



18 Reasons Why Agricultural Soil Carbon Offsets are the Wrong Approach to the Climate Crisis

And What We Should Do Instead

A report by the
National Farmers Union
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Eighteen Reasons Why Agricultural Soil Carbon Offsets are the Wrong Approach to the Climate Crisis, and What We Should Do Instead

A report to Environment and Climate Change Canada and to farmers and other citizens

By the National Farmers Union

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Introduction

Many farmers and farm organizations continue to push for payments for soil carbon sequestration, also known as “carbon credits,” and for other agricultural emissions “offset” payments and protocols. Perhaps under pressure to deliver, Environment and Climate Change Canada (ECCC) is working to develop emissions offset protocols and payment schemes that can include farms and farmland—initiatives including the now-in-development Enhanced Soil Organic Carbon (ESOC) offset protocol.¹ Such offset protocols would enable large emitters regulated under Canada’s Output-Based Pricing System (OBPS)² to make payments to farmers to supposedly offset emissions from OBPS-regulated facilities via soil carbon sequestration or other on-farm actions to reduce emissions and/or sequester carbon/CO₂.

For the reasons detailed on the pages to follow, the National Farmers Union (NFU) believes that offset protocols, offset projects, and emissions trading are ineffectual, illegitimate, and damaging. The NFU urges the Canadian government to shelve plans for soil-based offset protocols. In this report we provide the numerous reasons and ample evidence that underpins our position.

Before we embark on a critical examination of offset protocols and offset trading, however, let us establish a crucial distinction: **though soil-based offset protocols and payments are the wrong approach, building soil carbon and soil organic matter and supporting farmers to adopt beneficial management practices (BMPs) to speed those processes is vital.** Protecting and enriching soils and

1 Environment and Climate Change Canada, “Canada’s Greenhouse Gas Offset Credit System: Protocols,” February 22, 2023, <https://www.canada.ca/en/environment-climate-change/services/climate-change/pricing-pollution-how-it-will-work/output-based-pricing-system/federal-greenhouse-gas-offset-system/protocols.html>.

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

building soil carbon is an absolute good, but commodifying, financializing, and trading soil carbon will prove very negative, both for farmers and the environment.

Carbon-rich soils are black, alive, sweet smelling, and teeming with beneficial fungi and other organisms. Raising carbon and organic-matter levels can aid in water infiltration and retention and drought resilience, reduce 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 very high 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. For these reasons, farmers and policymakers must embrace and propagate best-possible soil-stewardship practices.

The farmers who make up the membership of the NFU strongly support measures to maximize soil carbon sequestration, but strongly oppose the notion that such soil-carbon changes can in any way "offset" emissions from fossil fuels, and we strongly oppose the idea that farmers' positive actions should be funded by payments from the largest emitters—payments provided so that those large emitters can delay, minimize, or avoid emission reductions.

In addition to the point-form overview on the following pages, additional details on offsets and soil carbon sequestration can be found in previous NFU publications:

- *Submission to the Public Comment Period for the Federal Government's Draft Greenhouse Gas Offset Credit System Regulations*, May 4, 2021, and
- *A Critical Analysis of Greenhouse Gas Offset Schemes and Draft Offset Credit System Regulations*, May 4, 2021.

Both are available at <https://www.nfu.ca/wp-content/uploads/2021/05/Fedl-Regulations-for-Offset-Protocols-NFU-submission-May-2021-Final.pdf> .

The reasons why agricultural soil-carbon offsets are illegitimate and damaging

1. Temporary soil sequestration can in no way offset essentially permanent fossil-fuel emissions

Carbon released from deep geological deposits into the atmosphere via fossil fuel extraction and combustion is essentially permanent (with resulting carbon/CO₂ remaining in the atmosphere/biosphere for centuries—much of it for more than 1,000 years³). In contrast, carbon sequestered inches below the soil surface in active, biologically cycling carbon pools is not permanently stored and is easily released by changes in farming practices or changes in land use or even by rising temperatures. Temporary storage cannot “offset” permanent release. Releasing carbon from oil and then putting it into soil in no way resolves the problem created by the initial release.

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 that 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 the air to soil or from the air to a tree—does not fix the problem that the initial addition of fossil carbon created. Fossil-fuel combustion is *addition*; soil sequestration represents *shifting*, not subtraction. The idea of soil-carbon “offsetting” is a misunderstanding of biospheric carbon dynamics—a damaging fiction.

What are offsets and offset protocols?

Note: There are two main types of offset markets: voluntary and compliance. The latter are created and regulated by governments and often mandatory for large emitters. This report focuses on government compliance markets and, more specifically, on protocols being developed by ECCC. Voluntary markets are largely unregulated, structured by large emitters, and often chaotic—resembling “the Wild West.” Voluntary markets are not specifically addressed in this report, though many of the observations and analyses developed here would apply to voluntary markets.

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 place. Governments and third-party verifiers certify offset credits under defined protocols; project proponents then sell the credits; and the credits can be traded in carbon markets until the point when a regulated large emitter buys and “retires” the credits. The retirement of the credit by the buyer is seen as regulatory compliance—the buyer’s continued or excess emissions have been “offset” by reductions or removals by the credit-selling project.

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

3 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>.

2. There is no capacity within our soils to offset any fossil-fuel emissions

Why can agricultural soils absorb atmospheric carbon/CO₂? Because past agricultural practices *released* carbon from those soils. Moreover, the quantity that those soils can absorb is equal to a portion—perhaps 75 percent—of the carbon released by those past farming practices. Most crucially, the carbon that was released from those soils is still in the atmosphere, in the form of carbon dioxide, a GHG that stays in the atmosphere/biosphere for many centuries.

Thus, when we think about soils sequestering carbon dioxide, we should not think of those soils absorbing those gases from current or future fossil-fuel combustion, but rather (re)absorbing CO₂ from past soil emissions triggered by farming practices.⁴ *Positive on-farm actions can restore previously released soil carbon back to agricultural fields but cannot remove fossil fuel emissions.* Farmland is not a sponge that can sop up industrial emissions. The carbon from oil cannot be crammed into the soil.

Figure 1, 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 (e.g., Prairie grasslands) were converted to cropland production via tillage. A large portion of soil carbon was lost within decades. Decades later still, changes in farming systems (e.g., reduced tillage) began to restore some of that soil carbon. But in most cases, it is impossible to exceed (or even match) 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. When soils absorb CO₂, we are returning to the soil the carbon that came from the soil, not carbon from fossil fuels.

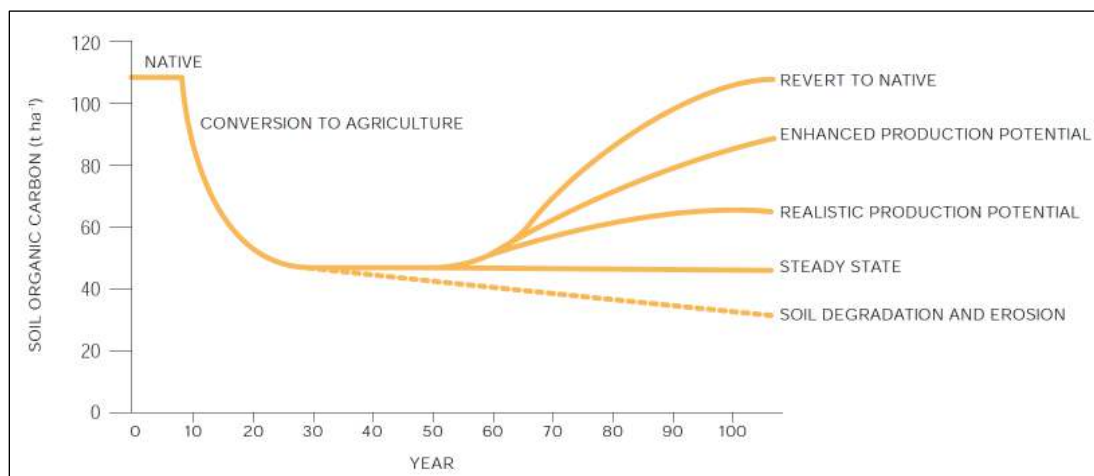


Figure 1. Soil-carbon dynamics from cultivation and improved management practices

Source: Reproduced from H.H. Janzen et al. and Agriculture and Agri-Food Canada, *Better Farming, Better Air: A Scientific Analysis of Farming Practice and Greenhouse Gases in Canada* (Ottawa: AAFC, 2008).

⁴ We need not think of previous farming practices as damaging or second rate. When a person tills grassland to make cropland, even if he or she employs the best, most soil-building and most carbon-retaining practices, that former grassland will lose carbon.

3. Agricultural emissions are rising, not falling

The foundational idea underlying emissions offsets and offset trading is this: those firms or entities that take special actions to reduce emissions and are particularly successful at doing so should be rewarded by being permitted to sell their surplus reductions (i.e., reductions that exceed requirements) to other entities that have not met emission-reduction requirements.

Thus, it is odd that the default assumption is that agriculture would be a provider and seller of offsets. As a sector, Canadian agriculture is not a leader in emissions reduction. To the contrary, agricultural emissions are rising, fairly rapidly—up 35 percent since 1990.⁵

When we look at Figure 2 or similar comparisons of Canadian economic sectors, it is revealed as odd that agriculture would be selling offsets to industry, manufacturing, or other sectors. Might the reverse not better reflect the relative success of sectors to reduce emissions?

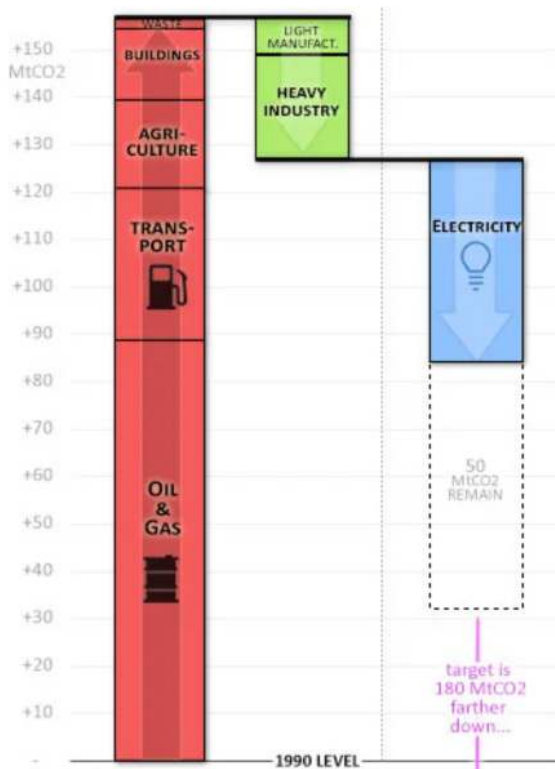


Figure 2. Increases and decreases in emissions, various Canadian sectors, 2021 vs. 1990.

Source: reproduced from Barry Saxifrage, “Canada Says Emissions are Finally Heading Down but the Numbers Seem to Tell a Different Story,” *National Observer*, May 12, 2023,

<https://www.nationalobserver.com/2023/05/12/analysis/are-canada-emissions-finally-heading-down>

It would be a peculiar offset system, indeed, if sectors with rising emissions were somehow seen as *offsetting* emissions in other sectors.

5 Darrin Qualman and National Farmers Union, “Agricultural Greenhouse Gas Emissions in Canada: A New, Comprehensive Assessment,” Second Edition (Saskatoon: NFU, 2022), <https://www.nfu.ca/wp-content/uploads/2022/06/Comprehensive-Ag-GHG-Emissions-EN-2nd-Ed.pdf>.

Admittedly, Figure 2 does not take into account the soil-carbon increases in agricultural soils—“sequestration” tonnes recorded in the National Inventory Report (NIR) in the category “Land Use and Land Use Change” rather than in the category “Agriculture.” If those soil-carbon gains are taken into account, they more-or-less equal the increases in agricultural emissions, such that net agricultural emissions can be construed as not rising. But note what has to be done here: in order to avoid the idea that agricultural emissions are rising, agricultural soil carbon sequestration must be applied against *agricultural* emissions. But if we must apply those sequestration successes against agricultural emissions, can soil-carbon gains legitimately be seen as offsetting emissions in *other* sectors? If agricultural soil-carbon gains can be thought of as offsetting anything at all, are they not best thought of as offsetting rising emissions from agriculture itself, rather than from some other sector?

4. Agriculture as a potential offset seller has an odd history

The default perception that the agricultural sector would be a source of salable offsets is an *artifact* of two arbitrary decisions in the past:

1. For the most part, carbon dioxide was the focus of Canada’s Output-Based Pricing System (OBPS), and the main GHGs produced on Canadian farms—methane and nitrous oxide—were largely excluded; and
2. Agriculture, as a sector, was excluded from the OBPS.

It is these two accidents of history (and not agriculture’s economy-leading successes in reducing emissions) that today give some the impression that agriculture can be an offset seller.

5. Why are there any offset sellers at all?

Beyond the question of the appropriateness of agricultural offsets, per se, there is an overarching question: why is any sector in Canada an offset seller? What company or sector in the Canadian economy has reduced its emissions so fast and by so much that it should have credits to sell?

Ninety-nine 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. Moreover, even among industrialized nations, Canada is a laggard; every G7 industrialized nation has cut its emissions faster and deeper than we have in Canada.⁶ So where in our ultra-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?

Here is another way to think about this: with world-topping per-capita GHG emissions and slow progress toward our 2030 or 2050 goals, Canadians are now faced with the need to make very rapid reductions in overall GHG emissions: reductions of about 7 percent per year, year after year after year.⁷ If we

6 Barry Saxifrage, “Canada Says Emissions Are Finally Heading down but the Numbers Seem to Tell a Different Story,” Canada’s National Observer, May 12, 2023, <https://www.nationalobserver.com/2023/05/12/analysis/are-canada-emissions-finally-heading-down>.

7 Such a reduction rate would lead to Canadian emissions being 40 percent below current levels by 2030 and having a residual of about 14 percent of current emissions remaining by 2050—emissions, presumably, that we’d need to offset by tree planting or some other emissions-removal means, although such means remain highly uncertain. Note that this 7% represents “exponential decay,” not linear, i.e., it is the reverse of “compound interest”: emissions would fall 100, 93, 86.5, 80.4, 74.8, 69.6, 64.7, 60.2 not 100, 97, 90, 83, 76, 69, 62, 55, so that, each year, no matter what the year, emissions would be 7% lower than the year before.

required every Canadian firm and sector to cut emissions at that rate, and sustain that rate for decades, all would face significant challenges. Moreover, which sectors or companies could *exceed* such challenging reduction percentages and generate offset credits to sell? *If we were to require Canadian sectors to reduce emissions by the amounts actually required to meet our commitments, all would struggle; virtually all sectors would find themselves as offset credit buyers, not sellers.* In this scenario, with surging demand for offset credits and little or no supply, prices of offsets would spike and emission-trading markets would seize up. 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. Indeed, offset trading schemes are both a cause and consequence of lethargic climate action. Because we are slow to act but unwilling to admit it, we turn to the reassuring fictions of offsets; and those offsets—by licencing delays in reductions among the largest emitters—further slow progress. A vicious cycle.

6. Agriculture’s possible rejection of a net-zero goal?

Canada has made international commitments to reach net-zero emissions, for our economy overall, by 2050. Most other nations have made similar commitments. Moreover, the *Canadian Net-Zero Emissions Accountability Act* legislatively commits our nation to achieve net-zero greenhouse gas emissions.⁸ Net-zero by 2050 is the law. And failing to reach net-zero by mid-century will lead to a multiplication of damaging and irreversible climate impacts. Anyone working on agricultural and climate policies should adopt a position that, overall, Canadian emissions will be net-zero in just 27 years.

Many farmers and farm organizations have embraced a net-zero goal. These include Grain Growers of Canada, Dairy Farmers of Canada, and Egg Farmers of Canada. To quote the Grain Growers: “We are proud to bring together experts from inside and outside the agriculture sector to develop a holistic pathway to zero emissions by 2050 that is realistic and practical for Canadian grain farmers.”⁹

But many other farmers and farm organizations resist or reject net-zero—claiming it is an inappropriate or unachievable goal. They argue for lower ambitions and weaker targets for Canadian agriculture.

Any rejection of a net-zero path for Canadian agriculture, however, triggers certain consequences. Most important, if farmers collectively reject net-zero, we are, in effect, saying that we expect some other sector or entity to mop up our residual emissions—to *offset* our continuing emissions. If agriculture is one of Canada’s few sectors that chooses not to pursue a net-zero goal, if our sector chooses, instead, to depend on others to offset our continuing emissions, we disqualify ourselves as offset sellers. We are, in effect, choosing to position ourselves as offset buyers. Stated another way: it would be perverse for a sector not on track for net-zero to be taking money to offset emissions from sectors that are. Such a situation would further reduce the already dubious legitimacy of offset schemes.

8 Government of Canada, *Canadian Net-Zero Emissions Accountability Act*, <https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/net-zero-emissions-2050/canadian-net-zero-emissions-accountability-act.html>

9 Road to 2050, “Grain Growers of Canada’s ‘Road to 2050’ Reaches New Milestone, Announces Expert Advisory Council,” News release, Road to 2050, December 1, 2022, <https://www.ggcroadto2050.ca/grain-growers-of-canada-road-to-2050-reaches-new-milestone-announces-expert-advisory-council/>.

Three quantification methods

Before continuing this critique of soil-based agricultural offset schemes, we must pause to briefly outline the three protocol quantification methods contained in ECCC's regulations.¹⁰

1. Tonne-tonne. This is perhaps the most intuitive. Essentially, projects are credited based on the number of tonnes of CO₂e they prevent from entering the atmosphere or remove/sequester from the atmosphere on a permanent basis, with "permanent" effectively meaning a minimum of 100 years. If a project removes one tonne during the crediting period and has no reversals/releases and maintains a risk-management plan for 100 years and submits reports for 100 years, it has fulfilled the requirements for an offset credit of 1 tonne CO₂e.

2. Tonne-year. Because the 100-year "permanence" and reporting periods for tonne-tonne quantification can lead to problems of farmer lock-in and liability (see point 7, next) ECCC's regulations include alternatives; one is tonne-year. The regulations define tonne-year quantification thus: "...the determination of the quantity of GHGs removed from the atmosphere is based on the climate benefit from the reduced radiative forcing that results from withholding carbon from the atmosphere over a reporting period and for which the proponent is not required to monitor the quantity of GHGs emitted and GHGs removed from the atmosphere...." Essentially, this allows projects to gain credits for holding GHGs for a short period of time—perhaps as little as a year or a decade. There are few details available around this quantification method and repeated requests to ECCC have done little to add to the picture, but here is what might be the case: Intuitively, if a tonne-tonne project (see previous) receives a credit for holding one tonne CO₂e for a minimum of 100 years, then a tonne-year project that held one tonne for just one year would receive 1/100th credit. In practice, though, that is not likely to be the case. As a result of using "discount rates" for the future, it is more likely that a project using a tonne-year quantification method and that held one tonne for one year would receive more—perhaps 1/55th or 1/46th of a full tonne-tonne credit.¹¹ To put it another way, a tonne-year quantification method would credit a project holding about 50 tonnes for one year as equivalent to a project that held one tonne "permanently," i.e., for a minimum of 100 years. Of course, releasing GHGs after just a year, or even a decade, clearly has little or no positive effect in fighting climate change (see point 8, below).

3. Hybrid tonne-year. To avoid delving deeper into these complex protocols and quantification methods, we will suggest that our critical assessments of tonne-year and tonne-tonne quantification systems will apply to the hybrid tonne-year quantification method and thus not go into detail on the latter.

7. Farmer lock-in, liability, and unworkable century-plus monitoring and reporting

ECCC has been clear: offset tonnes must be unique, additional, and *permanent*.¹² What does "permanent" mean? For the tonne-tonne quantification method, it means a minimum of 100 years. This century-plus permanence period is given effect by the 100-year monitoring and reporting requirements and risk-management period stipulated in the Regulations. But century-long "permanence" is both too short (when compared to the millennia-long effects of releasing fossil-fuel

10 "Canadian Greenhouse Gas Offset Credit System Regulations" (n.d.), <https://laws-lois.justice.gc.ca/PDF/SOR-2022-111.pdf>.

11 ECCC has put the details of the tonne-year quantification method in the "to be determined" category, but academic papers on the subject suggest numbers around perhaps 50 tonne-years equal to permanent/100-year tonne-tonne sequestration. See, for example, Philip Fearnside, Daniel Lashof, and Pedro Moura-Costa, "Accounting for Time in Mitigating Global Warming Through Land-Use Change and Forestry," *Mitigation and Adaptation Strategies for Global Change* Mitigation and Adaptation Strategies for Global Change (2000).

12 Canadian Greenhouse Gas Offset Credit System Regulations, 4.

carbon) and too long (from a farm business risk perspective). Century-long reporting and monitoring requirements create the following, seemingly insurmountable, problems for farmers:

i. On-farm practice lock-in. Potentially, farmers would have to work in ways that maintain the sequestered carbon in the soil for a minimum of 100 years (and up to 160, when a maximum crediting period is added to the 100-year monitoring period). It would seem that farmers would have to maintain certain practices (e.g., cover cropping) or land uses (perhaps forage or grassland) for 100 years or more. Farmers would be highly constrained, into the 2120s and beyond.

ii. Unlimited liability. Under the Regulations, if a project releases or “reverses” its sequestered CO₂ and that reversal is deemed “voluntary,” the project proponent and/or the farmers within the project will have to return the credits. In most cases, this means they will have to buy them back. But consider this example: a farmer participates in a soil carbon protocol project (that uses tonne-tonne quantification) and receives \$10 per tonne CO₂e for his or her offset credits in the 2020s. Now imagine that forty years pass, 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. In the case of a release/reversal, farmers would probably have to buy back those credits at that much higher price. One can even imagine scenarios in which liability and caveats or other encumbrances on land titles and restrictions on land-use changes could result in reductions in land values that exceed offset credit income, leaving farmers as net losers.

iii. Unrealistic monitoring expectations. In a tonne-tonne protocol, to avoid being held liable for voluntary reversals and facing the prospect of buying back credits, projects/proponents/farmers would have to ensure that risk management plans were kept in place for at least 100 years and that project reports were filed regularly over that same period. It is wholly unreasonable, however, to assume that project proponent and aggregator corporations will remain in business for 100+ years.

iv. The challenge of keeping carbon in the ground. Despite our best efforts, even if farmers were to maintain all BMP and risk management plans and monitoring, our farmland may release large amounts of carbon over the next century. Even taking into account all our emission-reduction commitments and programs, Earth is on track to warm 2.6 degrees Celsius this century.¹³ The Prairies are warming at twice the global average rate and are projected to continue doing so.¹⁴ Thus, 80+ percent of Canadian farmland is on track for 5.2 degrees C of warming this century. We know from scientific studies that hot, dry periods cause soils to lose carbon, for two reasons:

- i. As soils warm, soil organisms can become more numerous and active and break down and release soil 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...”¹⁵ and
- ii. Hot, dry periods result in smaller *additions* of carbon because of reduced plant growth.

For the four reasons listed above, and others, nearly everyone, including ECCC staff, have concluded that tonne-tonne offset protocols built on 100-year “permanence” are wholly unworkable for agricultural offsets, especially soil carbon sequestration protocols. The “solution,” however,—tonne-year quantification systems—is much worse.

13 United Nations Environment Programme, “Emissions Gap Report 2022” (Nairobi: UNEP, 2022).

14 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.

15 William Schlesinger and Jeffrey Andrews, “Soil Respiration and the Global Carbon Cycle,” *Biogeochemistry* 48, no. 1 (January 2000): 11.

8. Tonne-year quantification as a solution?

Clearly, locking farmers into farming practices and monitoring and reporting and risk-management requirements for 100+ years is a non-starter. Thus, ECCC has advanced an alternative: the tonne-year quantification method.

As noted above (see box on “Three quantification methods”), tonne-year quantification methods would essentially pay farmers, per year, for short-term storage of carbon in soils and elsewhere or for adopting carbon-sequestering practices. Briefly, here are some of the *many* problems with this approach.

- A. **Tonne-year offsets are not permanent.** The Canadian Greenhouse Gas Offset Credit System Regulations, Section 4(1), stipulates that “GHG reductions” must be “real, additional, quantified, verified, unique, and *permanent*” [italics added]. Holding planet-warming GHGs back from the atmosphere for a few years or a decade or two, then releasing those GHGs into a fast-warming world appears to be the opposite of *permanent* reductions in GHGs. Crucial to remember: creation and trading of these offset credits *greenlights fossil fuel GHG emissions from the largest emitters—emissions that are essentially permanent: affecting the climate for a thousand years.* No reasonable person would agree that holding back emissions for a few years qualifies as a “permanent” reduction. Indeed, the short-term diversion of emissions would seem to have no significant medium- or long-term benefit whatsoever.
- B. **They are not offsets.** Though the NFU would not, some people might agree that a tonne-tonne protocol that holds a tonne CO₂ for 100 years can “offset” the release of a tonne of CO₂ via fossil fuel combustion. But that same tonne of fossil-fuel CO₂ can in no way be “offset” by very temporary storage. It is absurd to call small delays in the warming and destabilizing effects of emissions on our atmosphere “offsets.” Such schemes amount to little more than carbon catch-and-release.

In light of 1,000-year CO₂ residence time in the atmosphere/biosphere, 100-year “permanent” offsets seem mismatched; but 1-, 5-, 10-, or perhaps 20-year tonne-year offsets seem dangerously inadequate—damaging to the credibility of Canada and our emission-reduction efforts. The idea that one can offset permanent releases of CO₂ from fossil fuels with schemes that hold back CO₂ for a few years is illegitimate, damaging, and even dangerous—it is folly. Most simply, it is wrong. ECCC must abandon such ill-conceived and future-imperilling schemes.

9. Offsets delay and diminish action on actual emissions reduction

Canada’s federal and provincial ministers of environment are clear: offset protocols and credit trading delay and reduce emissions cuts among Canada’s largest emitters. To quote those ministers: “GHG offsets are a substitute for direct emission reductions required by the regulated emitter. ... GHG offsets take the place of direct emissions reductions...”¹⁶ Indeed, the main reason that a large emitter would pay a farmer or some other offset seller is so that that large emitter could delay or avoid spending money to actually reduce emissions. Large emitters have a choice: cut emissions or buy offsets. They buy offsets *instead of* cutting emissions. No one should want that, farmers least of all.

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

10. Emission tonnes are real and certain; offset tonnes are modelled and elusive

The corporations that will be the offset buyers produce consistent large quantities of well-quantified emissions. Emissions from oil refineries, fertilizer plants, and other industrial facilities are real and measurable to a high degree of accuracy and certainty.

But soil-carbon changes purported to offset these emissions are highly variable, mathematically modelled, and only very roughly quantified. Leading researchers point out that in any given year, even if the best-possible BMPs are employed, soil can gain or lose carbon.¹⁷ Indeed, two fields right next to each other may have carbon balances moving in opposite directions. Whether a field gains or loses carbon and the rate of loss or gain depend upon temperature and rainfall, the history of the field, the crop grown, insect or disease pressures, and many other factors. Purported soil carbon gains are modelled and often notional—far less certain and consistent than the emissions they are said to offset.

This issue of on-again-off-again soil carbon gains, while problematic for tonne-tonne offsets that may run for 100+ years, pose a crucial problem for tonne-year schemes that may run for just a handful of years. Even with the best-possible carbon-building BMPs, if the weather is very hot and dry and crop yields are low, fields in a given region will lose rather than gain carbon. Thus, soil-carbon protocols amount to attempting to offset real emissions with soil-carbon changes that often do not exist.

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

Many will assume that offset protocols and credit trading have the effect of holding emissions constant: one party (the credit seller) emits less or removes carbon dioxide and this offsets or cancels out an emission from another party (the credit buyer) and the net result is that emissions stay the same—they do not rise. But this is not the case. Offset systems can easily exist within sectors and economies with rising emissions.

Offset Regulations, protocols, and credits exist as appendages 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. It would be perverse, for example, if fertilizer companies (with rising emissions) purchased soil carbon offset credits from farmers (with rising emissions) and this was somehow seen as equivalent to emissions reduction.

12. Farmer complicity

In offset markets, when a farmer takes money for doing the right thing, he or she is receiving payment so that a corporation or other entity can continue doing the wrong thing—so that a high-emission fossil-fuel company, utility, or fertilizer maker can delay action and minimize its investment in emissions reduction. GHG offset protocols, emissions trading, carbon markets, and similar schemes

17 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), <https://static1.squarespace.com/static/5fc882025388527f26b77665/t/5ff2b6fa0db4f45ccb302/1609742076069/2020-0223+PSCB+Report+2020+Final.pdf>.

are designed to enable the delay of actual emission reductions by the largest emitters. Thus, offset projects and credit payments make farmers accomplices in schemes that greenlight or greenwash the high emissions that endanger humanity's future.

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 the companies and their shareholders by delaying emission-reduction investments and actions. For ethical reasons, many farmers cannot accept such payments.

13. Corporate-funded offsets create a weak patchwork of incentives

Many people and organizations advocate paying incentives to farmers to speed adoption of BMPs that sequester carbon and protect/build soils. Perhaps a few of the practices that we might want farmers to adopt could be incentivized via offset payments (ignoring the many critiques above and below) but a large number of practices could not qualify—leaving many farmers, acres, and BMPs unsupported. Thus, choosing offset protocols and payments as a primary tool to speed farmer adoption of BMPs risks creating an incoherent patchwork of incentives and practices.

Consider these examples:

- A farmer already utilizing a practice, even if he or she is almost alone in doing so, could not be paid, as this fails the requirement of additionality.
- A farmer who wishes to adopt a practice may not be able to access payment via an offset project if corporate project proponents or aggregators are not active in that region.
- There is no reason to believe that the cost of adopting a practice (determined by agronomic factors) will in any way align with fluctuating carbon credit prices (determined by carbon market forces) and, thus, there is no way to predict if a given practice can be supported or incentivized by carbon credit payments.
- A farmer may not attract the interest of a corporate project proponent or aggregator because the farm's acreage is too small.
- Farmers unwilling to accept money from large-emitter corporations would be excluded (see previous point regarding "Farmer complicity").
- Farmers unwilling to turn over large troves of detailed and sensitive business and production data to corporate project proponents and aggregators could not participate (see next point).
- Finally, and most crucially, protocols will only be developed for a small and narrow range of on-farm practices, leaving most BMPs unsupported via offset trading mechanisms.

It is clear that agricultural offset projects and credit selling cannot provide the primary means to advance rapid soil health restoration or gains in soil organic carbon levels. A patchwork of large-emitter-funded incentives is, at best, a fourth-rate way of accomplishing our soil-building and emission-reduction goals. Superior and more rapid means exist and should be pursued (for these, see the "Recommendations" section, below).

14. Offset programs create incentives for farmers to side with large emitters and oppose regulations

Offset protocols and attendant credit payments would create an incentive for farmers to oppose regulations on large emitters that could force them to reduce emissions. For an offset to be valid, it must be additional with respect to existing laws (i.e., above and beyond what is currently required by

legislation and regulations). If a future government brings in more stringent legislation that makes the emissions reduction from an offset project mandatory, that project will cease to generate credits and, thus, payments to farmers. In effect, offset schemes and payments give farmers a financial interest in governments continuing to delay mandatory emissions reductions. This creates a system wherein both the corporate emitters and the credit-selling farmers will have an incentive to delay regulations and attendant emissions reductions.

To be clear, farmers should absolutely receive financial support as they work to mitigate GHG emissions. That support should not hold them hostage to relying on emitters for funding and, perhaps as a result, resisting the legislation necessary to drive further emissions reductions.

15. Farmer data requirements

To participate in offset projects and receive payments, farmers will have to give third-parties access to large quantities of data. ECCC, the federal government, and entities advocating for offset protocols and projects have not given sufficient thought to the potential negative effects if such projects lead to a torrent of farmer data being transferred to third-party, for-profit corporations. Just as Google and Facebook are monetizing user data, so too will corporate offset proponents and aggregators.

16. Keeping several sets of books, and counting the same tonne twice (or thrice)

The same tonne of CO₂ sequestered in farmland soil could, conceivably, be counted several times in several contexts, including:

1. In a voluntary offset market, be counted by a corporation as offsetting their emissions and advancing them toward their corporate net-zero pledges. (Corporations such as Maple Leaf, Danone, Pepsico, and Kraft Heinz all have net-zero pledges and rely, at least partly, on credits purchased in voluntary markets to offset their emissions, or on pointing to on-farm practices that, they claim, their policies have helped advance.)
2. In the compliance market, as enabling a corporation to meet its commitments under the OBPS and, thus, continue emitting without further penalty or impediment.
3. In Canada's official report to the UN—the National Inventory Report (NIR)—counted on farmers' side of the ledger as, to some eyes, offsetting the emissions coming from agriculture. For example, Saskatchewan Premier Scott Moe has stated that "We can say with the utmost confidence that in [Saskatchewan], not only is agriculture net-zero, we most certainly are quite likely net negative and we're just trying to determine to what degree that is."¹⁸

In each of these systems individually, there may be no double counting—it may be that each tonne is counted only once. But across the various systems running in parallel, the same tonne of sequestration does double or triple duty. The same tonne, in different contexts, will be construed as greenlighting an emission at a high-emission facility (OBPS); helping farmers achieve reduced or net-zero emissions (NIR); and enabling agri-food and other corporations to claim that they have achieved net-zero emissions (in Annual Reports to shareholders and to customers and the media). This will confuse citizens and, thus, hamper policy implementation and impede emissions reduction.

18 Karen Briere, "Sask. Premier Says Ag Emissions Reach Net Neutral," *The Western Producer*, December 15, 2022, <https://www.producer.com/news/sask-premier-says-ag-emissions-reach-net-neutral/>.

17. Offsets are the *last things* we should use

Let us, for the moment, put aside the many 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.

The Oxford Principles for Net Zero Aligned Carbon Offsetting urge governments, corporations, and others to “Prioritize reducing your own emissions—Minimize the need for offsets in the first place. ... Reduce first, offset with high-quality offsets second....”¹⁹

For many types of emissions there are clear paths to reduction. For example, CO₂ 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 eliminated via efficiency or alternatives. One example is (a portion of) nitrous oxide from crop production. Nitrous oxide is a GHG roughly 300 times more powerful than carbon dioxide in terms of trapping heat. Nitrous oxide emissions can be dramatically 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, though they can be reduced, cannot be eliminated. It is against these types of hard-to-eliminate 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, etc.
5. Work for systems change. For example, move agriculture from its current focus on exponential growth in output to a new foundation focused on feeding people and maximizing wellbeing.
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. as a last resort to deal with irreducible residual emissions.

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

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

18. The relative ease of offsets does not align with the magnitude of the emergency we face

To paraphrase and update a passage from a previous NFU report²⁰:

In year 35 of the climate crisis era,²¹ humanity is on track for 2.6 degrees Celsius of warming this century²²—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.

That report noted a “risk of economic, biospheric, and civilizational collapse.” Many experts agree. In the face of this massive calamity roaring down upon us, trading dubious offsets seems massively inadequate—the most reckless of folly.

As a 2019 NFU report stated: “Farmers, other citizens, all sectors, and all levels of government must mobilize, with near-wartime-levels of commitment and effectiveness, to slash emissions.”²³ 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 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.

20 NFU, Submission to the Public Comment Period for the Federal Government’s Draft Greenhouse Gas Offset Credit System Regulations, May 4, 2021, <https://www.nfu.ca/wp-content/uploads/2021/05/Fedl-Regulations-for-Offset-Protocols-NFU-submission-May-2021-Final.pdf>.

21 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.

22 United Nations Environment Programme, “Emissions Gap Report 2022.”

23 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>.

Conclusions and recommendations

“Soil C sequestration is time limited, non-permanent, difficult to verify, and is no substitute for GHG emission reduction.”

—Pete Smith, a Coordinating Lead Author of the UN Intergovernmental Panel on Climate Change (IPCC) Special Report on Climate Change and Land (2019); a Coordinating Lead Author of the Agriculture and Forestry Chapter of the IPCC Fifth Assessment Report, Mitigation volume (2014); a Coordinating Lead Author of the IPCC Fourth Assessment Report, Mitigation volume, Chapter 8, Agriculture (2007); and a Coordinating Lead Author for the UN FAO Status of World Soil Resources report (2015).²⁴

The preceding list of eighteen points is critical—negative. It details a litany of problems with emissions offsets. But we need not despair. Just the opposite. Effective, permanent solutions are at hand: rather than struggle to sequester and monitor for 100 years (tonne-tonne-based protocols) or to sequester GHGs very briefly then release them to further damage the climate (tonne-year), *don't emit the GHGs in the first place*. Rather than complex, unworkable schemes to catch carbon after it is released, don't release it. This is the NFU's advice to government: Take ambitious, rapid steps to actually and rapidly cut emissions in all sectors rather than implementing Enron-like accounting schemes wherein carbon is moved from one box to another and held there for wholly inadequate periods of time. We must avoid making 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.

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.

Recommendations

Based on the reasoning and evidence above, the NFU recommends the following policy approach (these are re-iterated from our May 2021 submission, and expanded):

1. For at least the next two decades, shelve agricultural offsets and emissions trading (though not the carbon levy) and focus instead on *rapidly reducing actual emissions from fossil fuel combustion*.
2. Never use projects or credits to offset *fossil fuel* emissions—which should instead be rapidly *reduced* using mature, affordable technologies. Use protocols, projects, and credits solely to offset truly irreducible portions of emissions (such as residual enteric emissions from cattle).
3. Retain a strong commitment to the principles of additionality, quantification, verification, uniqueness, and authentic permanence.

²⁴ Pete Smith, “The Pros and Cons of Soil Carbon Sequestration” (Soil Carbon Sequestration: Problems, Possibilities and Practices. A workshop organised by the FCRN, London, January 21, 2010), https://fcrn.org.uk/sites/default/files/FCRN_SoilCarbon_Smith.pdf.

4. Scrap tonne-year quantification, as it fails to meet the requirement for permanence.
5. Do not allow cross-border credit trading or out-of-country offset projects.
6. Acknowledge that soil-carbon offsets are unworkable, for these reasons:
 - a. Soils can absorb the carbon previously released from soils, but not from fossil fuels.
 - b. Soil sequestration is not permanent, especially in a warming climate.
 - c. Agriculture has not displayed the economy-leading emissions-reduction successes requisite for an offset-selling sector.
 - d. As a way of funding soil-building BMPs, offsets create an incomplete patchwork, to the exclusion and detriment of many farmers.
7. 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 BMPs 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—paying farmers for adopting practices rather than on a per-tonne basis.** Farmers who grasp climate change realities want to reduce their own emissions, not offset 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.
9. 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.
10. Economy-wide, implement programs and regulations that achieve the magnitude and speed of emissions reductions necessary to stabilize global temperatures well below 2 degrees C.

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, nutritious, and delicious food system for all Canadians.

Respectfully submitted by the National Farmers Union, July 28, 2023