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Submission to the Public Comment Period for the Federal Government's

Draft Greenhouse Gas Offset Credit System Regulations

National Farmers Union

May 4, 2021

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This brief technical submission to Environment and Climate Change Canada (ECCC) should be read in conjunction with the NFU's longer document, *A Critical Analysis of Greenhouse Gas Offset Schemes and Draft Offset Credit System Regulations*, which provides background, context, and citations.

In response to the draft Regulations for the Federal Government's proposed Greenhouse Gas Offset Credit System[1] published March 6th, 2021, the NFU recommends:

1. For at least the next two decades, shelve offset credit systems and emissions trading (though not the carbon levy) and instead focus on *actually reducing fossil fuel combustion and emissions*. According to the Oxford Principles[2] and other expert analyses, offset systems should not be first-line measures. Instead, offsets should only be deployed after we achieve deep reductions in actual greenhouse gas (GHG) emissions. (See section 6 in *A Critical Analysis of Greenhouse Gas Offset Schemes and Draft Offset Credit System Regulations*.)

2. Do not use projects or credits to offset *fossil fuel* emissions—which should instead be rapidly *reduced*, and can be, using mature and affordable technologies. Rather, use protocols, projects, and credits solely to offset truly irreducible portions of emissions (see section 6).

3. Retain a strong commitment to the principle of additionality.

4. Retain rigorous, long-term requirements for monitoring and reporting.

5. Do not allow cross-border credit trading or out-of-country offset projects.

6. Acknowledge that soil carbon offsets are essentially unworkable, for these reasons:
    a. Soil sequestration is not permanent, especially in a warming climate. In contrast, fossil carbon releases are essentially permanent and thus cannot be equated to, or offset by, temporary sequestration in actively cycling biological carbon pools (see section 3).
    b. Soil sequestration potential is too limited to offset fossil fuel emissions (section 2).
    c. Requirements for 100 to 200 years of monitoring and reporting are unrealistic; few farming practices, companies, monitoring programs, or laws last that long. Moreover, such requirements may create long-term unlimited liabilities for farmers, contractual entanglements, land title encumbrances, and other forms of lock-in and risk (section 3).

7. Provide programs and financial support to help farmers to reduce actual emissions from agriculture so we can make our rightful contribution to overall reductions. Farmers who

1 Government of Canada, "Greenhouse Gas Offset Credit System Regulations (Canada)," in Canada Gazette, Part I, vol. 155, 2021, 966–1018, https://canadagazette.gc.ca/rp-pr/p1/2021/2021-03-06/pdf/g1-15510.pdf.

2 Myles Allen et al., "The Oxford Principles for Net Zero Aligned Carbon Offsetting" (Oxford: University of Oxford, 2020).

grasp climate change realities want to reduce their own emissions, not offset excess or continuing emissions of others.

8. Work with farmers and Agriculture and Agri-Food Canada (AAFC) to develop publicly funded programs to support and incentivize soil enhancement and protection (section 8).

About the National Farmers Union.

Founded in 1969 by an Act of the Federal Parliament, the NFU represents thousands of farmers in every Canadian province and two territories. NFU member farms range from among the largest to the smallest, employ a wide range of production practices, and produce nearly every imaginable farm product. The NFU works to advance and implement policy solutions that lead to a more stable, prosperous, just, sustainable, and nutritious food system for all Canadians.

Respectfully submitted by the National Farmers Union, May 4th, 2021

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A Critical Analysis of

Greenhouse Gas Offset Schemes and Canada's Draft Offset Credit System Regulations

National Farmers Union

May 4, 2021

Executive Summary

In March, the federal government published in the *Canadian Gazette* draft Regulations for its proposed Greenhouse Gas Offset Credit System.[3] In parallel, the government is developing the actual offset protocols—the rules that will govern various types of offset projects. A priority is the Enhanced Soil Organic Carbon protocol.[4] The following analysis focuses on the draft Regulations as they may pertain to a Soil Carbon protocol, but also on the Regulations and offset schemes more generally as they may apply to a broad range of future protocol types. This document provides background and context for the NFU's *Submission to the Public Comment Period for the Federal Government's Draft Greenhouse Gas Offset Credit System Regulations* sent to Environment and Climate Change Canada (ECCC) on May 4th, 2021.

The thesis of this critical analysis has three parts:

i. Offset systems and related emissions-trading schemes are the wrong tools for reducing emissions generally;

ii. Offset protocols that depend on soil carbon sequestration are especially problematic and should not be pursued; and

iii. Building up soil carbon and organic matter levels and protecting and restoring soils are crucial tasks but using payments from large corporate emitters as a means to incentivize on-farm best practices is the wrong mechanism. Governments should instead create comprehensive, publicly funded awareness and incentive programs to encourage farmers to enhance and safeguard Canada's soils.

What are offsets?

Offset protocols and credits are financial and regulatory instruments implemented by governments, standards bodies, and third-party verifiers. Protocols and credits are intended to link ongoing or excessive greenhouse gas (GHG) emissions in one place with projects that create increased or "additional" efforts to reduce or remove emissions in another. Governments and third-party verifiers certify offset credits under defined protocols, project proponents then sells the credits, and the credits can be traded in carbon markets until the point when a regulated, large-emitter buys and "retires" them. The retirement of the credit by the buyer is seen as regulatory compliance—the buyer's continued or excess emissions have been "offset" by increased or accelerated reductions or removals by other parties.

Examples of projects that could generate offset credits include accelerated and additional (i.e., above the projected business-as-usual baseline/trendline) capture of methane from landfills, accelerated tree planting, or direct air capture of GHGs. Examples of offset credit buyers include regulated emitters such as oil refineries, nitrogen fertilizer factories, auto plants, and tar sands extraction operations.

3 Government of Canada, "Greenhouse Gas Offset Credit System Regulations (Canada)."

4 Environment and Climate Change Canada, "Federal Greenhouse Gas Offset System: Backgrounder," News release backgrounder, March 5, 2021, https://www.canada.ca/en/environment-climate-change/news/2021/03/federal-greenhouse-gas-offset-system.html.

It is crucial to create publicly funded government programs to incentive and otherwise support farmers to improve soil health and to increase levels of soil organic matter and carbon. But it is wrong to see soil-building activities as somehow offsetting GHG emissions in other sectors or substituting for actual reductions in fossil fuel use and emissions. This is true for several reasons:

1. **Impermanence.** Carbon released from deep geological formations into the atmosphere by fossil fuel combustion is essentially permanent, with the resulting carbon dioxide remaining in the atmosphere/biosphere for many hundreds of years. In contrast, carbon sequestered just inches below the soil surface in biologically cycling carbon pools is not permanently stored and can be rapidly released by changes in farming practices or land use or even by rising temperatures.

2. **Lack of capacity.** There is no capacity in soils to mop up the half-trillion tonnes of carbon atoms released by fossil fuel combustion. Best possible cropping and grazing practices can begin to restore soil carbon to pre-agricultural levels and thus return to farm fields a quantity of carbon nearly equal to that released from soils by past farming practices, but there is no capacity within agricultural soils to mop up the carbon torrent from past, present, or future fossil-fuel combustion or other GHG sources. Positive actions to restore previously released soil carbon back to agricultural fields can in no way *offset* continued fossil fuel emissions, nor can these on-farm measures substitute for *rapid reductions* in *actual emissions* from *all sectors*.

3. **Unworkable century-plus monitoring.** In an attempt to deal with the impermanence of soil carbon, the government's draft Regulations for its proposed Offset Credit System propose monitoring and reporting periods of 100 to 200 years. This is ridiculous. Farms, offset project proponent corporations, and legislatively aligned governments will not last that long. Over such long periods, the framework legislation, protocols, regulatory enforcement, projects, proponents, monitoring efforts, and risk management plans and efforts will predictably fade away.

4. **Farmer lock-in.** The hundred-year-plus monitoring and reporting period required by the draft Regulations may lock farmers into specific farming practices into the 2120s or beyond. Also, farmers may become responsible to replace credits if carbon is released—creating the risk of long-term, unlimited liability. Finally, there is the issue of possible encumbrances on land titles and restrictions on land use changes and resulting reductions in future land values—reductions in land values that may far exceed offset credit income.

5. **Farmer complicity.** In offset markets, when farmers take money for doing the right thing, they are receiving those payments so that others can continue doing the wrong thing—so that high-emission fossil fuel companies, utilities, fertilizer makers, and others can delay actions and minimize their investments in reducing emissions. GHG offset protocols, emissions trading, carbon markets, and similar schemes are designed to enable the delay of actual emission reductions by the largest emitters (see quotes at the end of the next section). Thus, offset projects and credit payments can make farmers accomplices in schemes that greenlight or greenwash continued high rates of emissions that endanger humanity's future.

Soil-based offset protocols are unworkable; offset payments cannot form a primary means of incentivizing soil protection and restoration. Similarly, offset credits and emission trading systems should not be a primary or first-line strategy for reducing emissions.

1. Context: A risk of economic, biospheric, and civilizational collapse

In year 33 of the climate crisis era,[5] humanity is on track for 3.2 degrees Celsius of warming[6]—far above the 2-degrees-C line that marks extreme danger. Thus, we are on track to kill hundreds of millions of people, maim economies, scorch ecosystems, and plunge humanity into an agonizing perma-catastrophe from which it may never emerge. This is the most severe crisis ever, and among the most severe imaginable. We are sleepwalking into a woodchipper.

We Canadians, our lifestyles, our economy, and our high-emission corporations are major contributors to the catastrophe. Canadians produce nearly the highest per-capita emissions in the world, behind only a handful of petro-states.[7] In 2018, Canada posted record-high fossil fuel use.[8] Our per-capita energy use is sixth highest in the world and the highest in the G20.[9] We are the world's fourth-largest oil producer, but we rank nineteenth in solar power production.[10]

Moreover, Canada has repeatedly made and broken climate commitments. Figure 1 shows Canada's various international commitments to reduce GHG emissions: Kyoto, Copenhagen, Paris, etc. It also shows that we have already missed, or seem likely to miss, all those targets. Of the 191 nations that ratified the 1997 Kyoto Protocol, only Canada renounced its commitments and exited the process. Canada has been talking and negotiating and promising and reneging for more than 30 years.

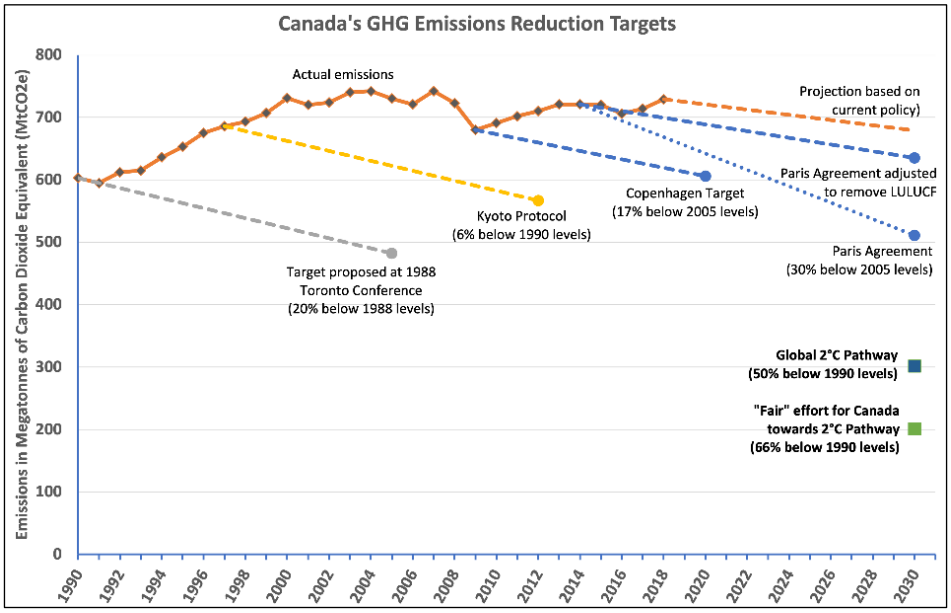

Figure 1. Canada's commitments to reduce GHG emissions, vs. actual and projected emissions
Source: Update provided by Steve Easterbrook. See also Steve Easterbrook, "Missing the Target: Canada's Deplorable Record on Carbon Emissions," blog post, Oct. 18, 2016, https://www.easterbrook.ca/steve/2016/10/missing-the-target-canadas-deplorable-record-on-carbon-emissions/

5 In 1988, Canada hosted the world's first large climate conference to bring together scientists, policy makers, and the media. The World Conference on the Changing Atmosphere issued a statement that "humanity is conducting an unintended, uncontrolled, globally pervasive experiment whose ultimate consequences could be second only to a global nuclear war." That same year, governments and scientists formed the IPCC, and NASA scientist James Hansen told a congressional committee that climate change was already underway and that he was 99 percent certain that the cause was carbon dioxide from human activities.

6 UN Environmental Program, "Emissions Gap Report 2020" (UNEP, December 1, 2020), http://www.unenvironment.org/emissions-gap-report-2020.

7 "Global CO_2 Emissions per Capita by Country 2018," Statista, accessed March 26, 2021, https://www.statista.com/statistics/270508/co2-emissions-per-capita-by-country/.

8 "BP Statistical Review of World Energy 2020" (London: BP, 2020).

9 "BP Statistical Review of World Energy 2020." Only Trinidad and Tobago, Singapore, Kuwait, Qatar, and UAE have higher per-capita use.

10 "BP Statistical Review of World Energy 2020."

It is clear from Figure 1 that Canada has not taken adequate, effective actions to curb emissions. And looking into the future, even considering recent announcements in Budget 2021[11] and Canada's new climate plan,[12] Canada is still not on track to curb emissions rapidly or adequately. Ninety-nine percent of humanity lives in countries with lower per-capita emissions than Canada. When it comes to global emissions, we are "the 1 percent."

Canada must do much more—approach emissions reduction far more aggressively. As the NFU stated in a 2019 report: "Farmers, other citizens, all sectors, and all levels of government must mobilize, with near-wartime-levels of commitment and effectiveness, to slash emissions."[13] We need action on all fronts—*maximum-rate emissions reductions in all sectors*. It is in this context that the NFU urges the federal government to shelve emissions offset credit schemes and to instead use the full extent of its spending, educational, research, regulatory, enforcement, leadership, and *governance* powers to ensure that every sector reduces emissions at the rapid pace that atmospheric physics now demands. Because Canada has dithered so long, we are now forced to act at speeds appropriate to an emergency situation.

Canada's federal and provincial ministers of environment have made it clear that offset protocols and credit trading delay and reduce emissions reductions among Canada's largest emitters. To quote those federal and provincial ministers of environment: "GHG offsets are a substitute for direct emission reductions required by the regulated emitter. ... GHG offsets take the place of direct emissions reductions...."[14] One entity emits less so another can emit more. But one step forward and one step back is not good enough in year 33 of the climate crisis—not good enough just 9 years away from 2030 and Canada's commitment to a 40-plus-percent reduction in emissions. We need all steps to be forward, and all at a running pace.

11 Government of Canada, "Budget 2021: A Recovery Plan for Jobs, Growth, and Resilience" (Ottawa: Government of Canada, April 2021), https://www.budget.gc.ca/2021/pdf/budget-2021-en.pdf.

12 Environment and Climate Change Canada, "A Healthy Environment and a Healthy Economy: Canada's Strengthened Climate Plan to Create Jobs and Support People, Communities and the Planet" (Ottawa: ECCC, December 2020), https://www.canada.ca/content/dam/eccc/documents/pdf/climate-change/climate-plan/healthy_environment_healthy_economy_plan.pdf.

13 Darrin Qualman and National Farmers Union, "Tackling the Farm Crisis and the Climate Crisis: A Transformative Strategy for Canadian Farms and Food Systems" (Saskatoon: NFU, 2019), 19, https://www.nfu.ca/wp-content/uploads/2020/01/Tackling-the-Farm-Crisis-and-the-Climate-Crisis-NFU-2019.pdf.

14 Canadian Council of Ministers of the Environment, "Pan-Canadian Greenhouse Gas Offsets Framework" (Ottawa: CCME, 2019), 1–2.

2. Soils can sequester carbon from soils, but not from fossil fuels

A priority for the federal government is the Enhanced Soil Organic Carbon protocol. Such a protocol would enable large emitters regulated under the Output Based Pricing System (OBPS)[15] to pay farmers to offset emissions from OBPS-regulated facilities via soil carbon sequestration. This approach is wrong and dangerous, for many reasons.

First, carbon that farmers may capture and put into their soils via improved cropping and grazing systems can best be thought of as carbon *from* soils—carbon released by past farming practices. Figure 2, from Agriculture and Agri-Food Canada (AAFC), depicts long-term soil-carbon dynamics. The left side of the graph represents previous centuries when native ecosystems (Prairies grasslands, for example) were converted to agricultural production via tillage. The graph suggests that a large portion of soil carbon was lost within decades. Decades later, improvements in farming systems begin to restore some of that soil carbon. But in most cases, it is impossible to exceed (or even approach) the soil carbon levels that existed before tillage—that existed, for example, as the result of Bison rotationally grazing on biodiverse, deep-rooted, unbroken Prairie grasslands *for thousands of years*. There is a limit to soil carbon sequestration tonnage approximately equal to that which agriculture has released into the air.

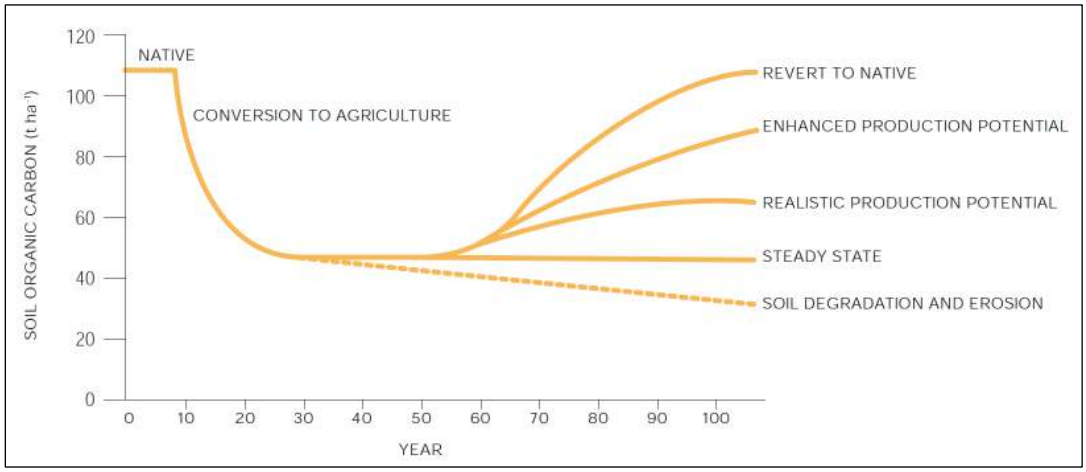

Figure 2. Soil carbon dynamics from cultivation and improved management practices
Source: Reproduced from H.H. Janzen et al. and Agricultural and Agri-Food Canada, *Better Farming, Better Air: A Scientific Analysis of Farming Practice and Greenhouse Gases in Canada* (Ottawa: AAFC, 2008).

The idea that soil sequestration has limits is not controversial. The following is a selection of opinions from scientists and others regarding carbon dynamics in cropping and grazing systems:

> "Soil organic carbon sequestration does, however, have a finite capacity and a new equilibrium will eventually be reached."
> —Ward Smith et al., "The Net Flux of Carbon from Agricultural Soils in Canada 1970–2010."[16]

> "Rain-fed rangelands are estimated to attain new upper limits on C sequestration in about two decades following major improvements in management strategies."
> —David Briske et al., "The Savory Method Can Not Green Deserts or Reverse Climate Change."[17]

15 Incl. oil refineries, ethanol plants, steel mills, auto plants, mines, fertilizer factories, tar sands production facilities, pulp mills, etc.

16 W. Smith, R. Desjardins, and E. Pattey, "The Net Flux of Carbon from Agricultural Soils in Canada 1970–2010," *Global Change Biology* 6, no. 5 (June 1, 2000): 558, http://onlinelibrary.wiley.com/doi/10.1046/j.1365-2486.2000.00340.x/abstract.

17 David Briske et al., "The Savory Method Can Not Green Deserts or Reverse Climate Change," Rangelands 35, no. 5 (2013): 73.

> "The annual rate of cropland soil carbon sequestration will decline from 11 Mt [million tonnes] in 2013 to 6 Mt in 2030. This is a result of the soil carbon sink approaching equilibrium...."
> — AAFC, *An Overview of the Canadian Agriculture and Agri-Food System*.[18]

> "Soil cannot absorb more carbon indefinitely. According to the U.S. Environmental Protection Agency, soil carbon accumulation through conservation tillage occurs for periods of 15 to 20 years. At that point, the soil reaches a carbon steady state with no additional gains in carbon sequestration."
> —Monsanto Corporation, *Growth for a Better World: 2007 Pledge Report*.[19]

Monsanto's statement is especially surprising, given that the company has staked so much of their value proposition on the soil carbon sequestration that they claim results from (Roundup-enabled) no-till cropping systems.

Farmers who utilize best possible grazing and cropping techniques can increase soil carbon levels back toward pre-agricultural levels, but the proper way to think about this sequestration is that it is carbon from *soils* released in the *past* that is being (re)sequestered, not carbon from *fossil fuels* that will be burned in the *future*. Soil carbon that is turned into carbon dioxide and released remains in the atmosphere for centuries—with significant portions remaining in the air for more than a thousand years.[20] Thus, virtually all the carbon released from Canadian farmland soils in past centuries is still in the atmosphere/biosphere.[21] Agricultural soils have the capacity to absorb quantities of GHGs roughly equal to the tonnage of previously released soil carbon, but there is no capacity to sequester fossil-fuel carbon. Farmland is not a sponge that can sop up industrial emissions.

The NFU makes the preceding points, not to criticize farmers for past practices or past releases of soil carbon, but instead to ensure that farmers and agricultural soils are not made into cogs in ill-conceived, reality-ignoring schemes to greenlight or greenwash emissions from fossil-fuel use and high-emission industrial systems. Farmers who understand climate change want no part of offset schemes which prolong high-emission production systems and fossil fuel use. These farmers do not want payments from corporations that enrich themselves and their shareholders by delaying emission-reduction investments and actions. All farmers and landowners should reflect on their ethical positions if they accept money from such companies as part of offset credit programs.

The capacity of farmers to capture carbon and improve soils is real and undebatable. But the idea that soil carbon gains can offset fossil carbon releases is false and dangerous. Other ways need to be found to support and incentivize farmers, and other ways, such as strict regulations, need to be put in place to rapidly reduce GHG outflows from large industrial emitters.

18 Agriculture and Agri-Food Canada, "An Overview of the Canadian Agriculture and Agri-Food System" (Ottawa: AAFC, April 2016), http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.510.7186&rep=rep1&type=pdf.

19 Monsanto Corporation, "Growth for a Better World: 2007 Pledge Report" (St. Louis, Missouri: Monsanto Corporation, 2007), https://www.emerald.com/insight/content/doi/10.1108/case.darden.2016.000207/full/html.

20 David Archer et al., "Atmospheric Lifetime of Fossil Fuel Carbon Dioxide," *Annual Review of Earth and Planetary Sciences* 37, no. 1 (May 2009), https://doi.org/10.1146/annurev.earth.031208.100206.

21 There is, of course, air-sea exchange of CO_2, but that point can be ignored for the purposes of this argument, as it applies equally to CO_2 coming out of soil, CO_2 going back in, CO_2 from fossil fuels, etc.

3. The "permanence" problem

Soil carbon sequestration is not permanent

Left in the ground, fossil fuel hydrocarbons are sequestered permanently—for millions of years. But when those fossil fuels are sought out, pumped or dug up, sold, and burned, the addition of carbon to the atmosphere/biosphere is again, essentially permanent, because a significant portion of emitted CO_2 stays in the atmosphere/biosphere for more than a thousand years.[22] It is to these timescales that soil carbon sequestration must be compared. When so compared, soil sequestration is not permanent, but temporary. *When we burn fossil fuels, we release carbon that was stably sequestered deep underground for hundreds-of-millions of years. In contrast, when we re-sequester that carbon into soils, we put it into a place, just inches below the surface, where it will be held much less securely and probably for just decades, not for millions of years or even hundreds.* Releasing carbon from oil and then putting it into soil in no way resolves the problem created by the initial release.

Key is this: Fossil carbon (from coal, oil, and natural gas) and biospheric carbon (in plants, soils, and the atmosphere) are distinct and not interchangeable for accounting, analytic, or public policy purposes. Unless extracted by energy companies, fossil carbon is wholly isolated from Earth's other carbon pools. In contrast, soils, air, plants, and animals *continuously exchange and cycle* carbon—acting as a single interlinked biospheric pool. That is why it is called "the carbon cycle." Soil carbon sequestration serves to *shift* carbon from one part of the active biospheric pool to another—from the atmosphere to the soil. But burning fossil fuels *adds* to the biospheric carbon pool. Once that carbon is added via fossil-fuel combustion, shifting that carbon from one part of the biospheric pool to another—from air to soil—does not fix the problem that the initial addition of fossil carbon created. Fossil fuel combustion is *addition*; soil sequestration represents *shifting*, not subtraction. In summary: a foundational error underlying soil carbon offset protocols is the treatment of temporary soil storage as offsetting permanent release.

How offsets regulations and protocols try to get around the permanence problem

Despite many references to permanence in news releases, backgrounders,[23] and the Regulatory Impact Analysis Statement,[24] the draft Regulations for the Greenhouse Gas Offset Credit System do not define "permanent" or "permanence." For the Regulations, protocols, and Offset Credit System, permanent will effectively mean 100 years, as put into effect by the 100-year monitoring and reporting requirements stipulated in the draft Regulations.

This 100-year requirement is both too short (when compared to the millennia-long effects of releasing fossil carbon) and too long (from a farm business risk perspective). Above, we dealt with the former problem; here we deal with the latter.

The ECCC's Regulatory Impact Analysis Statement published with the draft Regulations essentially serves as a commentary and interpretation document. That Impact Analysis states:

> The proposed Regulations specify the length of the periods during which offset projects are eligible to generate credits, as well as the number of times that these crediting periods may be extended. In general, the crediting period is set at 30 years for forestry

22 Archer et al., "Atmospheric Lifetime of Fossil Fuel Carbon Dioxide."

23 Environment and Climate Change Canada, "Federal Greenhouse Gas Offset System: Backgrounder."

24 Government of Canada, "Greenhouse Gas Offset Credit System Regulations (Canada)."

> projects, 20 years for other biological sequestration projects, and 8 years for all other project types. Crediting periods for biological sequestration projects may be extended up to a maximum period of *100 years*....
>
> The proposed Regulations also set out requirements for reporting, monitoring, record-keeping and verification. ... *Monitoring reports for biological sequestration projects would be required annually during the crediting period and for 100 years following the end of the crediting period*, in order to mitigate against the risk of reversals of GHG removals from the atmosphere [italics added].[25]

The crediting and monitoring periods could together add up to 200 years! Governments, project proponents, aggregators, verification companies, and farmers could be measuring, monitoring, and reporting into the 2220s. Two hundred years is longer than Canada has existed, and much longer than private-sector offset-project firms will exist. Even taking a more moderate example (perhaps a 20-year crediting period) still leaves the need to monitor and report and ensure the integrity of sequestered carbon for 120 years. Governments are tying themselves into knots to make non-permanent soil carbon sequestration seem somehow permanent.

Reversals

The draft Regulations define reversal as "the release into the atmosphere of GHGs removed by a project for which offset credits have been issued" [Sec. 1 (1)]. The Regulations specify two types of reversals, voluntary and involuntary. An involuntary reversal is "a reversal that is out of the proponent's control or that occurs in spite of the proponent implementing the project's risk management plan." ECCC gives the example of a forest fire releasing carbon from a forestry offset project. A voluntary reversal is "a reversal that is within of the control of a proponent or resulting from a proponent's failure to implement a risk management plan." Voluntary reversal could trigger significant liability. See below.

Note the multiple risks of lock-in and liability for famers. First, there is the risk of production-practice lock-in. In some scenarios, farmers could be expected to continue a carbon-sequestering practice for more than a century. But farming practices change rapidly and may change more rapidly still in the fast-warming 21st century. Imagine if we had locked in the farming best-practices of the 1920s or '30s.

Some may counter that the preceding misstates the case; that it is the enhanced *carbon content* of the soil that will be preserved and monitored and reported on over the coming century (or two) and that there would be no attempt to maintain a particular practice over a hundred-plus-year period. But how then can monitoring and reporting function? If the many farmer participants (and subsequent farmers and landowners) of an aggregated soil carbon project are left to each pursue divergent production practices over several generations, aggregated projects effectively cease to exist. Would this not be seen as a deviation from a protocol and a voluntary reversal? What about liability?

Soil carbon offset protocols can either require farmers to maintain certain practices for more than a century, or they can omit such requirements. Both alternatives raise concerns. This problem becomes thornier when we consider that for the purposes of monitoring, reporting, and detecting reversals, soil carbon levels will most often be modelled rather than measured. And it will be exceedingly difficult to estimate soil carbon levels from models if on-farm practices are not held constant and instead allowed to diverge.

25 Government of Canada, 973–74.

In addition to production-practice lock-in, liability is a huge issue. In the case of a voluntary reversal the draft Regulations stipulate that:

> 15 (2) If the Minister determines that the reversal was voluntary, the Minister may
> (a) ... revoke all offset credits that remain in the GHG offset account for the project in which the reversal occurred and cancel all offset credits deposited into the environmental integrity account in respect of the project;
> (b) where the number of offset credits revoked under paragraph (a) is less than the number of credits issued in respect of the project,
> (i) *require the proponent ... to remit compliance units in an amount equal to the difference between the number of credits issued in respect of the project and the number revoked under paragraph (a)*,
> (ii) where the proponent does not remit credits in accordance with subparagraph (i) or make a payment in lieu thereof under subsection 181(3) of the Act, cancel offset credits in the environmental integrity account to make up the difference; and
> (c) cancel the registration of the project [italics added].

Note the requirement to "remit compliance units" (i.e., federal offset credits or similar units generated from approved provincial protocols) in amounts that could approach the total credits generated by the project. This clause creates a potential liability for any project proponent and, it would seem, for farmers participating in aggregated projects. Moreover, that liability seems to extend for more than 100 years, and it seems to be *unlimited*. Imagine a scenario wherein a farmer participates in an aggregated Enhanced Soil Organic Carbon protocol project and receives $10 per tonne for his or her offset credits in the 2020s. Now imagine that 40 years pass and the climate crisis intensifies and offset credits are highly sought after and the market price has risen to $200 per tonne—20 times what the farmer originally received. Might farmers facing certain types of reversals be required to replace credits by purchasing them at the increased price?

It is unclear from the draft Regulations how much risk farmers may be forced to accept, but it appears that there is potential for long-term unlimited liability. Moreover, future liability may be litigated and decided in the courts, opening farmers to the risk of legal costs. The alternative, implied by the word "may" in the regulations quoted above and by section (2) (b) (ii), is that no one will be held liable for voluntary soil carbon releases that occur perhaps a half century from now. And while this last scenario seems better for farmers, it compromises the offset credit system: private-sector proponents could pocket millions or billions of dollars for projects but not be held financially accountable for reversals that are, as we detail in the next section, wholly foreseeable.

Other lock-in risks are possible. How will farmers, their descendants, or subsequent landowners be made to comply with offset protocol restrictions that result from participation in projects and acceptance of offset credit revenues? Will caveats or other encumbrances be placed on farmland? If so, and in light of the potential for unlimited liability, might not resulting reductions in land values be larger than carbon credit income? To whom would the liability adhere? To the descendants of the original farmer who signed the contracts? To a subsequent landowner? To both? With more than $115 billion in farm debt, is it wise for the federal government to facilitate the creation of additional intergenerational liabilities?

Turning to another point, is it rational to assume that project proponents and aggregators will remain in business for 100 to 200 years? If not, what do the monitoring, reporting, and credit reversal clauses really mean? And who will be responsible for maintaining the risk management plans? This last question has huge implications. Farmers participating in soil carbon protocols may face little or no

liability for releases so long as those are "involuntary reversals." But note the definitions in the draft Regulations:

> "involuntary reversal means a reversal that is out of the proponent's control or that occurs in spite of the proponent implementing the project's risk management plan."
>
> "voluntary reversal means a reversal that is within of the control of a proponent *or resulting from a proponent's failure to implement a risk management plan*" [italics added].

Once the project's risk management plan is no longer applied, future reversals would be seen as voluntary and thus trigger huge liabilities. As corporate proponents and aggregators fade away over the century, would the responsibilities to implement risk management plans devolve to farmer participants and their descendants?

Finally, governments will change and times will change. If sequestration efforts or monitoring requirements become too onerous or liabilities too large, governments 50 years from now (or even just 20) may simply decide to let project proponent companies or farmers off the hook. Seen another way, what environmental legislation from the latter-1800s is enforced today? There is much in the draft Regulations that is absurd.

But we need not despair. Effective, permanent solutions are at hand: rather than struggle to sequester and monitor for 100 years, *don't emit the GHGs in the first place*. Non-emission does not require 100 years of monitoring or reporting. Non-emission does not need to rely on future governments to continue enforcement. And non-emission does not require spikey contracts that constrain farmers' future choices and raise the spectre of unlimited liability. Rather than complex, unworkable schemes to catch carbon after it is released, don't release it. This is the thrust of the NFU's advice to government. Take ambitious, rapid steps to actually and rapidly cut emissions in all sectors rather than implementing emissions accounting schemes wherein carbon is moved from one box to another and we pretend that it can be kept in the box for more than a century.

We can have no certainty of even 100-year "permanence"

For now, let us put aside the preceding points. Let us deem that keeping carbon in the ground for a century is close enough to "permanent" to be acceptable, and let us ask the question: even with our best and most sincere efforts, do we have a good chance of 100-year sequestration? No. It is more prudent to assume that, despite our best efforts, farmland may release large amounts of carbon over the next century. Here is why: Even with all current global climate commitments and policies, the Earth is projected to warm 3.2 degrees Celsius this century.[26] This is devastating news for the planet, with warming far beyond the 2 degree C "extreme danger" line. But it is even worse news for the parts of the country that contain 85 percent of Canada's farmland: the Prairies. ECCC confirms that the Prairies are warming at twice the global average rate and are projected to continue doing so.[27] Thus, 85 percent of Canadian farmland is on track for 6.4 degrees C of warming this century.

We know from scientific studies that hot, dry periods cause soils to lose carbon, for two reasons. As soils warm, soil organisms can become more numerous and active and break down and release soil

26 UN Environmental Program, "Emissions Gap Report 2020."

27 F. Warren and D. Lemmen, Canada in a Changing Climate: Sector Perspectives on Impacts and Adaptation (Ottawa: Government of Canada, 2014), 6, http://epe.lac-bac.gc.ca/100/201/301/weekly_checklist/2014/internet/w14-26-U-E.html/collections/collection_2014/rncan-nrcan/M174-2-2014-eng.pdf . This high rate of warming is not unexpected: continental interiors and higher latitudes warm much faster than global average.

carbon faster. One study reports that "nearly all models of global climate change predict a loss of carbon from soils as a result of global warming...."[28] In addition to accelerated release of soil carbon, dry periods also result in smaller *additions* of carbon because of reduced plant growth.

Here are three quotes regarding how warm, dry periods can be expected to affect soil carbon levels:

> "We present a comprehensive analysis of warming-induced changes in soil carbon stocks by assembling data from 49 field experiments located across North America, Europe, and Asia. ... Despite the considerable uncertainty in our estimates, the direction of the global soil carbon response is consistent across all scenarios. This provides strong empirical support for the idea that rising temperatures will stimulate the net loss of soil carbon to the atmosphere...."[29]

> "Good rainfall will stimulate plant growth and carbon uptake, but a subsequent drought will cause plants to die, soils to dry and soil carbon to be released. Carbon gains made in one season may therefore be reversed in the next."[30]

> "The drop in SOC [soil organic carbon] from 1999 to 2005 [was] attributed to general drought during 2001-03."[31]

In this last quote, Dr. Brian McConkey is detailing a six-year period during a twenty-six-year study of approximately 100 fields across Saskatchewan. That ongoing study measures the effects of a transition to no-till seeding and found a gain in soil carbon generally over the 26 years study period, but it found periods of declining soil carbon corresponding to dry periods. Even when practices were employed that generally increased soil carbon levels, dry periods caused levels to fall. Given this reality, and given the hundred-year time horizon of "permanent" soil carbon offset protocols, one should ask: what is the likelihood of a reprise of a 1930s-style multi-year drought? Or more appropriately, what is the likelihood *given a possible 6.4 degrees of warming* on the Prairies? The answer: Almost certain.

On this point last, long-term climate data is illuminating, and alarming. Dr. David Sauchyn used tree rings ("dendrochronology") to reconstruct a 600-year climate record for the Prairies. In trees, wider rings correspond to more growth, i.e., wetter years. What does the data show?

> "The tree rings suggest that the climate of the 20th century was relatively favourable for the settlement of the Prairies. The initial phase of homesteading during 1880 through the 1910s coincided with the longest sustained wet period of the past 600 years. Furthermore, the droughts of greatest severity and duration occurred before the Prairies were settled. These include the intense drought years of the 1790s, when sand dune fields in the [South Saskatchewan River Basin] became active, and the sustained drought of the 1850-60s, when the southern prairies were deemed unsuitable for agriculture. [32]

The long-term data reveals a drier Prairie region than farmers and policymakers have come to know. A reversion to this long-term "normal" would mean much drier growing conditions. On top of this risk, we are on track to add several degrees of heat and increased climate severity. Confidence that we can retain elevated levels of soil carbon over the next century seems unwarranted. Soil carbon, endlessly

28 William Schlesinger and Jeffrey Andrews, "Soil Respiration and the Global Carbon Cycle," *Biogeochemistry* 48, no. 1 (January 2000): 11, https://doi.org/10.1023/A:1006247623877.

29 T.W. Crowther et al., "Quantifying Global Soil Carbon Losses in Response to Warming," *Nature* 540, no. 7631 (2016): 104.

30 Tara Garnett et al., "Grazed and Confused: Ruminating on Cattle, Grazing Systems, Methane, Nitrous Oxide, the Soil Carbon Sequestration Question" (Food Climate Research Network; Oxford Martin Programme on the Future of Food; Environmental Change Institute, University of Oxford, 2017), http://www.fcrn.org.uk/sites/default/files/project-files/fcrn_gnc_report.pdf.

31 Brian McConkey et al., "Prairie Soil Carbon Balance Project: Monitoring SOC Change Across Saskatchewan Farms from 1996 to 2018: Change in SOC at Field Level Component" (Saskatchewan Soil Conservation Association, 2020), 31.

32 Dave Sauchyn, "Climate Trends and Projections for the South Saskatchewan River Basin" (Medicine Hat, AB: South East Alberta Watershed Alliance (SEAWA), 2010).

cycling and always impermanent, will probably be even more so in a rapidly heating Prairie landscape. Protocols premised upon 100-year permanence are not prudent under these conditions.

So, given that hot, dry periods in the latter 21st and early 22nd centuries are wholly foreseeable, when those events occur and release soil carbon, will that be seen as an unintentional reversal? Or might proponents and project-participating farmers be held accountable for these foreseeable risks and releases?

We make these points, not to foreclose offset credit revenue possibilities to farmers, but to avert a massive policy and civilizational error: staking our future on offset protocols, emissions trading, and similar schemes that are wholly unsuited to the task of *rapidly* and *permanently* reducing emissions and stabilizing the climate for farmers and all citizens of the world.

4. Offset markets require sellers; why do sellers exist?

Offset system advocates envision that some entities that have adequately reduced their emissions will sell credits to others that have not. For example, firm A has found ways to affordably cut emissions beyond what regulations require and can sell those excess reduction credits to firm B in order for the latter to meet regulatory requirements by offsetting excess emissions.

But why are there any such sellers? What company or sector in the Canadian economy has reduced its emissions so fast and so much that it should have credits to sell? Recall from above that 99 percent of humans live in countries and economies where per-capita emissions are lower than in Canada. Canadians and our corporations have the distinction of being among the top 1 percent of global emitters. So where in this high-emission economy and society are the corporations or other entities that have achieved such large emission reductions that they can now cash out those successes by selling credits to others?

Let us approach this question another way. Many scientists state that to keep global temperature increases to 1.5 or 2.0 degrees C, the world must reach net zero emissions in the 2050s[33]—perhaps just 30 years from today. (Many would suggest far sooner.) Further, countries such as Canada that have emitted the most and enriched themselves the most during the fossil-fuel era should reduce emissions fastest, to leave emissions space for less developed countries. (I.e., Grenada should not have to reach net zero as quickly as Canada.) So, a rich, ultra-high-emission country such as Canada should attempt to reach net zero emissions in perhaps 20 years. Doing so would require annual emissions reductions of about 10 percent per year—year after year.[34] If we asked every Canadian firm and sector to cut emissions at that rate, could any come close? Moreover, which sectors or companies could *exceed* such reduction percentages and generate offset credits to sell? *If we were to require Canadian sectors to reduce emissions by amounts actually required to avert disaster, all sectors would find themselves as would-be offset credit buyers, not sellers*. With rampant demand and little supply, prices of offsets would spike and emission-trading markets would cease to function. This thought experiment demonstrates something about offsets and related schemes: carbon markets and offset trading function only so long as we pursue limited ambition and lethargic progress.

Let us look at this one final time and ask the question: why do farmers assume that we will be offset sellers and not buyers? As a sector, agriculture has high emissions (about 80 million tonnes annually), the sector's emissions are rising (up 22 percent since 1990);[35] and though soil carbon sequestration is real, annual sequestered tonnage is much smaller than agricultural emissions and sequestration rates will continue to fall as the decades pass and soils approach maximum carbon capacity.[36] Thus, farmers might wonder why they are potential offset credit sellers and not buyers? Is it because they lead other sectors in the rate and extent of their emissions reduction? No. Again, emissions are high and rising. Farmers are potential credit sellers only because of regulatory artifacts: agriculture was not designated a regulated industry under the Output Based Pricing System; and nitrous oxide and methane, the main agricultural GHGs, are not regulated under the OBPS at this time.

The reality of Canada's proposed Offset Credit System is that in many cases it will be firms and sectors with rising emission selling offsets to firms and sectors with rising emissions. See next chapter.

33 UN IPCC, "Global Warming of 1.5° C: Summary for Policymakers" (IPCC, October 2018), 12, https://www.ipcc.ch/site/assets/uploads/sites/2/2019/05/SR15_SPM_version_report_LR.pdf.

34 Reducing emissions by 10 percent per year for 20 years would leave approximately 10 percent of current emissions in 2041.

35 Environment and Climate Change Canada, "Canada's Official Greenhouse Gas Inventory," accessed March 28, 2021, http://data.ec.gc.ca/data/substances/monitor/canada-s-official-greenhouse-gas-inventory/.

36 Agriculture and Agri-Food Canada, "An Overview of the Canadian Agriculture and Agri-Food System."

5. Offsets are wholly compatible with *rising* emission levels

Offset Regulations, protocols, and credits exist as an appendage to the OBPS which regulates large emitters such as oil refineries, fertilizer factories, steel mills, and tar sands facilities. For most sectors, the OBPS restricts emissions, not in absolute terms, but on an *intensity* basis: tonnes of emissions per tonne (or other unit) of output. Many OBPS-regulated facilities face no fees or restrictions when they increase emissions, so long as output is also rising and emissions do not rise *relative* to output. For example, a fertilizer factory can increase both its fertilizer output and its emissions and face no sanctions so long as it maintains the same ratio of tonnes of emissions per tonne of fertilizer. Thus, the OBPS and offset credits and protocols are fully compatible with rising emissions.

Nitrogen fertilizer provides an example of how the OBPS and offset protocols can combine to yield both rising emissions and the greenwashing of those emissions. For agricultural emissions, nitrogen fertilizer is the big problem—a large component of overall agricultural emissions and the reason why those emissions are rising. Nitrogen fertilizer use is rising fast and this increase is the main reason that overall Canadian agricultural emissions have risen 22 percent since 1990 (Figure 3).

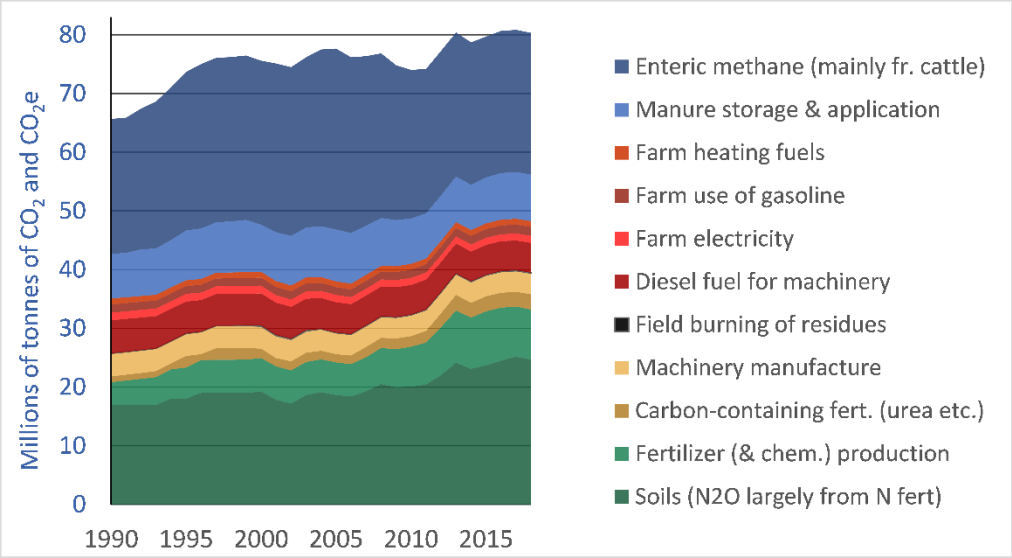

Figure 3. Emissions from agriculture and the production of farm inputs, Canada, 1990-2018
Sources: Environment and Climate Change Canada, "Canada's Official Greenhouse Gas Inventory"; and calculations of emissions from fuel use, electricity production, and fertilizer manufacture based on reports by Dyer et al.[37]

Over the past three decades, fertilizer rates have doubled in Alberta and Manitoba, quadrupled in Saskatchewan, and increased in many other provinces, partly as a result of fertilizer company efforts to increase sales and profits. As a result of increased fertilizer production and sales, not only are on-farm emissions up, so too are emissions from fertilizer factories (see Figure 3, light green band, second from the bottom). Under the federal government's OBPS, some of those fertilizer companies may have to go looking for offset credits. It would be perverse if fertilizer companies (with rising emissions) purchased soil carbon offset credits from farmers (with rising emissions) and this was somehow seen as tantamount to emissions reduction. While programs to reduce fertilizer use and attendant emissions are critically needed, offset protocols and payments are clearly the wrong ways to accomplish these ends.

37 J. Dyer et al., "Integration of Farm Fossil Fuel Use with Local Scale Assessments of Biofuel Feedstock Production in Canada," in Efficiency and Sustainability in Biofuel Production, Ed. B. Gikonyo (New York: Apple Academic Press, 2015); J. Dyer et al., "The Fossil Energy Use and CO2 Emissions Budget for Canadian Agriculture," in Sustainable Energy Solutions in Agriculture (Boca Raton: CRC Press, 2014); and J. Dyer and R. Desjardins, "Carbon Dioxide Emissions Associated with the Manufacturing of Tractors and Farm Machinery in Canada," Biosystems Engineering 93, no. 1 (Jan. 2006).

6. Offsets are among the last thing we should do

> "Prioritize reducing your own emissions—Minimize the need for offsets in the first place. … Reduce first, offset with high-quality offsets second...."
> —The Oxford Principles for Net Zero Aligned Carbon Offsetting.[38]

Let us, for the moment, put aside preceding objections to offsets and ask, how and when should offsets be used? Answer: as a last resort, to offset emissions that cannot be eliminated, and only after all efforts at emissions reduction, efficiency, substitution, and system change have been deployed.

There are many kinds of GHG emissions, including carbon dioxide from cars, methane from wet paddy rice production, nitrous oxide from cropland fields (even those that use no synthetic fertilizer), etc. For many emissions there are clear paths to reduction. For example, CO_2 emissions from cars can be reduced or eliminated by substituting electric vehicles, buses or trains, or walking and biking. For such emissions, we should utilize alternatives, efficiency, *and actual emissions reductions*, not offsets.

Other types of emissions cannot be easily reduced via efficiency or alternatives. One example is nitrous oxide from crop production. Nitrous oxide is a GHG about 265 times more powerful than carbon dioxide in terms of trapping heat. Nitrous oxide emissions can be reduced if farmers use less fertilizer, use it more efficiently, find alternatives to purchased fertilizers, enhance natural soil fertility, etc. But the cropland systems needed to feed 8 to 10 billion people will always be large sources of nitrous oxide. Such emissions cannot be wholly eliminated. It is against these types of non-eliminable residual emissions that we may want to deploy offsets two or three decades from now.

Emission-reduction strategies, though they must proceed rapidly and thus, partly in parallel, should be prioritized in roughly the following order:

1. Pursue efficiency and conservation relentlessly (i.e., make buildings, vehicles, factories, and food systems as efficient as possible and pursue *absolute reductions* in energy and materials use).

2. Employ alternatives and substitutes (e.g., within continents, fast trains powered by low-emission electricity can substitute for jets; local carrots can substitute for air-freighted green beans).

3. Price pollution (i.e., place a levy on carbon dioxide emissions and rebate funds equitably).

4. Replace fossil fuels with near-zero-emission energy alternatives such as solar, wind, hydroelectricity (from existing sources), etc.

5. Work for systems change. It is unsustainable to continue making people happy via ever-rising living standards, consumerism, and endless economic growth. Instead, we must find new ways to bring satisfaction, purpose, security, and joy to Earth's soon-to-be-10-billion-person population.

6. Formulate near-term plans to reduce any remaining emissions where possible (e.g., capturing methane from landfills and carbon dioxide from cement production).

7. Use offset projects, etc. to deal with irreducible residual emissions.

By prioritizing offsets prematurely, we are pursuing this list in the wrong order. It is wrong to offset (and thus continue) emissions that should instead be eliminated.

[38] Allen et al., "The Oxford Principles for Net Zero Aligned Carbon Offsetting."

7. What soil-related offset protocols will and will not pay for

No protocols or credits for no-till in most provinces

The proposed Greenhouse Gas Offset Credit System will not be the delivery mechanisms for long-awaited "carbon credits"—payments to farmers for adoption of no-till seeding systems and resulting soil carbon sequestration. The draft Regulations specify that offset credits can only be generated if reductions in GHG emissions, or increases in removals, exceed what would occur if no offset protocols existed and no credit payments were made. Emission reductions or removals must be "additional" to what would have occurred in a business-as-usual or "baseline" scenario.

Figure 4 shows no-till adoption rates in Alberta and Saskatchewan. The graph includes trendlines. Note that adoption rates are rising, are now around 70 percent, and may top 90 percent this decade. Thus, creating protocols and paying offset credits for no-till adoption in such provinces is a non-starter according to the proposed regulatory framework because it is hard to argue that credit payments would cause adoption that is "additional" to what would happen without such payments.

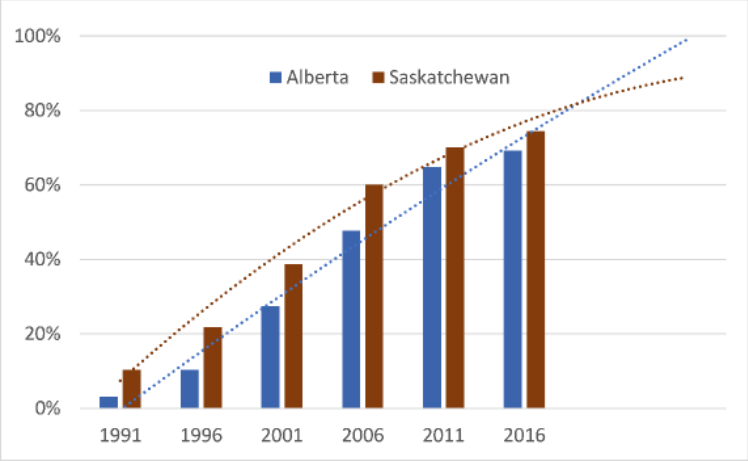

Figure 4. Adoption rates for no-till, Alberta and Saskatchewan, 1991–2016, with trendline projections
Sources: Stats. Can. table 32-10-0162-01

The case may be different in other provinces. Adoption rates for no-till cropping are lower in Ontario, Manitoba, and some other provinces. In such places, it might be possible to justify offset credits to farmers not currently practicing no-till (though not for those who already are; again, "additionality"). But for most Canadian acres, protocols developed under the draft Regulations cannot provide offset credit dollars for past, present, or future no-till adoption. Thus, *in arguing against offset protocols the NFU is not arguing away long-awaited carbon credits for no-till farmers; those payments are not part of the proposed offset system and are incompatible with principles of offset-protocol design adopted in jurisdictions around the world.* Other means must be found to reward farmers for soil conservation and improvement.

Protocols and credits for "regenerative agriculture"?

We do not have a clear picture of what governments envision regarding possible future offset credits for farmers—which on-farm measures may qualify under federal or provincial protocols. Here is much of what we do know, taken from the backgrounder to the federal government's March 6th announcement:

> The proposed Enhanced Soil Organic Carbon protocol aligns with increased interest in potential climate benefits from the adoption of regenerative agriculture land-

> management practices that go above and beyond business as usual. Farmers who reduce or remove GHG emissions through regenerative agriculture practices carried out in accordance with the protocol may be able to generate offset credits which can then be sold, providing a financial incentive.
>
> The specific practices that can generate offset credits will be determined during the protocol development process. A technical expert team will be established to provide advice on the latest science related to regenerative farming practices....
>
> Another agriculture-related federal offset protocol that is under consideration for development is Livestock Feed Management. ... Protocols for Avoided Conversion of Grasslands, Reduced Nitrogen Oxide Emissions from Agriculture Fertilizer, and Livestock Manure Management may also be considered.[39]

Regenerative agriculture, when appropriately implemented, is among the best and fastest ways to increase soil organic carbon levels and improve soil health. We must do all we can to proliferate regenerative agriculture and other practices that build soils. But the inclusion of regenerative agriculture as part of an offset protocol raises questions because regenerative practices—which can vary from farm to farm and ecosystem to ecosystem—will be hard to rigorously codify for offset protocols. As currently used, the term "regenerative agriculture" can encompass a spectrum of practices ranging from small changes (no-till seeding plus some cover crops and expanded rotations), at one end, to transformative changes, at the other (complex, holistic systems employing diverse poly-cropping, livestock integration, diverse fertility additives, and other principles and practices to maximize soil health). Offset project protocols for regenerative agriculture will be challenging to codify, monitor, and enforce. The preceding aside, governments must use their regulatory, financing, educational, and other powers to rapidly diversify agricultural production systems to include more low-input, organic, agroecological, and regenerative practices. But offset protocols and credit payments are the wrong way to accomplish this.

Offset protocols and credits for cover cropping?

The Prairies encompass 85 percent of Canada's farmland and are responsible for roughly the same proportion of agricultural emissions. Clearly, agricultural emissions reduction and soil sequestration efforts must include the Prairies, as well as all other parts of Canada. Since most Prairie acres would be ineligible for offset credits for no-till, the question arises: what offset protocols might be applicable? One possibility is cover cropping. But across much of the Prairies, seeding cover crops in the fall may not be an option in many years—soil moisture levels can often be too low. Seeding cover crops in the spring, at the same time as primary crops, or soon after in the summer, may be techniques that can be developed, but such approaches are not yet ready for broad deployment, or, at best, are more challenging. While cover crops hold promise in many parts of Canada, currently they seem less suited for drier regions.

Agricultural offset protocols overall

Many government programs and on-farm changes are needed in order to maximize soil protection and improvement, maximize organic matter and carbon gains, and, overall, move rapidly to reduce on-farm emissions and increase resilience and sustainability. *At best*, offset credit payments could provide a patchwork of support for some farmers—incentivizing a few practices in some places but leaving most farmers, acres, and practices unsupported. Therefore, offset programs in agriculture cannot provide the primary means to advance rapid soil health restoration or gains in soil organic carbon levels.

39 Environment and Climate Change Canada, "Federal Greenhouse Gas Offset System: Backgrounder."

8. Support and incentivize farmers to improve soil

Carbon-rich soils are black, sweet smelling, well-textured, and teeming with beneficial fungi and other organisms. Raising carbon and organic-matter levels can aid in water infiltration and thereby increase water retention and drought resilience and, critically important, reduce flooding. Raising carbon and organic-matter levels can reduce wind and water erosion, increase soil-organism biodiversity and activity, enhance fertility and nutrient availability, decrease chemical run-off, potentially decrease diseases and the need for pesticides, raise productivity, and increase farmers' margins and net incomes. Government policies and incentive programs and on-farm grazing and cropping practices must place a top priority on building healthy, carbon-rich soils. Even if there was no climate crisis, there would still be a crucial need for policies and practices that protect and rebuild soils and increase carbon levels.

To encourage and support soil-health practices by farmers, governments should deploy several mechanisms (measures in **bold** have been significantly funded in Budget 2021[40]):

1. For the farmers who make a commitment to restore soil health and increase carbon and organic-matter levels, governments should provide:
    a. Free agronomic support and advice from public servant extension agrologists tasked with helping farmers transition to soil-building, emission-minimizing production approaches; and
    b. Free soil testing (using standardized methods) for nutrient and carbon levels, water infiltration, and other measures of soil and ecosystem health.

2. Per-acre agri-environmental payments for the adoption of soil-building practices, such as:
    a. Cover cropping;
    b. Intercropping, diversified rotations, and the addition of perennials to rotations;
    c. Transitioning some cropland to grassland or marginal land to set-aside programs;
    d. Adopting rotational or other enhanced grazing systems;
    e. Improving grazing land biodiversity and adding native species and legumes;
    f. Utilizing compost and other natural soil amendments; and
    g. Wetlands restoration and riparian planting.

3. Financing for:
    a. Cross-fencing and water systems to enable best possible grazing;
    b. Machinery to facilitate intercropping (e.g., grain cleaners) and
    c. Transition support to holistic, regenerative, agroecological, and other soil-building production systems.

A recent CBC opinion column by Nicholas Rivers (Canada Research Chair in Climate and Energy Policy), Kathryn Harrison (Canadian Institute for Climate Choices advisory member and professor of Political Science at UBC), and Mark Jaccard (IPCC lead author and director of the School of Resource and Environmental Management at Simon Fraser University) came to a similar conclusion, recommending:

> "Activities such as ... soil carbon sequestration ... should be encouraged directly using government regulation or incentives. Removing these activities from the industrial offset system will ensure that Canada's industrial greenhouse gas mandates achieve the emission reductions for which they are designed."[41]

40 Government of Canada, "Budget 2021: A Recovery Plan for Jobs, Growth, and Resilience."

41 Nicholas Rivers et al., "OPINION | Why Federal Government's Carbon-Offset Proposal Could Cause Emissions to Rise | CBC News," CBC, March 29, 2021, https://www.cbc.ca/news/opinion/opinion-carbon-offsets-1.5951395.

9. Conclusions and recommendations

It is right to incentivize and support farmers to improve soil health and levels of soil organic matter and carbon. It is wholly wrong to see these on-farm activities as somehow offsetting fossil fuel emissions.

Farmers who understand climate and emissions realities do not want to be a part of offset credit systems wherein our positive actions are traded to others as a licence to postpone emissions-reduction investments and measures. These farmers do not want to be a part of a system wherein our positive steps in one place—be it soil sequestration or emissions reduction—are offset or undone by retrograde actions in other sectors. And they do not want their farms enriched by payments from high-emission corporations.

Farmers do not want to participate in projects that require more than 100 years of monitoring and reporting. They do not want to risk unlimited long-term liability. And they do not want to be locked into certain land uses or on-farm practices for generations. What farmers do want is what all Canadians want: heathy soils, secure and sustainable food systems, real and rapid emission reductions, and a stable and hospitable climate and biosphere for future generations.

The National Farmers Union strongly recommends that the government of Canada shelve its Greenhouse Gas Offset Credit System and instead:

1. **Implement a broad suite of direct programs to support and incentivize farmers to improve and protect soils;**

2. **Implement programs and regulations that achieve the magnitude and speed of emissions reductions necessary to stabilize global temperatures *well below* 2 degrees C; and**

3. **Work with farmers to actually reduce emissions from agriculture so that we can make our rightful contribution to overall emissions reduction for Canada and the planet.**

Respectfully submitted by the National Farmers Union