres fluctuate with trends in grain and oilseed prices relative to livestock prices. As of 2016, there are 19.93 million acres (8.06 million hectares) of agricultural land under permanent cover.

Total area of agricultural land under permanent cover (million acres)



Source: Statistics Canada Table 32-10-0406-01 and 32-10-0359-01

The province, through the Farm Stewardship Program, continues to provide funding for beneficial management practices (BMPs) that support this target of maintaining agricultural land under permanent cover. These BMPs include: native rangeland grazing management; conversion of marginal cultivated lands to permanent native forage; and conversion of marginal cultivated lands to permanent tame forage.

Measure 2.

Total amount of soil organic matter (SOM) sequestered in Saskatchewan's cultivated land

This measures the amount of soil organic matter that is sequestered in Saskatchewan's cultivated lands as a result of various agricultural practices, such as reduction in summer fallow, changes in tillage practices, and conversion of cropland to forage.

How the measure contributes to building resilience

Soil organic matter improves soil quality through increased water infiltration and retention, soil stability and nutrient retention, which eventually lead to higher agricultural productivity. Soil organic carbon, the carbon component of soil organic matter, represents the carbon dioxide (CO₂) sequestered in the soil.

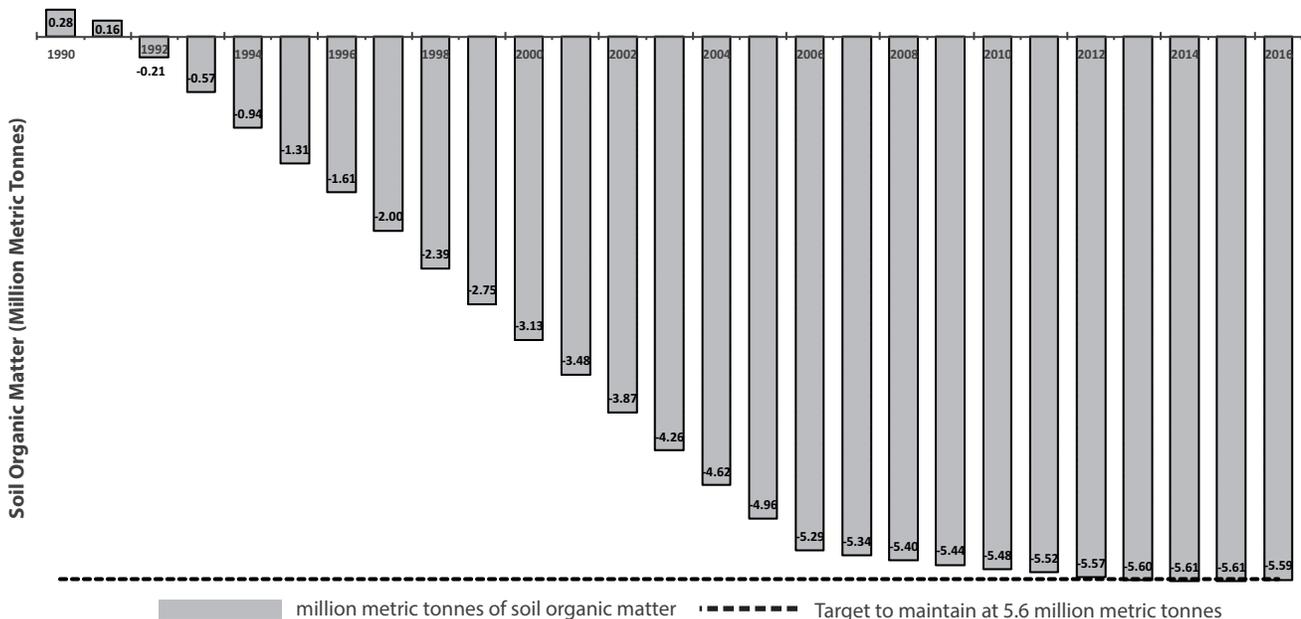
What is the target for this measure?

Maintain sequestration at 5.60 million tonnes (Mt) soil organic matter per year.

What is the status of this measure?

The province's innovative production practices such as zero-till and reduced summer fallow, as well as investments in research and development, have supported Saskatchewan farmers to add to the organic matter content in the soil every year. Over the past 20 years, sequestration rates have increased and Saskatchewan farmers have since early 2006, sequestered at least 5.3 Mt of soil organic matter annually.

Soil organic matter added to Saskatchewan agricultural soils due to changing farming practices (1990 to 2016)



Source: National Inventory Report, Environment and Climate Change Canada. 1990-2016.

Negative values indicate that the soil is sequestering carbon/soil organic matter and is therefore a carbon sink.

Carbon sequestered in soil can be expressed as tonnes of soil organic matter (SOM) or tonnes of CO₂ equivalent (CO₂e). One tonne of SOM is roughly equivalent to two tonnes of CO₂e. SOM is selected for this measure because it provides a more comprehensive depiction of the overall soil productivity.

In 2016, Saskatchewan farmers sequestered about 11.9 Mt of CO₂e. In comparison, Saskatchewan's agricultural emissions totaled 17.71 million tonnes, including farm-fuel.

Measure 3.

Percentage of agricultural land area with 4R nutrient stewardship plan

This measures the total area of agricultural land in Saskatchewan managed under an improved fertilizer management strategy that incorporates the right fertilizer source at the right rate, at the right time and in the right place (4R).

How the measure contributes to building resilience

The 4R nutrient stewardship plan helps ensure protection of the environment and has the capacity to reduce GHG emissions from fertilizer use. The adoption of 4R nutrient stewardship allows farmers to achieve efficiency while helping to maintain the health of the soil, air and water.

What is the target for this measure?

By 2025, 25 per cent of Saskatchewan's cropland is under 4R designation.

What is the status of this measure?

Some Saskatchewan farmers have adopted 4R practices. As of 2018, approximately 0.4 per cent of the province's agricultural land is under 4R designation. Saskatchewan's partnership with Fertilizer Canada will continue to support more of Saskatchewan's cropland to be environmentally responsible by implementing the 4R principles. The 4R concept is currently being featured at eight Agri-ARM (Applied Research Management) field sites across the province, to demonstrate methods for reducing nitrous oxide emissions.



A scheduled field day for the Agri-ARM sites includes at least one stop at a 4R nutrient demonstration project to describe 4R nutrient principles and discuss the specifics of the demonstration projects.

Saskatchewan's agricultural land area under 4R designation

Land Status	Land area (acres) under 4R
Total 4R designation in 2018	152,735
Total crop acres in Saskatchewan	37,141,300
% Saskatchewan acres under 4R designation (2018)	~0.4%

Source: Fertilizer Canada/Statistics Canada Table 32-10-0359-01

Measure 4.

Number of Forest Management Plans that incorporate Values, Objectives, Indicators, and Targets (VOITs) related to forest age class distribution for the licence area

Saskatchewan's Forest Management Planning Standard requires forestry companies/licensees to develop Values, Objectives, Indicators and Targets (VOITs) describing the desired future state or condition of values (e.g., forest age class distribution) that contribute to sustainable forest management.

This measure tracks the number of Forest Management Plans (FMPs) that incorporate a VOIT related to the forest age class distribution for the licence area. Specifically, the licensee shall harvest according to the approved age class profile target, by area, on the Managed Forest Land Base (MFLB). MFLB refers to the forested subset of a forest company's gross licence area where forest management activities are conducted. The MFLB covers both timber and non-timber values, such as wildlife, biodiversity and recreational opportunities.

How the measure contributes to building resilience

Maintaining key forest attributes that are ecologically important, such as age class distribution, helps maintain an intact boreal landscape. Further, forests comprising a mixture of young and old stands are more resilient to extreme wildfires, pest outbreaks or extreme weather events in a changing climate.

What is the target for this measure?

By 2020, 100 per cent of approved FMPs will contain a VOIT that identifies approved age class profile target, by area, on the managed forest land base.

What is the status of this measure?

Saskatchewan's Forest Management Planning Standard was finalized in 2017. This included a requirement for the licensee to establish a VOIT that identified age class for the managed forest land base. Out of six licence areas that have FMPs either approved or under development, three have an approved age class target. The remaining three are currently under development, with expected approval dates ranging from April 1, 2019 to April 1, 2020.

Three forest management plans approved

These plans incorporate Values, Objectives, Indicators and Targets (VOITs) related to forest age class distribution.

Three forest management plans under development

Total protected areas in Saskatchewan

This measures the increase in protected areas in Saskatchewan as an indicator of progress toward fulfilling the provincial commitment of protecting 12 per cent of its terrestrial and aquatic ecosystems. Protected areas include designated Crown lands that have been given a level of protection by legislation and private lands managed for biodiversity by agreement. These conservation lands include parks, ecological reserves and pastures.

How the measure contributes to building resilience

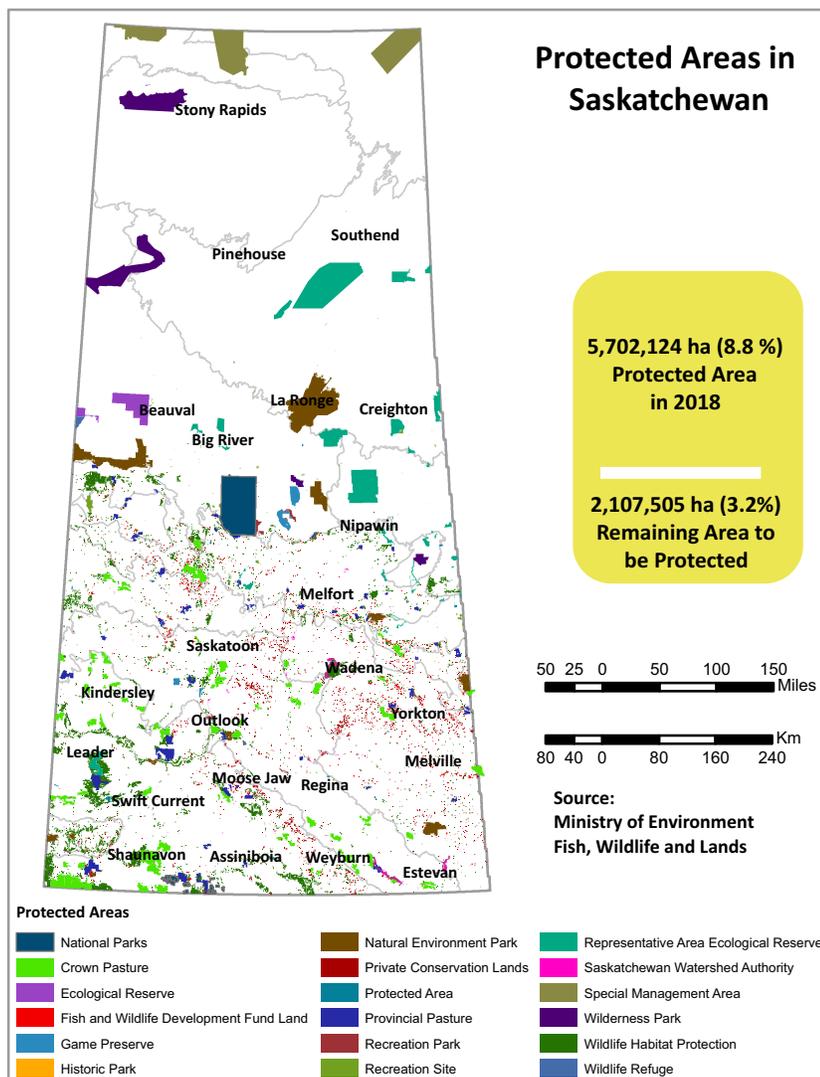
Protected areas serve a number of functions: ecological benchmarks for research and to better monitor natural response to climate change impacts; genetic reservoirs and refuges for species at risk; and maintenance of culturally and traditionally important sites.

What is the target for this measure?

By 2020, 7,809,629 hectares (12 per cent) are protected.

What is the status of this measure?

As of 2018, there were approximately 5.7 million hectares of protected areas in Saskatchewan (around nine per cent of the province's total land base), with representation from each of the province's 11 ecoregions. The province's recent work in the Lower Foster Lake and Nisbet Forest contributed to around 34,000 hectares of protected land.



There are challenges in adding significant numbers of hectares to the protected areas. In the agricultural areas of the province, a large portion of the land is privately owned and additions to the protected areas are achieved in small quantities. In northern Saskatchewan, even though Crown land dominates, many interests must be considered and weighed to achieve a balance between conservation and economic development. The greatest risks to achieving the target are increasing development pressures and the resulting developments that either decrease the ecological value of the land or take up lands fully so they are not representative of a natural landscape. These notwithstanding, the province continues to work towards achieving its target of protecting 12 per cent of its total land base by 2020.



Measure 6.

Total number of provincial culverts on the national highway system meeting new provincial flood standard

This measures the number of culverts on the national highway system that are replaced with the new provincial flood standard, as an indicator of the province's efforts to upgrade vulnerable roadway locations.

How the measure contributes to building resilience

Culverts provide a critical function in moving water from one side of the road to another, preventing road washouts and protecting the surface infrastructure. Modifying culverts to the new provincial standard helps ensure that the province's transportation network is more resilient to extreme weather and climatic changes. A reliable transportation infrastructure is key to economic growth and quality of life for Saskatchewan residents.

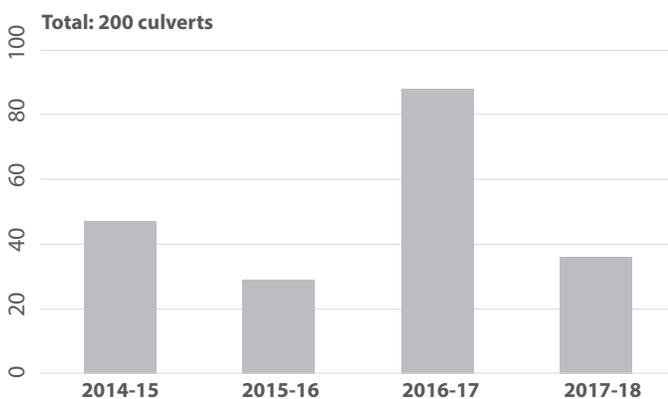
What is the target for this measure?

Increase the total number of provincial culverts on the national highway system meeting new provincial flood standard.

What is the status of this measure?

In 2014, the province adopted a new provincial flood standard for culverts on the national highway system, increasing the minimum culvert diameter from 600 mm to 900 mm. Most culverts installed are designed by Ministry of Highways and Infrastructure technical staff to suit the location of the installation. Thus, a culvert design may require a culvert that well exceeds the 900 mm minimum standard. As of fiscal year 2017-2018, the Government of Saskatchewan had a total of 200 culverts on the national highway system that meet the new flood standard.

Number of culverts on the national highway system that meet new provincial flood standard



Measure 7.

Saskatchewan's renewable energy generation capacity

This measures the amount of electrical generation capacity by SaskPower (or purchased by SaskPower) from renewable sources.

How the measure contributes to building resilience

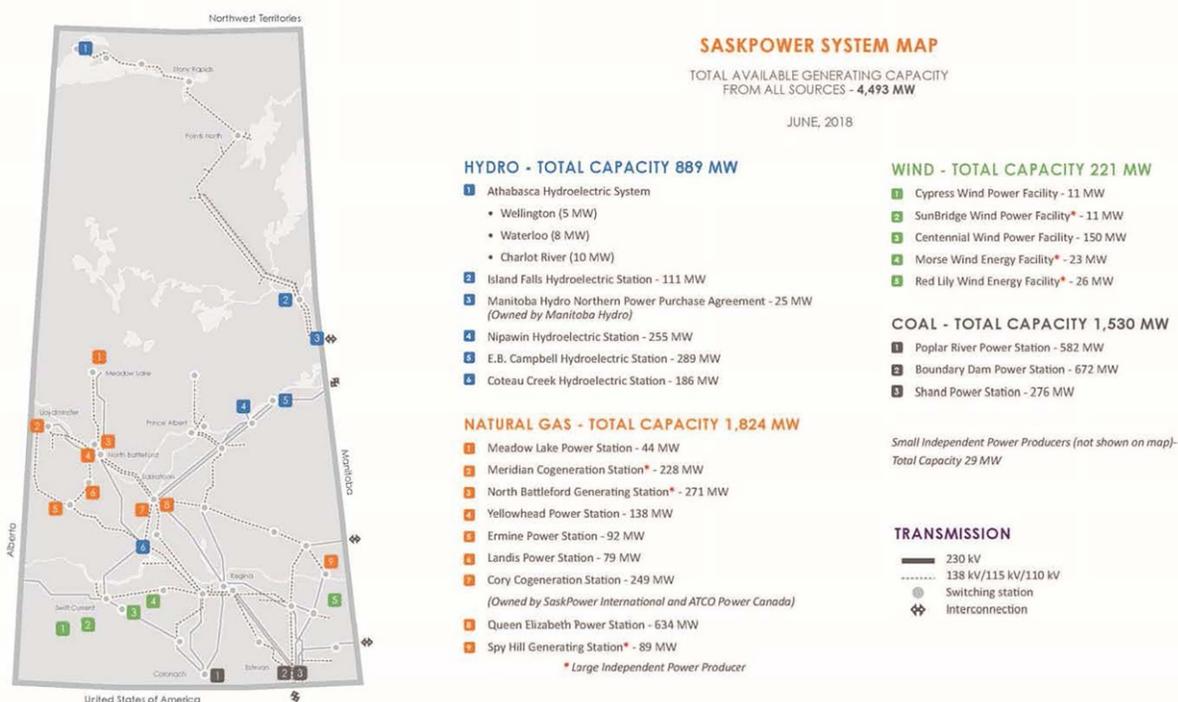
Increasing Saskatchewan's renewable energy generation capacity lowers the province's GHG emissions. Increased diversification of energy sources also increases resilience.

What is the target for this measure?

By 2030, up to 50 per cent of electrical generation capacity from renewable energy sources.

What is the status of this measure?

Saskatchewan is on track to increase its share of renewable electrical generation capacity to up to 50 per cent in 2030. As of June 2018, SaskPower owned or had under contract 25.4 per cent (1,139 megawatts (MW) out of a total 4,493 MW from all sources) of its capacity from hydro, wind and waste recovery.



In October 2018, SaskPower signed a new agreement with Manitoba Hydro for an additional 215 MW of hydroelectricity. During the same time period, SaskPower signed a 25-year power purchase agreement with Potential Renewables that will see the development of a 200-MW wind power facility to power approximately 90,000 Saskatchewan homes. More wind power solicitation is expected to accommodate an increase in wind power generation capacity. There is also expectation for growth in solar, biomass and geothermal generation capacity, as well as in conventional thermal generation capacity.

Saskatchewan continues to be a leader in technologies and knowledge about carbon capture use and storage (CCUS). SaskPower has applied that expertise to the provincial electricity generation system since 2014, capturing a total of more than 2.57 million tonnes CO₂ as of February 2019.

Measure 8.

Saskatchewan's total greenhouse gas emissions from the electricity sector

This measures Saskatchewan's progress towards its commitment to reduce GHG emissions from the electricity sector by 40 per cent from 2005 levels by 2030.

How the measure contributes to building resilience

The electricity sector contributes approximately 19 per cent of Saskatchewan's total GHG emissions. Reducing emissions in the electricity sector therefore contributes significantly to the province's overall GHG emissions reduction.

What is the target for this measure?

By 2030 achieve 8.52 Mt CO₂e GHG emissions from Saskatchewan's electricity sector (40 per cent reduction of 2005 levels).

What is the status of this measure?

In 2017, emissions from electricity generation were 15.96 Mt CO₂e which is higher than the 2005 baseline year at 14.2 Mt CO₂e. In 2017, SaskPower generated more electricity than any previous year, 29 per cent more than 2005. Therefore, the overall emissions increased due to that proportion of generation from fossil fuel-fired power stations. However, since 2005, electricity production has become 13 per cent more efficient in terms of tonnes of CO₂e emissions per gigawatt-hour (net).

Since January 1, 2018, the province – through its *Management and Reduction of Greenhouse Gases (General and Electricity Producer) Regulations* – has imposed a GHG emissions limit on coal and gas-fired electricity generators in Saskatchewan. Further, SaskPower continues to increase its renewable capacity, support low-emission technologies and modernize its electricity grid. These actions are central to meeting the targeted emissions reduction.

Based on a 40 per cent reduction from 2005 emissions



Emissions data for 2018 are not yet available, as third-party analysis of monthly fuel carbon contents will not be completed until mid-2019.

Measure 9.

Total amount of energy savings from SaskPower's Energy Efficiency and Conservation Program

This measures the amount of energy savings from SaskPower's various demand side management (DSM) programs.

How the measure contributes to building resilience

Adopting DSM programs increases resilience for both the utility sector and customers. DSM reduces the strain on the generation and distribution systems during peak demands and it lowers the large costs associated with building and maintaining new electrical generating capacity. Also, customers are able to use energy more efficiently, thereby reducing their GHG emissions and energy costs.

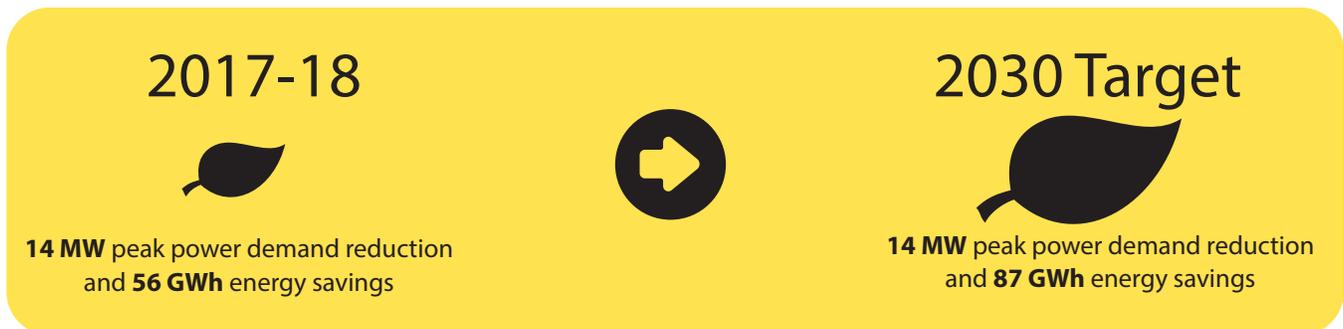
What is the target for this measure?

In 2030, 14 MW peak demand reduction and 87 GWh energy savings are achieved. These targets are under review and subject to change. Energy efficiency programs rely on market conditions, customer awareness, and other factors influencing customer participation, and as impact of these programs depend on the incremental energy savings from new technologies, targets are subject to change based on market sentiment, relative adoption benefits, and independent efficiency measures.

What is the status of this measure?

For fiscal year 2017-18, SaskPower had a 14 MW peak power demand reduction and 56 GWh of energy savings. SaskPower continues to work towards achieving a target of 87 GWh of energy savings and 14 MW peak power demand reduction in 2030, through its portfolio of energy efficiency and conservation programs.

Energy savings from SaskPower's Energy Efficiency and Conservation Program



Reducing peak power demand, which refers to the highest rate of electricity usage, reduces strain on the system.

Demand side management continues to play a role in helping SaskPower customers manage their energy use and reduce GHG emissions. Education, technical support services and financial incentives are key components of SaskPower's DSM strategy. Examples of DSM programs provided by SaskPower are the Industrial Energy Optimization Program (IEOP) and the Commercial Lighting Rebate Program. The IEOP provides technical and financial support for the development and implementation of energy management and capital projects for large industrial facilities.

Measure 10.

Area of SaskPower power line right-of-ways (ROWs) widened

This measures SaskPower's vegetation management to protect its facilities and other values at risk of wildfire. This measure includes ROWs for both transmission and distribution lines.

How the measure contributes to building resilience

Trees in Saskatchewan cause about 1,000 power outages a year and they can also cause fires when they come in contact with power lines. Vegetation management is therefore important to prevent wildfires and outages. These efforts also help ensure reliable service delivery to residents and industries. SaskPower is focusing its efforts on the right-of-ways in fire management plan areas where vegetation management is a priority.

What is the target for this measure?

By 2030, 10 per cent of right-of-ways are cleared to maintenance standard per year.

What is the status of this measure?

SaskPower staff regularly patrol its circuits to monitor potential risk from vegetation overgrowth and/or encroachment. Transmission lines carry high voltages and require the widest ROWs and the highest maintenance standards. Distribution lines carry power to residences and through communities. As of 2018, SaskPower managed 4,134 kilometres of ROW in wildfire management plan areas and 3,128 kilometres in northern communities and provincial parks, for a total area of 21,785 hectares (@30 m width). Of these, 1,266 hectares (5.8 per cent) were cleared to reduce wildfire risk and ensure service reliability.



SaskPower staff regularly monitor potential risk from vegetation overgrowth and/or encroachment.

Measure 11.

Total energy consumption for Saskatchewan government-owned buildings

This measures energy consumption in all provincial government-owned and operated buildings and provides an indication of the province's success in maximizing operational efficiencies while minimizing environmental impacts.

How the measure contributes to building resilience

As of 2017, the Government of Saskatchewan managed approximately 700,000 m² of buildings. Maximizing operational efficiencies in these buildings increases resilience by reducing GHG emissions and energy costs.

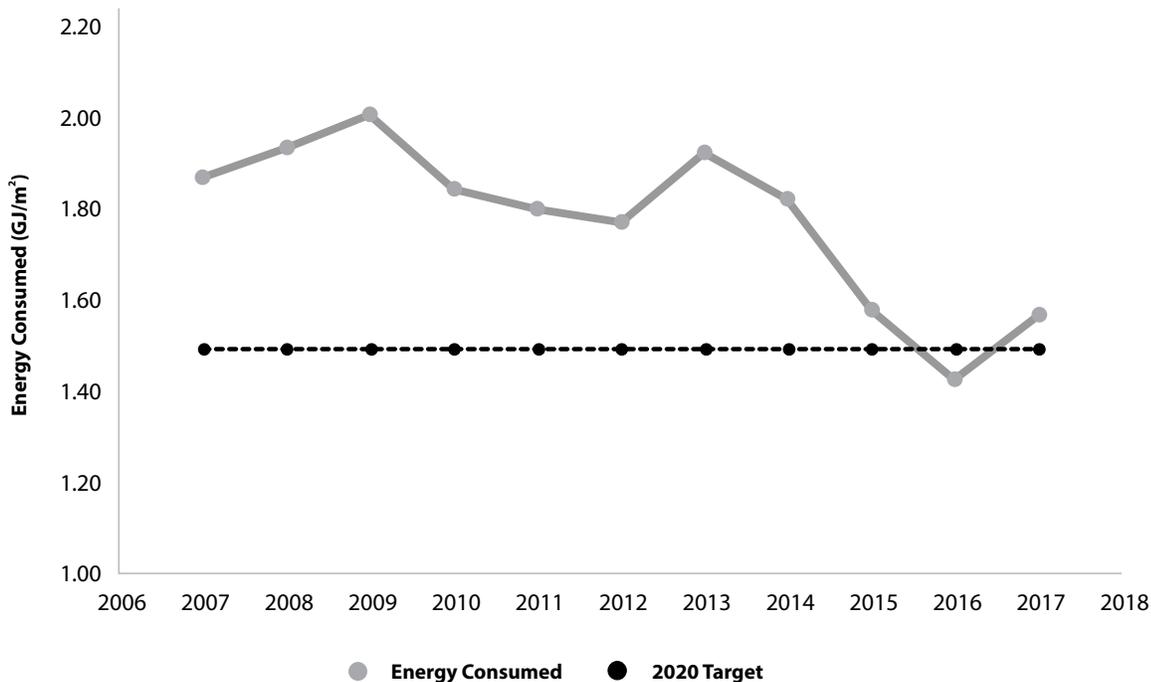
What is the target for this measure?

By 2020, reduced energy consumption to 1.494 GJ/m².

What is the status of this measure?

Significant reductions in total energy consumption have already been made over recent years. The total consumption of Saskatchewan executive government-owned buildings in fiscal year 2017-18 was 1.566 GJ/m², slightly above the 2020 target of 1.494 GJ/m².

Energy consumption of government-owned buildings



A number of government-owned buildings are subject to estimated meter reading and billing, which can cause an over-recording of consumption prior to adjustments being made. As a result, a margin of error of approximately two per cent exists in the data.

Saskatchewan continues to show leadership by enhancing energy efficiency and conserving energy use in and around government-owned buildings. Buildings are built and refurbished to the highest of environmental standards under the international LEED (Leadership in Energy and Environmental Design) certification program. These are also maintained and operated in an environmentally friendly manner under the Canadian industry standard for commercial building sustainability certification program known as BOMA BEST (Building Environmental Standards). The Government of Saskatchewan also commits and plans to exceed the energy performance requirements of the 2015 National Energy Code for Buildings by 10 per cent for new construction and major rehabilitation projects.

Measure 12.

Total greenhouse gas emissions from Saskatchewan government-owned buildings

This measures reduction in GHG emissions from provincial government-owned and operated buildings. This is measured in tonnes of CO₂e based on energy consumed (both electricity and natural gas), which is estimated from billing information.

How the measure contributes to building resilience

Reducing GHG emissions in government-owned and operated buildings contributes to the province's overall emissions reduction.

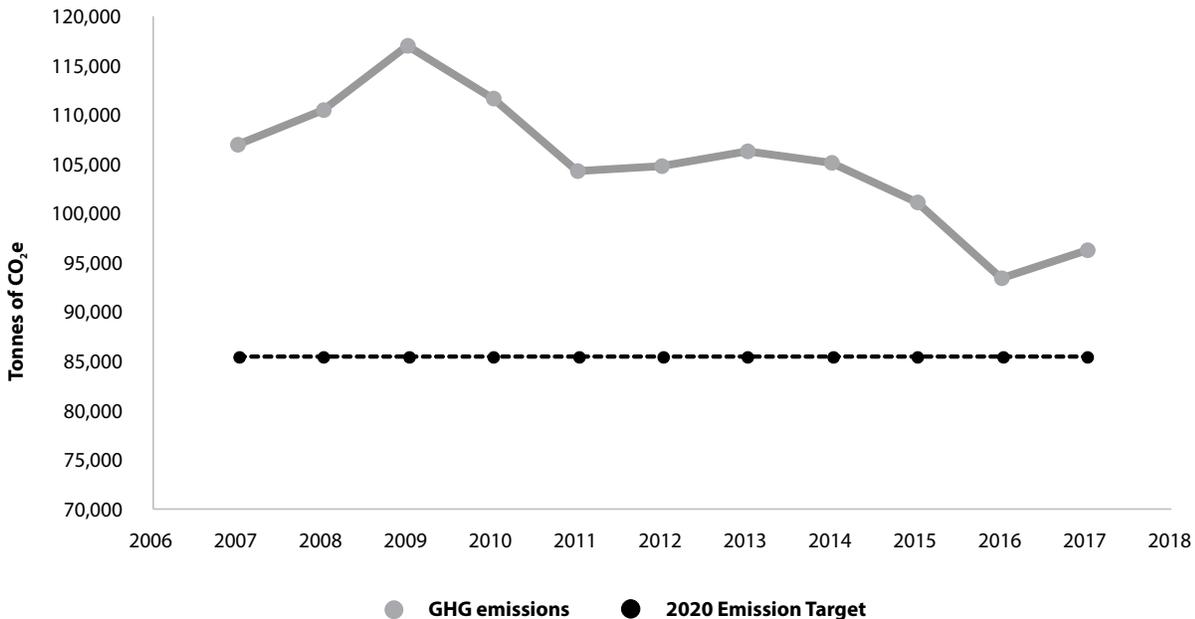
What is the target for this measure?

By 2020, reduce GHG emissions to 85,489 tonnes CO₂e.

What is the status of this measure?

The provincial government is on track towards the target for this measure and has reduced 2007 emissions by 10 per cent as of March 31, 2018. It is important to note that although a number of efforts have been made to reduce emissions, emissions are affected by a number of factors including weather, building type, building size and the energy sources used throughout the year. The total GHG emissions during 2017-2018 (96,277 tonnes of CO₂e) increased by 3.2 per cent from the previous fiscal year. This increase is as a result of the cold winter in the province, which increased heating requirements. In 2017-18, heating degree days increased by 10.7 per cent and natural gas consumption increased by 9.2 per cent. Heating degree days are a measurement to quantify the demand for energy needed to heat a building.

GHG Emissions from executive government-owned buildings





Economic Sustainability

Measure 13.

Saskatchewan's total GHG emissions from gas produced in association with oil

This measure accounts for GHG emissions that result from the flaring and venting of gas produced in association with oil.

How the measure contributes to building resilience

This contributes to reducing the carbon footprint from oil and gas operations and to the overall GHG emissions reduction in the province.

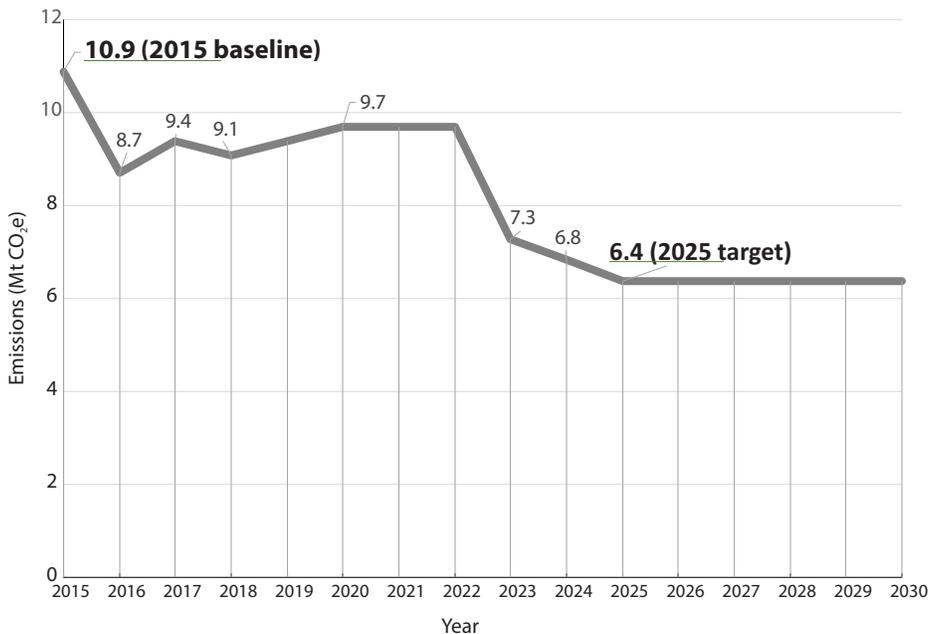
What is the target for this measure?

By 2025, reduce GHG emissions to 6.4 Mt CO₂e (4.5 Mt CO₂e reduction from 2015 emissions).

What is the status of this measure?

GHG emissions from gas produced in association with oil has decreased from 10.9 Mt CO₂e in 2015 to 9.1 Mt CO₂e in 2018 (value is estimated to year end). It is expected that the implementation of *The Oil and Gas Emissions Management Regulations* (OGEMR) will reduce the 2015 emission levels (10.9 Mt of CO₂e) by more than 40 per cent by 2025 (at 6.4 Mt of CO₂e).

GHG emissions from gas produced in association with oil



The values reflected for years 2020 to 2030 represent the annual emission levels per OGEMR.

In 2018, SaskPower announced a partnership with the First Nations Power Authority to secure 20 megawatts of flare gas projects from First Nations-led businesses, helping reduce the carbon footprint of oil and gas operations.

Measure 14.

Emissions intensity of Saskatchewan's economy (GHGs per unit of GDP)

The measure tracks Saskatchewan's GHG emissions intensity, which is the amount of CO₂e per a fixed value of economic activity (one million chained 2012 dollars, where chained dollar is an adjusted value to factor out inflation. This allows for comparisons between quantities produced across time). This measure helps us understand the province's exposure to CO₂e reduction policies and to determine if CO₂e reductions are a result of efficiency gains or loss of production.

How the measure contributes to building resilience

Balancing Saskatchewan's economic growth with the commitment to reduce the province's GHG emissions ensures that the province is able to grow and prosper, and that people's jobs and livelihoods are supported.

What is the target for this measure?

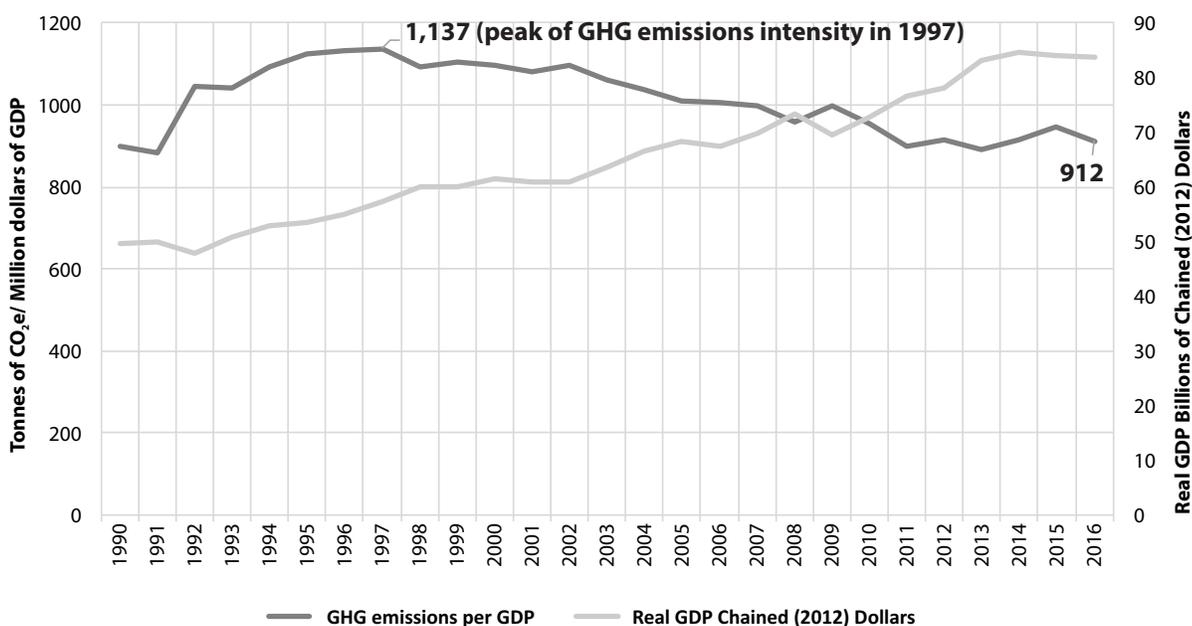
Continued decrease in the emission intensity of Saskatchewan's economy.

What is the status of this measure?

Saskatchewan's GHG emissions intensity peaked at 1,137 tonnes of CO₂e per million dollars of economic activity in 1997 but has been on a downward trend since. The all-time low in the last 10 years was in 2013 at 891 tonnes of CO₂e per million dollars of economic activity. From 2006 to 2016, GHG emissions intensity in Saskatchewan dropped by nine per cent, while the province's real Gross Domestic Product (GDP) increased by 24 per cent during the same period.

It is anticipated that the different programs and regulations being introduced by Saskatchewan as components of *Prairie Resilience* will continue to drive down Saskatchewan's emissions intensity. These include: electricity regulations for coal-fired electricity producers; expanding renewable energy sources; regulations proposed for the upstream oil and gas sector; output-based performance standards for Saskatchewan's large industrial emitters; and energy efficiency improvements.

Saskatchewan GHG emissions per GDP



The GDP and GHG data were obtained from Statistics Canada and Environment and Climate Change Canada (ECCC) websites, respectively. The most recent data for GHG emissions is 2016 since there is a standard two-year delay for the National Inventory Report data processing.

Measure 15.

Saskatchewan's realized net farm income

Realized net farm income is the difference between a farmer's cash receipts (crop receipts + receipts from livestock and livestock products + government program payments) and expenses (operating expenses + depreciation) plus income in kind. This is a measure of farm business income.

How the measure contributes to building resilience

Agriculture remains a key economic driver in our province. Volatility in realized net farm income gauges resilience of the agricultural sector from both a production and financial perspective.

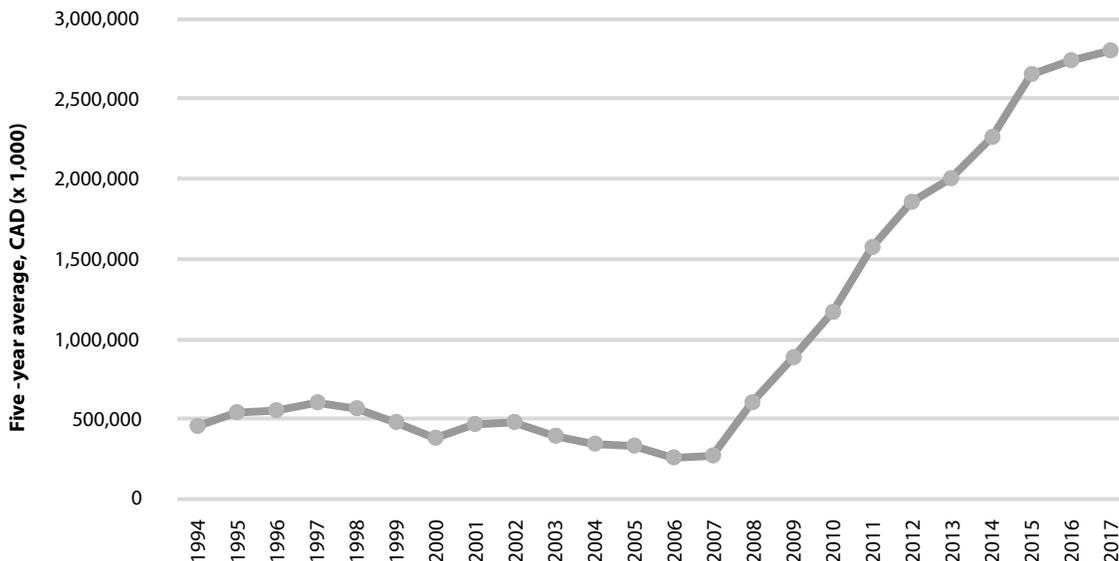
What is the target for this measure?

No greater than 50 per cent decrease in realized net farm income from the previous five-year average. The target for this measure aims to limit drastic declines in profitability in comparison to the previous five years.

What is the status of this measure?

There has been no drastic decline in Saskatchewan's five-year average of realized net farm income in the last 10 years and levels have in fact been increasing from 2008 to 2017. To help farmers adapt to climate change impacts, Saskatchewan continues to provide funding for crop-related research – for example, in drought-resistant crops. The province and Agriculture and Agri-Food Canada also offer programs through Saskatchewan Crop Insurance Corporation (SCIC) to help limit the volatility of a farmer's income. These include crop/production insurance, fire insurance (under the Forage Rainfall Insurance Program), AgriInvest, Agristability, the Western Livestock Price Insurance Program, and compensation for livestock predation and wildlife damage to crops.

Five-year average of realized net farm income



Source: Statistics Canada Table 32-10-0052-01

Realized net income = net cash income – depreciation + income in kind

Net cash income = farm cash receipts – cash expenses

Farm cash receipts = market receipts from crops and livestock + government program payments

Measure 16.

Percentage of cultivated land in different types of crops

The crop diversity target will be used to measure the mix of crops in Saskatchewan. A measure of one crop type above 50 per cent would suggest more potential risk from drought, pests and diseases than a broader mix of crops. With this measure, crop types will be organized under the categories of cereals, oilseeds, pulses and soybeans, and summer fallow.

How the measure contributes to building resilience

Diversification of crops enhances soil health, assists with managing pests and diseases, and manages financial risk. The addition of pulses to crop rotations also helps reduce emissions through reduced use of fertilizer.

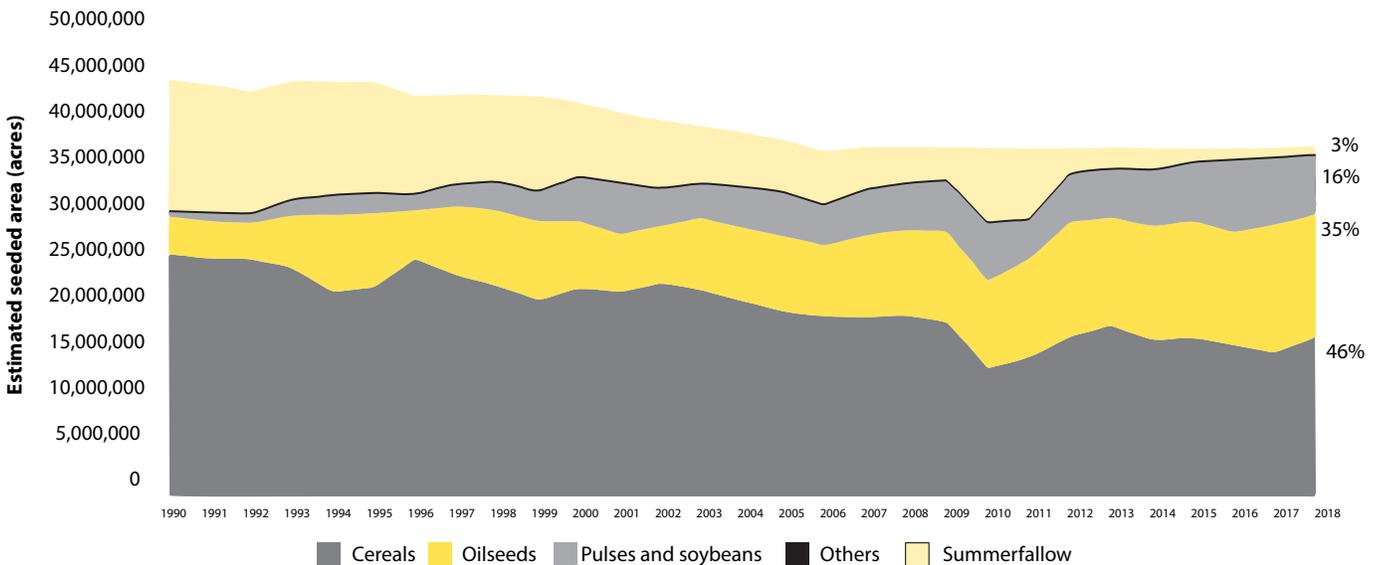
What is the target for this measure?

No one crop type to rise above 50 per cent of the cultivated area.

What is the status of this measure?

In 2018, there was no crop type that made up more 50 per cent of the cultivated area. Cereals have consistently made up the largest cultivated land area, but have not made up more than 50 per cent of the cultivated land area since 2008 when cereal cultivation reached 52 per cent. In 2018, cereals made up approximately 46 per cent of the cultivated land area (17.41 million acres), oilseeds made up 35 per cent (13.5 million acres), pulses made up 16 per cent (6.1 million acres), and summer fallow made up three per cent (1.1 million acres).

Crop types by seeded area



Source: Statistics Canada Table 32-10-0359-01. Others include buckwheat, corn, hemp and mixed grains.



To reduce the probability of not having one crop type beyond 50 per cent, the provincial government will continue to provide science-based information to producers on the importance of crop rotations for mitigating the effects of pests and diseases such as clubroot, and will continue to conduct research on new crop varieties.

Measure 17.

Incorporation of natural forest disturbance patterns in provincial forest harvest design

This measure highlights the requirement within Saskatchewan's Forest Management Plans (FMPs) for forest harvesting to emulate the natural forest patterns (NFPs) created by wildfires.

How the measure contributes to building resilience

Natural disturbances are critical in maintaining healthy and biologically diverse forests. Implementing these management practices helps to maintain landscapes and the natural balance of young and old forests.

What is the target for this measure?

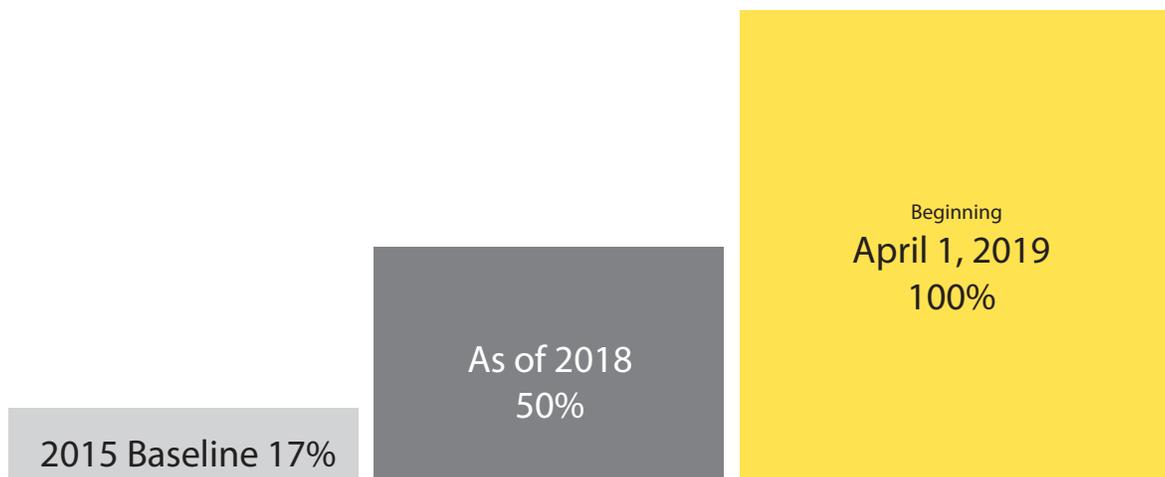
Beginning April 1, 2019, 100 per cent of forest harvest designs incorporate natural disturbance patterns.

What is the status of this measure?

The Ministry of Environment tracks the number of FMPs reporting on aspects of NFPs including event and patch size, the amount of old and very old seral stage stands, and residual stand structure. In 2017, the Forest Management Planning Standard was finalized, as part of Saskatchewan's Environmental Code. This included a requirement for the licensee to establish specific VOITs, (see page 11) that incorporated NFP concepts, and to develop 20-year tactical plan maps in adherence to these concepts.

Licensees with FMPs finalized (three out of six) since April 1, 2015 have all included VOITs and 20-year tactical plan maps that incorporate NFP concepts such as harvest event size, mixed wood regeneration, old and very old seral stage retention as well as retention of residual stand structure.

Forest harvest design incorporate natural forest patterns (NFPs)





Community Preparedness

Measure 18.

Floodplain mapping completed for communities identified as being at risk of flooding

This measures the percentage of communities in Saskatchewan identified as being at risk of flooding that have completed – or have access to – floodplain maps.

How the measure contributes to building resilience

Where appropriate, flood maps are an important analytical tool that enables communities to initiate more active mitigation measures to protect from costly recurrent flood damage, to reduce flood recovery time and costs, and reduce or eliminate stress and suffering of citizens. For example, flood maps that delineate the flood way and flood fringe for a number of flood frequencies (1:25, 1:100, etc.) up to the provincial regulatory standard (1:500), are an important analytical tool for enabling communities to develop zoning bylaws to restrict development from floodprone areas and to complete emergency and construction and development planning. A 1:500 flood is a term used to describe a flood event that has a one in 500, or 0.2 per cent, chance of occurring in any given year.

What is the target for this measure?

By 2030, 100 per cent of communities at risk of flooding have completed floodplain mapping where appropriate.

What is the status of this measure?

The last decade was the sustained wettest period in the province's instrumental record, punctuated with severe flooding of communities, some of which flooded repeatedly. Most communities at risk of recurrent flood damage do not have access to flood maps that could assist with completion of official community plans, direct development planning, develop emergency flood plans or guide the construction of flood protection works.

The Water Security Agency (WSA) has engaged contractors to complete desktop studies, including imagery analysis and consultations with communities to finalize the list of at-risk communities with floodplain mapping, without floodplain mapping or with mapping requiring revision. The number of communities at risk of flooding will be finalized in 2019.

Also, since 2011, the Government of Saskatchewan has offered the Emergency Flood Damage Reduction Program (EFDRP) each year to assist citizens with implementing measures to prevent or reduce damages due to imminent flooding. The program was broadened in August 2018 on an annual basis to include the Flood Damage Reduction Program (FDRP) in the latter half of a fiscal year to help communities take a proactive approach to flood risk. While the EFDRP continues to provide funding to address possible extreme flooding in the spring and early summer, the FDRP provides cost share funding for implementing proactive flood damage prevention or reduction measures for communities that face a risk of suffering recurrent flood damage in the future. The FDRP provides funding for risk assessments, permanent flood works, mitigation planning, and floodplain mapping projects.

Measure 19.

Number of communities with a standardized and ratified emergency preparedness plan

This measures the number of communities that have completed emergency preparedness plans.

How the measure contributes to building resilience

Standardized emergency preparedness plans help Saskatchewan communities respond to emergencies in a timely, efficient and coordinated manner. Emergency preparedness plans can reduce the human and financial impacts of emergencies and support recovery process. Plans enable agencies to locate resources and equipment required for emergency operations to inform citizens of dangers, how to avoid them and quickly arrange assistance when needed.

What is the target for this measure?

Target to be set in 2019.

What is the status of this measure?

The Ministry of Government Relations in collaboration with the Saskatchewan Urban Municipalities Association and the Saskatchewan Association of Rural Municipalities, has conducted a community survey to determine the number of Saskatchewan municipalities and First Nations communities that have an emergency preparedness plan. The majority of communities (238 out of 290 communities) that responded indicated that they have an emergency preparedness plan.

Number of communities invited for the survey	>700 communities
Number of communities with response	290 communities
Number of communities with an emergency preparedness plan	238 communities (82%)
Number of communities without an emergency preparedness plan	42 communities (14.5%)
Communities that do not know if they have an emergency preparedness plan	10 communities (3.5%)

Measure 20.

Number of wildfire operational pre-plans completed for “at-risk” northern communities

This measures the number of “at-risk”⁸ communities in Saskatchewan's wildland-urban interface (WUI) that have community pre-plans. These communities are rated with moderate to high risk of wildfire.

How the measure contributes to building resilience

The operational pre-plans help with wildfire suppression delivery when communities are threatened by wildfire. Wildfire risk assessment and planning also enables communities to identify hazards and prioritize efforts to address higher risks and more vulnerable areas/populations, well in advance of wildfire impacts to the area.

What is the target for this measure?

By 2030, all 86 “at-risk” communities have wildfire operational pre-plans completed.

What is the status of this measure?

The Ministry of Environment has conducted community wildfire risk assessment and has identified 86 communities in the WUI that have moderate to high risk from wildfires (classified as at-risk communities). Since 2010 and up to March 31, 2018, the ministry has completed pre-plans for 49 at-risk communities (57 per cent). The target is to complete pre-plans for all at-risk communities by 2030, with a current rate of three communities per year.

Number of communities with wildfire community risk assessment	104
Total number of communities identified as at-risk (moderate and high risk)	86
Number of communities with operational pre-plan (as of March 31, 2018)	49 (57%)
Remaining number of operational pre-plans needed	37 (43%)

⁸ Communities in the wildland-urban interface rated with moderate or high risk of wildfire. The rating is based on community wildfire risk assessments conducted by the Ministry of Environment.

Measure 21.

Saskatchewan's total Crown land with wildfire fuel management work completed

This measures wildfire mitigation projects completed in Saskatchewan's provincial forest within and adjacent to communities.

How the measure contributes to building resilience

Vegetation and wildfire fuel management projects enhance effectiveness of wildfire suppression when communities are threatened by wildfire. Vegetation management reduces the intensity of fire behaviour, providing an anchor point for suppression activities and reducing the level of wildfire risk to the community, thus increasing a community's resilience to wildfire.

What is the target for this measure?

By 2030, complete the remaining 747 hectares adjacent to communities.

What is the status of this measure?

The Saskatchewan Community Wildfire Risk Assessment identifies all Crown land locations requiring fuel management projects, as well as priority for project completion. Between 2000 and March 31, 2018, the Ministry of Environment completed fuel management for 800 hectares of Crown land in the provincial forest.

Example of a fuel management project at Candle Lake



Forest view of project **before** thinning

Forest view of project **after** thinning



2000-2018

800 ha of Crown Land with fuel management (2000-March 2018)



2018-2030

Fuel management for additional **747 ha** Crown Land completed by 2030



2030 Target

1,547 ha of Crown Land with fuel management by 2030

In partnership with First Nations communities and with funding from the Government of Canada, the Ministry of Environment's Wildfire Mitigation Program has completed 79 fuel management projects on First Nations lands. Considering the success of this mitigation program in First Nations communities, this is now used as template for future planning of Canada-wide mitigation programs funded by Indigenous Service Canada - First Nations Emergency Management Program.



Human Well-Being

Measure 22.

Number of communities reliant on water supplies vulnerable to drought

This measures the number of municipalities that may experience water supply shortages due to low precipitation in the previous fall and winter.

How the measure contributes to building resilience

Identifying the communities within the southern half of the province that may experience water supply shortages allows the province to highlight areas of concern and to coordinate with municipalities to see what their plans are should drought conditions persist. Coupled with this measure are planned activities to help municipalities understand drought susceptibility, plan and eventually prepare by securing alternative source supplies.

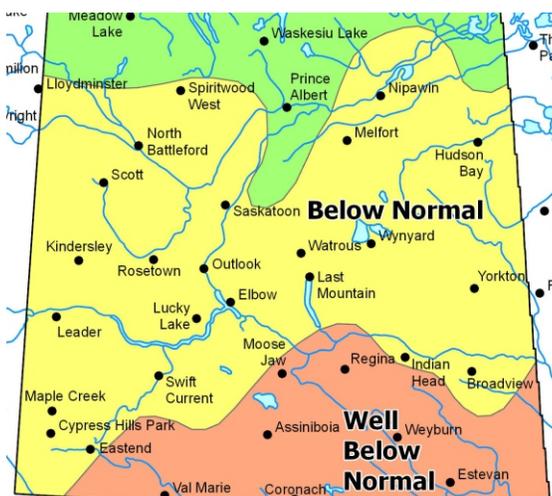
What is the target for this measure?

Decrease the number of communities reliant on water supplies vulnerable to drought.

What is the status of this measure?

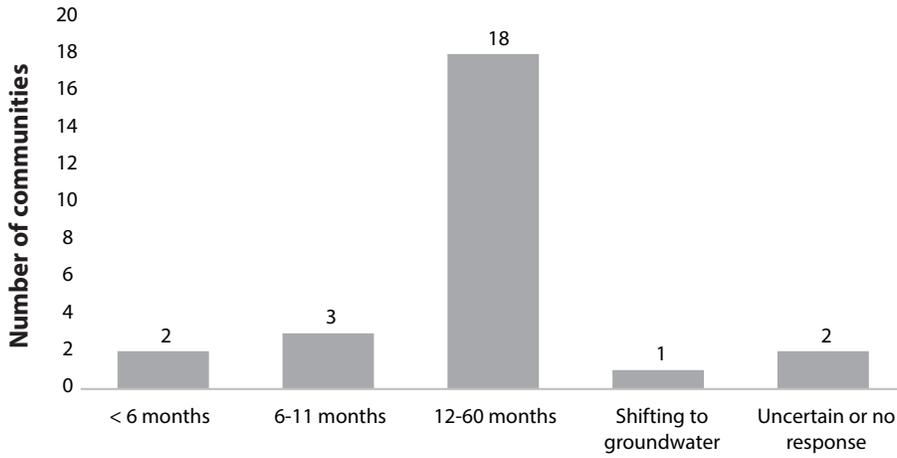
Every year, the Water Security Agency produces a spring runoff potential map, showing areas that have received below normal precipitation throughout the previous fall and winter. Any community with a surface water source in the regions identified as having 'below normal' or 'well below normal' precipitation over that time period is evaluated for its capacity to meet projected water demand. In future years, WSA's examination of drought susceptibility will be expanded to cover the entire southern half of the province.

In spring 2018, all of the communities shown in the spring runoff potential map (figure below) were assessed. There were 26 communities identified to have water supplies vulnerable to drought to some degree. The communities were contacted and asked how long they predict their reservoir would last with no additional precipitation and if they predicted any water quality concerns. Out of 26 communities, six predicted that their water supply would last for less than a year and the majority have a water supply that could last for at least a year. More than half (15) of the communities have a backup supply. Nineteen communities reported a water conservation plan that can be enacted if needed.



In spring 2018, 26 of the communities shown were vulnerable to drought due to receiving 'below normal' to 'well below normal' precipitation.

Duration of water supply for communities vulnerable to drought*



*Vulnerability to drought is based on spring runoff potential and the nature of the water source for the community. Communities that received below normal precipitation throughout the previous fall and winter are considered vulnerable to drought.

Number of communities with below normal and well-below normal precipitation **26**

Number of communities with water conservation plan **19** (73%)

Number of communities with back up water supply **15** (58%)

Source: Spring run-off potential map is produced by the Water Security Agency (WSA). Information on water supply is based on community self-assessments. WSA staff conducted phone interviews with 26 communities.

Measure 23.

Average municipal water consumption per capita and total municipal water consumption

The per capita use of water is generally considered to be a measure of water use efficiency. When combined with per capita use, total use can provide an indication of how conservation efforts may support growth even under resource constraints. For example, where per capita use declines, while the total use remains constant, water is made available for growth (population, commercial, industrial, etc.) without increasing the overall consumption.

How the measure contributes to building resilience

Declining trends in per capita use indicate gains in efficiency, often associated with conservation programs, and can lead to overall improvement in the sustainability of a water source and of the infrastructure used to provide water to users. Using less water overall will help in the reduction of emissions as energy savings are realized from having to pump and treat less water. This may also buffer against impacts to water resources where climate change may affect the reliability (quality or quantity) of municipal water sources.

What is the target for this measure?

Increase water use efficiency shown as a decrease in per capita municipal water consumption.

What is the status of this measure?

In the last 30 years, the total community water consumption showed general stability, but with a general decrease for usage rates (litre per person per day). In 2017, Saskatchewan residents used an average of 364 litres per person daily, and total municipal water consumption was about 138 million cubic metres.

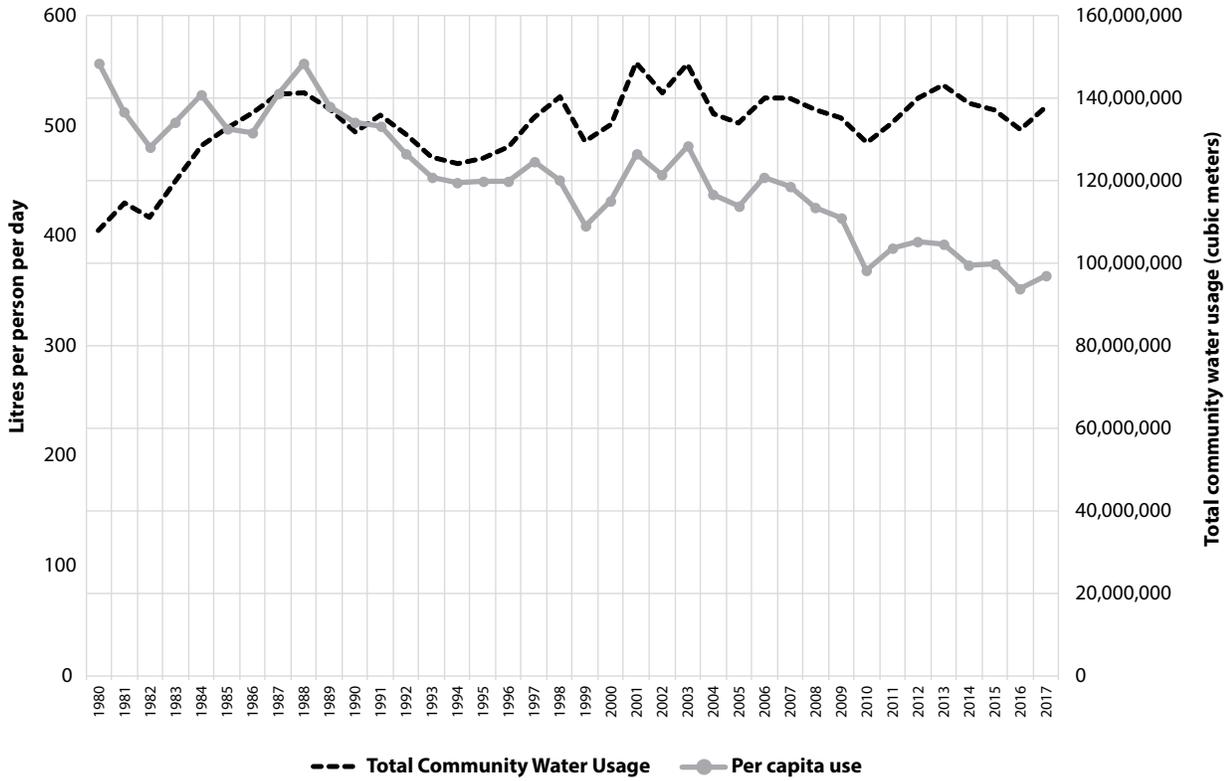
The annual variability in the water consumption rate is likely attributed to the natural annual climatic variability. The longer term trend in declining per capita use is the result of technological and behavioural influences on water use.

Usage rates in smaller communities are more variable, with the smallest communities trending to increasing usage. This is likely due to improvement in the security of their water supplies, or the transition to other water treatment technologies with higher raw water requirements (e.g., reverse osmosis). Small communities are also more likely to see increases in per capita use as a result of declining population as the water used for municipal services and commercial operations may not decline but will be spread over a smaller population base.

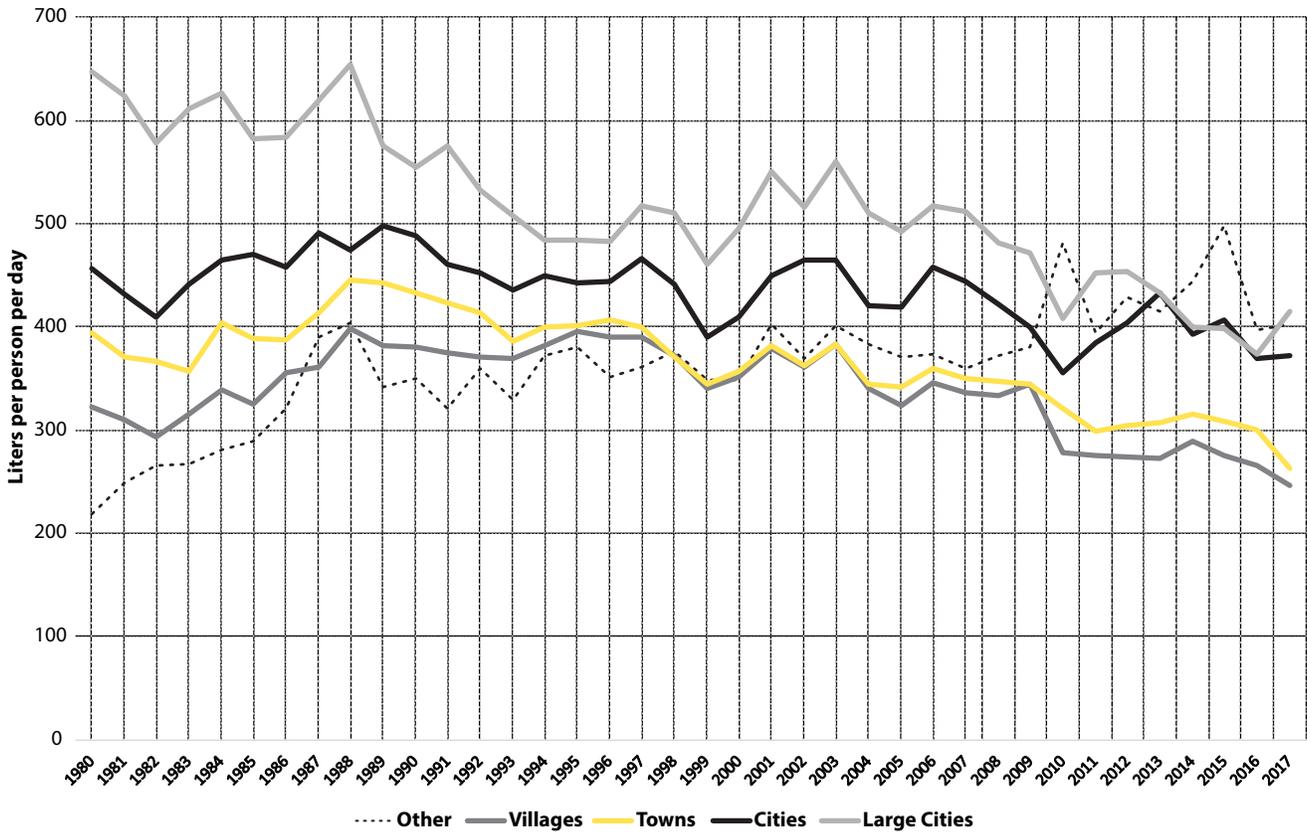
Larger communities show downward trends in per-capita usage, which could be due to improvements in water delivery infrastructure and a higher proportion of new construction (e.g., new water mains and high efficiency plumbing fixtures) in these communities.

From 2005 to 2018, the Water Security Agency promoted responsible water use through public education, partnerships and a variety of programs. Although now completed, the previous Provincial Toilet Replacement Rebate Program is one example of how water conservation has been promoted within the province. Water rates set by waterworks owners that recognize the true and full cost of system design, construction, operation and maintenance also promotes water conservation.

Community water usage and rates, 1980 - 2017



Water usage by population size



Community population sizes:

Large Cities >50,000; **Cities** <50,000 but >5,000; **Towns** <5,000 but >500; **Villages** <500 but >100; and, **Other** <100 (e.g., villages, hamlets, unincorporated areas, rural pipeline associations, etc.)

Source: Annual water use is self-reported to WSA by municipalities with licensed distribution systems. Population numbers are taken primarily from Ministry of Health, and secondarily from Census Canada data.

Measure 24.

Number of communities (with suitable habitat) where active surveillance for West Nile Virus and other mosquito-borne diseases occurs

This measures Saskatchewan's monitoring capacity for West Nile Virus and other mosquito-borne diseases.

How the measure contributes to building resilience

Warmer temperatures may increase the survival of insect vectors – those that transmit illnesses to humans. This can result in increased incidence of vector-borne illnesses such as West Nile Virus. Establishing surveillance sites helps the province monitor the risks of these illnesses, which allows the provision of better information to the public and for adaptive measures to control the population of insect vectors.

What is the target for this measure?

By 2020, increase to 20 communities.

What is the status of this measure?

West Nile Virus is an annual risk for Saskatchewan residents between June and September. The risk is highest in the southern portions of the Prairie provinces. However, the West Nile Virus risk may be increased in more northerly agricultural-forested transition areas during very warm years. The Ministry of Health provides weekly risk assessments, website updates and West Nile Virus prevention messages between June and September.

Mosquito surveillance provides the most direct indicator of the imminent risk for human infection. Rising infection rates and proportion of positive pools can provide an indicator of the severity or magnitude of a West Nile Virus outbreak. Permanent mosquito traps have been set up in 16 communities throughout the agricultural portion of southern Saskatchewan to monitor *Culex tarsalis* – this is the mosquito that carries West Nile Virus. An increase from 16 to 18 communities is planned by 2019.

Surveillance sites as of 2018: **16**

Remaining surveillance
to be established
by 2020: **4**

Measure 25.

Number of active surveys at suitable habitat sites for Lyme disease and other tick-borne diseases

This measures the number of sites in Saskatchewan with active surveillance for tick-borne diseases. Sites include parks, recreation and historic sites, ecological reserves where black-legged ticks have been collected by passive surveillance, and sites of most likely exposure for human or domestic animal Lyme disease cases.

How the measure contributes to building resilience

Monitoring work informs risk messaging to the public and provide details regarding the encroachment of ticks into environments with supportive climates. Information obtained from monitoring also informs adaptive measures to control tick populations.

What is the target for this measure?

By 2020, increase to 60 survey sample sites.

What is the status of this measure?

Active surveillance for the black-legged tick (*Ixodes scapularis*) has been ongoing in Saskatchewan since 2009. The black-legged tick is the primary carrier for the agents that cause Lyme disease and a number of other tick-borne diseases in Canada and the U.S. The active tick surveillance program aims to assess the risk of Lyme disease in the province by checking for black-legged ticks and determining if they have become established in any areas of the province, and determining what fraction of them carry the bacteria responsible for Lyme disease or other tick-borne diseases. As of 2018, there are 46 survey sample sites in the province for tick-borne diseases. In 2019, an increase from 46 to 53 sites is planned.

Active survey sites as of 2018: **46**

Additional active survey sites by 2020: **14**

Glossary

Absorptive capacity: ability of a system to prepare for, mitigate or recover from climate change impacts using predetermined coping responses in order to preserve and restore essential basic structures and functions (e.g., human life, housing, productive assets). It refers to the capacity to 'bounce back' from specific, known shocks and short-term stresses.

Adaptation: in human systems, this refers to the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities. In natural systems, this refers to the process of adjustment to actual climate and its effects; human intervention may facilitate adjustment to expected climate.

Adaptive capacity: ability of a system to adjust, modify or change its characteristics and actions in order to better respond to existing and anticipated future climatic shocks and stresses.

At-risk communities: communities in Saskatchewan's wildland-urban interface (WUI) rated to have moderate to high risks of wildfires, based on the Saskatchewan Ministry of Environment's Community Wildfire Risk Assessment.

Climate: the average of weather conditions over a long period of time (decades and longer).

Climate change: a change in the state of the climate that can be identified by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer. Climate change may be due to

natural internal processes or external forces, or to persistent anthropogenic changes in the composition of the atmosphere or in land use.

Community preparedness: refers to the resilience of Saskatchewan communities to climate change impacts. It includes provision of necessary information to the public, responding and recovering from extreme weather events, understanding risks of flood, drought and wildfires, establishing emergency preparedness/management plans, and adopting appropriate standards and practices to reduce risks.

Carbon dioxide equivalent (CO₂e): is a term for describing different greenhouse gases in a common unit. CO₂e signifies the amount of CO₂ which would have the equivalent global warming impact. A quantity of GHG can be expressed as CO₂e by multiplying the amount of the GHG by its global warming potential (GWP). For example, if 1 kg of methane (CH₄) is emitted, this can be expressed as 25 kg of CO₂e (1 kg CH₄ * 25 = 25 kg CO₂e). Methane's GWP is 25.

Soil organic matter (SOM): is any material produced originally by living organisms (plant or animal) that is returned to the soil and goes through the decomposition process. SOM mitigates climate change by decreasing atmospheric carbon dioxide. Thus, increasing SOM in an area reduces net carbon dioxide emissions.

Demand side management (DSM): refers to SaskPower's portfolio of energy efficiency, conservation, and load management programs that help Saskatchewan residents save power, money and help protect the environment.

Economic sustainability: refers to the ability to remain competitive in a global marketplace and encourage investment, while reducing greenhouse gas emissions. This includes ensuring businesses and industries enjoy the support they need to develop marketable innovations to address climate change.

Human well-being: refers to the resilience of Saskatchewan residents to climate change impacts. It includes ensuring residents are healthy and have stable jobs to provide for their needs and for their families.

Mitigation (of climate change): a human intervention to reduce the sources or enhance the sinks of greenhouse gases.

Natural systems: refers to maintaining the integrity of land, water and forests in Saskatchewan. Management of natural systems determines not only the ecosystem's resilience to climate change but also the ecological goods and services derived from them (e.g., food, fuel, water, air purification, carbon storage, and maintenance of wildlife habitat). Natural systems also inherently support mitigation through sequestration of carbon in soils, forests and wetlands.

4R nutrient stewardship: is a nutrient management plan that supports effective and efficient application of fertilizer. The 4R nutrient stewardship incorporates the right fertilizer source at the right rate, at the right time and in the right place, to achieve cropping system goals. It helps organize decisions towards achieving high production, increased profitability, improved environmental protection and improved sustainability.

Land under permanent cover: land cultivated with long-term crops that do not have to be replanted for several years, land under trees and shrubs producing flowers, and nurseries (except those of forest trees, which should be classified under Forestry). This includes native prairie, tame or seeded pasture, and tame hay.

Physical infrastructure: refers to the production and movement of goods, and the management of the built environment. It includes maintaining reliable transportation and utility services, and water resource management. This also means increasing capacity for renewable energy generation and building more energy-efficient buildings.

Realized net income: is the amount by which the total cash gains from an investment exceeds the total losses from the investment. Realized net income is the net cash income minus (-) depreciation, plus (+) income in kind.

Resilience: is the ability to cope with, adapt to, and recover from stress and change.

Summer fallow: involves keeping normally cultivated land free of vegetation throughout one growing season by cultivating and/or applying chemicals to destroy weeds, insects and soil-borne diseases and allow a buildup of soil moisture reserves for the next crop year.

Transformative capacity: ability of a system to holistically and fundamentally change its characteristics and actions when the existing conditions become untenable in the face of climatic shocks and stresses. It goes beyond incremental adjustments, but rather changes the primary systems and structures, and assumptions to substantially reduce vulnerability.

Weather: the state of the atmosphere at a given time, which changes with the passing of hours, days and seasons.

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More info?

More information about the Climate Resilience Measurement Framework and *Prairie Resilience: A Made-in-Saskatchewan Climate Change Strategy* is available at saskatchewan.ca/climate-change.

