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**National Farmers Union submission to the
Senate Agriculture and Forestry Committee study:**

Potential Impact of the effects of Climate Change on the Agriculture, Agri-Food and Forestry Sectors

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Introduction:

The National Farmers Union (NFU) is Canada's largest voluntary direct membership farm organization representing family farmers from across the country in all sectors of agriculture. We believe that family farms should be the primary food producers in Canada. We work to promote a food system that is built on a foundation of financially viable family farms that produce high quality, healthy, safe food; encourage environmentally-sensitive practices that will protect our soil, water, biodiversity and other natural resources; and promote social and economic justice for food producers and all citizens.

Climate change – Current understanding:

The 2016 *United Nations Emissions Gap Report* recently informed the world that even if all voluntary Greenhouse Gas (GHG) emissions commitments to date are honored, the Earth's temperature will go up 3.2 degrees by 2030. Because of the location of the Canadian prairies, where the majority of Canada's farmland is located, temperatures there could rise by as much as 6.4 degrees. If this happens, excessive heat combined with too much precipitation and/or periods of drought will render tens of millions of acres of farmland unsuitable for annual cereal and oilseed crop production. While the number of frost-free days at the northern edge of agricultural areas will increase, northern soils are not suitable for farming. Meanwhile, southern areas will become hotter, stressing crops and making it easier for disease and insect pests to survive and spread. Rising global temperatures will also cause problems with physical infrastructure, as well as negative social effects, such as strained trading relationships, population displacement and political instability, all of which will make it harder for agriculture to succeed in Canada. It is imperative that Canada takes action to reduce total GHG emissions dramatically and quickly: the multiple, cascading impacts of runaway climate change are beyond what we can adapt to.

Our first priority needs to be a major reduction in emissions to avoid disaster. To do this Canada needs to implement measures that help farmers adapt to climate change while they reduce emissions. This is how we can make agriculture an important part of the solution.

The United Nations 2015 Paris Agreement provides direction regarding GHG reductions in relation to agriculture. These include implementing adaptation and mitigation in a manner that does not threaten food production; setting economy-wide emissions targets; recognizing the importance of integrated, holistic and balanced non-market approaches to mitigation and adaptation; recognizing that the greater the mitigation, the lower the requirements for adaptation; adaptation action should include traditional knowledge and indigenous peoples' knowledge as well as Western science; building the resilience of socioeconomic and ecological systems; minimizing losses and damage due to acute and slow onset impacts of climate change; and noting countries' leadership includes a significant role of public funds in mobilizing climate action strategies.

In Paris, Canada committed to reducing GHG emissions to do our part to keep global temperature increase below 2.0 degrees Celsius. In light of the *UN Emissions Gaps Report*, our efforts will need to be even more ambitious than was understood in 2015.

Farmers and the Climate

Farmers are vulnerable to climate change impacts. While many current practices contribute to GHG problems, farmers can become a bigger part of the solution by adopting climate-friendly methods. Farmers are among those most directly affected by climate instability. We depend on getting the right amounts of sun and rain at the right times. As GHGs rise, the atmosphere retains more heat and can hold more moisture. This changes the global water cycle. More of our precipitation comes in intense storms. A hotter atmosphere drives stronger winds so tornados and plough winds become common. Changing upper atmosphere temperatures alter jet stream patterns, causing droughts in some areas and long periods of cool cloudy weather in others. Crop yields, soil and water quality, livestock health, farm building repairs, maintenance of rural infrastructure are all affected by the new and uncertain reality.

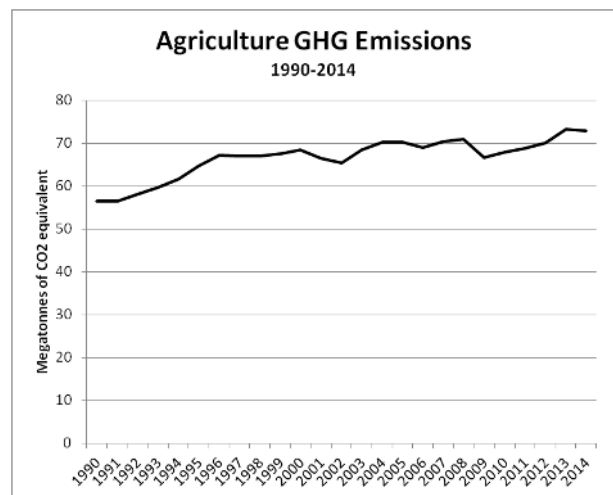
Adaptability and Resilience of Agriculture

While agriculture is responsible for significant GHGs, emission intensity varies among different farm types and methods of production. To avoid double-counting, Canada’s national GHG inventory assigns emissions from different sources to the sector of the economy that uses each source the most. For example, all emissions from burning diesel fuel are allocated to transportation, which puts farm tractor fuel emissions under “transportation” instead of agriculture. Only emissions due to animal production, manure management and agricultural soils are counted as “agricultural”. Thus, policy-makers may focus mostly on these emissions sources even though the farm chemicals, fertilizers, electricity and transportation that Canadian farms use are also significant agricultural sources of GHG emissions. Reducing these inputs or replacing them with lower GHG alternatives would reduce agriculture’s actual contribution to climate change.

Mitigation measures -- ways to reduce emissions and ways to remove carbon from the atmosphere -- should also promote adaptation and resilience. Redundancy and diversity are the keys to resilience. If farmers produce a range of products and incorporate natural buffers into the farm landscape they will be better able to survive unpredictable climatic conditions, extreme weather events and erratic market conditions. Farmers manage millions of acres of land in Canada, and with the right support, can make a huge contribution by building soil organic carbon.

Canada will have the best results by:

- Minimizing fossil-fuel intensive inputs, which will reduce GHGs emitted during production
- Maximizing crop plants’ ability to work with soil micro-organisms to convert atmospheric carbon into soil organic carbon, and
- Reducing business risk by increasing on-farm biodiversity: complementary revenue streams increase the chances that some, if not all, farm enterprises will succeed each year in the spite of unpredictable weather



Source: Environment and Climate Change Canada (2016) *National Inventory Report 1990–2014: Greenhouse Gas Sources and Sinks in Canada*.

conditions, and

- Promoting transportation, storage and processing infrastructure designed to support production for local and regional markets, with centralized facilities for export as a secondary priority.

Many Canadian farmers already use practices that reduce their GHG emissions and they are seeing good results. Intercropping (growing two or more crops in the same field at the same time), low-input crop production, the use of green cover crops before and after cash crops, planned intensive grazing of livestock, pastured poultry and pigs, as well as certified organic production all provide multiple economic, social and ecological benefits. These practices also rebuild soil organic carbon, which improves soil structure. Soil with good structure holds water better during both droughts and floods, which helps the farm keep producing under erratic climate conditions. Low-emission production methods that build soil carbon are triple wins: they reduce the GHGs needed to produce food, they move carbon from the atmosphere into the soil and they increase farms' resilience in the face of increased uncertainty.

Food system transformation:

Climate adaptation for agriculture also requires off-farm action. Today's food system uses 13.3 calories of fossil fuel energy to produce 1 calorie of food energy. Farmers can improve this ratio by reducing their reliance on fossil fuel for food production, but their efforts must go hand in hand with changes in the transportation, distribution, storage and consumption of food.

Railways are the most energy-efficient way to move bulk commodities, but rail line abandonment and consolidation means farmers truck grain longer distances than ever. Today, most of Canada's fruit and vegetables are imported, travelling thousands of kilometers by truck and sometimes by air. Even Canadian-grown produce goes to a few large distribution depots then shipped back to retail outlets, putting on hundreds of unnecessary kilometers.

Food waste is also a significant problem. Various studies estimate 40% of food produced is wasted. In Canada, most waste occurs after food has left the farm. This wasted food still required energy to produce, process and transport. Food waste decays in garbage dumps where it gives off methane, a GHG 84 times more powerful than CO₂ in the short term.

Export-oriented agriculture/trade policies are also connected to the increase in emissions from agriculture. Farmers are price-takers, often forced to accept prices below the cost of production due to inequitable conditions of international trade. Currency exchange fluctuations, market gluts due to other countries' policies, and lower labour, food quality and environmental standards are beyond the control of Canada, much less the individual farmer. To survive, many farmers pursue a strategy of more acres and higher yields, applying more synthetic fertilizers and other energy-intensive inputs. As farmland prices climb due to various factors, more treed land is cleared, marginal land is cultivated and annual cash crops are planted on land formerly in hay and pasture land to pay rents. Policy-makers need to recognize the connection between economic policies and ecological impacts. When farmers can count on receiving a fair return for their efforts they can better manage their farms for sustainability.

Climate change is a societal problem that has developed over many decades; consequently, society as a whole needs to help individuals make the changes needed now for our common benefit in future. We cannot rely on market mechanisms alone. There is a legitimate, indeed urgent and necessary role for public funding to be marshaled to transform our food system.

All agriculture-related policies and programs should be run through a “climate change filter” to evaluate their downstream effects on GHG emissions, fossil fuel use, and the resilience of both farming communities and natural ecosystems. With a planned, yet rapid, downsizing of our GHG footprint we will improve Canada’s capacity to continue reliable production while safeguarding the livelihoods of our farmers.

Implications of carbon pricing for farmers and agriculture

Under the Paris Agreement all countries, including Canada, committed to implement a carbon pricing regime. In October 2015 the federal government announced its plan for each province to implement a revenue-neutral carbon pricing mechanism by 2018.

Carbon pricing is an incremental approach to GHG reduction. With prices starting low and increasing gradually, putting a price on carbon is not enough to stop global temperatures from rising more than 2 degrees Celsius. If Canada does not implement additional GHG reduction measures beyond carbon pricing, such as regulation and public funding of adaptation and mitigation measures, climate chaos will accelerate and farmers will experience increasingly serious threats to their livelihoods.

The two most common approaches to carbon pricing are “cap and trade” and a “carbon tax”. Under cap and trade systems, farms do not have their emissions capped, however if offset markets are part of the cap and trade regime, these can have implications for farmers. Jurisdictions may allow offset projects that provide for payments to farmers for using methods that increase soil carbon. However, soil sequestration regimes are time-limited: carbon-depleted soils’ ability to absorb carbon decreases as the soils approach their equilibrium level. Eventually, the soil is “full” of carbon and cannot absorb any more. If a farmer’s practices cause soil carbon to be released back into the atmosphere he or she could be financially liable to repay any offset benefits associated with the land. Offset projects may promote adopting new methods that reduce nitrous oxide and methane emissions from farmland and/or livestock. Offset projects could also promote land use change from cultivation to permanent forest.

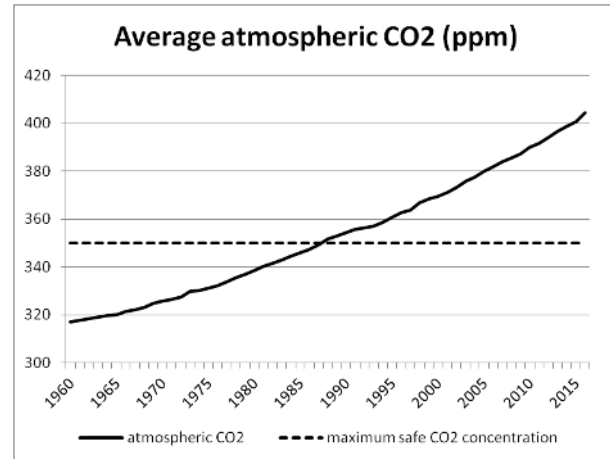
Offset markets could also have unintended consequences. Offset protocols may promote precision farming, but farmers may not be comfortable with the surveillance, ownership, use and management of data collected by computerized implements. Offset markets would inhibit innovation because once program requirements are defined, compliance would standardize the farming practices of participants. Carbon offset markets would increase demand for farmland for carbon sequestration projects and for wind and solar energy installations. Increased demand by wealthy emitters seeking offsets would raise land prices, making farmland less affordable, especially for young farmers.

Unlike cap and trade, carbon tax regimes apply to all buyers and sellers including farmers. A carbon tax regime would promote on-farm energy efficiency and low GHG practices – but only if lower GHG options for needed products or services are available. In agriculture, the market power of large input companies, railways, oil companies, grain companies, food processors and retailers far outweighs the power of individual farmers. These entities would be able to pass their carbon tax costs on to farmers in the form of higher input prices, higher freight rates and lower commodity prices. Railways might offload carbon tax costs by closing smaller delivery points. Even though rail transportation is more energy efficient, farmers may end up spending more money and burning more fuel trucking longer distances to deliver their grain as a result. Providing for additional producer car loading facilities and supporting short-line railways would help farmers reduce GHGs embodied in grain transportation.

Farmers could save money by adopting energy efficient practices, using renewable energy sources, investing in energy conservation and switching to lower-input production practices. If high enough, a carbon tax, would

encourage inventors and innovators to develop new kinds of farm machinery that allows farms to have smaller carbon footprints. A high carbon tax would also encourage farmers to hire more workers as an alternative to buying machinery or inputs.

A revenue-neutral carbon tax regime could be designed to compensate for farmers' lack of market power by providing a rebate based on a percentage of their farm's gross margin or acreage (adjusted for production system). Farmers who reduce their carbon footprint would pay less total carbon tax while receiving the same rebate as other farmers of equivalent size. The difference between carbon tax paid and the rebate amount would make low-emission farming more profitable than high-emission production.



Source: National Oceanic and Atmospheric Administration - Earth System Research Laboratory

The global emissions rate determines how fast the atmosphere fills with GHGs. It is quick and easy to add GHGs to the atmosphere, but the biological and chemical processes that remove GHGs are slow and depend on complex interactions among many factors. This differential means it is increasingly urgent to implement strong emission-reduction measures. Benchmarks, indicators and evaluation processes need to be built into carbon pricing regimes. It is urgent to act now, and it is important to make sure that if we start seeing unintended consequences these can be corrected.

Canada needs to help farmers adapt to the reality of climate change impacts with measures that increase resiliency of farms while reducing farm and food system-wide emissions, providing fair livelihoods to farmers and a future for the next generation of farmers, and securing Canada's ability to sustainably provide food for our residents and international customers.

Role of federal, provincial and territorial governments:

- Apply a GHG emissions filter to all government programs (such as Agriculture Policy Framework) and ensure there are no perverse subsidies to emission-intensive agriculture.
- Fund research and programs to support low-emission production methods that build soil carbon.
- Launch dedicated a public extension service to help farmers learn new low-GHG farming practices and support practical training and education in climate-friendly agriculture for new farmers and young people who want to become farmers.
- Provide assistance for appropriate investments to promote on-farm diversification.
- Help Canadian consumers waste less food and to compost unavoidable food waste in a manner that allows it to be returned to the land for soil improvement.
- Ensure full public funding for plant breeding so that varieties are developed for low-emission farming and that these varieties are available to farmers free of royalty payments.
- Re-establish and expand the PFRA public pasture program on crown land and via the acquisition of additional lands.
- Regulate railways to reduce distance between delivery points and ensure rail is the most affordable method of shipping bulk commodities; support the establishment of additional producer car loading sites

- Implement flood and drought control measures, reverse excessive ditching that floods downstream land, conserve wetlands to slow water movement and recharge groundwater.
- Use Canada-wide GHG emissions as the Key Performance Indicator (KPIs) to help policy-makers adjust operations to accomplish ambitious GHG-reduction goals in a holistic manner. The goal is to reduce atmospheric carbon to 350 parts per million (ppm) and prevent catastrophic climate instability.

Respectfully submitted by
The National Farmers Union
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