UNIVERSITY OF CALGARY
THE SCHOOL OF PUBLIC POLICY

SPP Briefing Paper
Volume 14:34
November 2021

THE SIMPSON CENTRE
FOR AGRICULTURAL AND FOOD
INNOVATION AND PUBLIC EDUCATION

A PRIMER ON CARBON TAX RELIEF FOR FARMERS

Sarah Dobson

A PRIMER ON CARBON TAX RELIEF FOR FARMERS

Sarah Dobson

SUMMARY

Canada's federal carbon tax currently applies in Alberta, Saskatchewan, Manitoba and Ontario. Farmers in these provinces lack consistency on the tax, which is differentially applied to agricultural fuels. They must navigate between distinct sets of rules depending on the type of fuels they're using and what those fuels are used for. Some fuels are eligible to be fully exempt from the carbon tax; others may be allowed a partial exemption, and still others may force farmers to face the full amount of the carbon tax.

The most significant agricultural fuel sources facing the full amount of the carbon tax are natural gas and propane used for grain and oilseed drying and for the heating of barns and other farm buildings. The burden of these tax payments on farmers is unclear. Agriculture and Agri-Food Canada reports carbon tax cost estimates for grain and oilseed drying that range from an average of $210 per farm in Alberta to $774 per farm in Saskatchewan. Individual farmers, in contrast, have reported carbon tax costs of up to $10,000.

Agriculture's sector-level emissions and trade flows are comparable to those of many industries in Canada that meet the criteria for being labelled an emissions-intensive and trade-exposed (EITE) industry. EITE industries are typically eligible to receive carbon pricing support on all priced emissions as part of either the federal government's output-based pricing system (OBPS) or similar provincial government programs. Agriculture is typically excluded from these programs because of the thousands of small producers in the sector, most of whom remain below the minimum emissions thresholds required for participation. As a result of this exclusion, agricultural subsectors have generally not been evaluated to see whether they meet EITE criteria.

With all federal parties in favour of additional carbon pricing support for farmers, it is likely that support will soon be expanded to additional fuel uses. Future support to the agriculture industry is best offered via a mechanism that maintains the full incentive of the carbon tax. Two options that satisfy this objective are either a lump sum rebate to farmers or an output-based rebate system specific to agriculture. With both options it is important that any rebate amount is divorced from emissions and fuel use, A third option, which does not maintain the incentive of the carbon tax, is to expand farm-fuel exemptions. All of these options come with advantages and disadvantages, which would need to be carefully weighed.

It would also be informative to complete an EITE assessment for agriculture that is based on all of the sector's combustion emissions being subject to the carbon tax. This would help to inform the potential impact of the carbon tax on agricultural production costs, farm profitability and the global competitiveness of Canada's farmers. Such an assessment would provide important insights on how to best support Canada's agricultural competitiveness without undermining its overall emissions reduction plan.

INTRODUCTION

The Canadian government announced its intent to introduce a pan-Canadian price on carbon pollution in October 2016 (Environment and Climate Change Canada 2016). For provinces that failed to implement their own qualifying system, the federal carbon tax, first set at $20 per tonne, came into effect on April 1, 2019 (Environment and Climate Change Canada 2021e). The tax has risen annually in $10 increments since then and was originally scheduled to peak at $50 per tonne in 2022. In its December 2020 climate plan, *A Healthy Environment and A Healthy Economy*, the federal government proposed introducing annual increases of $15 per tonne starting in 2023, with the price rising to $170 per tonne in 2030 (Environment and Climate Change Canada 2020). This updated price schedule was confirmed in August 2021 when Environment and Climate Change Canada released its new federal carbon pollution pricing benchmark (Environment and Climate Canada Canada 2021f). Currently, the federal carbon tax applies in four provinces: Alberta, Saskatchewan, Manitoba and Ontario. This short paper focuses on the impact of the federal carbon tax on farmers in these provinces. It also discusses basic principles for providing farmers with efficient carbon pricing support.

AGRICULTURE AND CANADA'S CARBON TAX

Tax support for farmers is common worldwide. A recent Organisation for Economic Co-operation and Development (OECD) report reviewed agricultural taxation in 35 OECD countries and emerging economies, finding that all countries offer some form of tax support to farmers (OECD 2020). Fuel tax support is the most common and is available in 29 of 35 countries, including Canada.

Fuel tax support most often takes the form of exemptions, reductions or refunds in excise taxes on fuel that is used for farming. Diesel is the most common fuel to be eligible for tax relief, with some countries additionally extending support to gasoline, fuel oil, natural gas and propane. The OECD report provides estimates of the annual value of agricultural fuel tax concessions for a subset of 22 countries. In 2018, among countries that had support mechanisms in place (16 of 22), these estimates range from a low of US$9 million in Japan to a high of $1,188 million in France (OECD 2020). As a share of the total value of agricultural production, fuel tax support is again lowest in Japan at 0.1 per cent and highest in Latvia at just over 3.5 per cent

The OECD's estimate of the value of fuel tax support in Canada in 2018 is US$228 million, corresponding to 0.5 per cent of the total value of agricultural production. This support is provided at the sub-national level with all 10 provinces, plus the Yukon, providing exemptions or rebates to farmers on provincial fuel excise taxes.[1] The level of provincial excise taxes and the supports for farmers are detailed

[1] At the national level, farmers do not receive any support and pay the full amount of the federal excise tax on both gasoline (10 cents per litre) and diesel (four cents per litre).

in provincial fuel and gasoline tax acts and regulations. The level of support, mechanisms of support and qualifying fuels and activities tend to differ from one province to the next (OECD 2020).

As a global industry with largely homogenous products, one of the key motivations for the provision of tax support to agriculture is protecting the competitiveness of domestic farmers. The widespread use of fuel tax relief reflects its importance as a key input to agricultural production.

For Canadian farmers, who make up Canada's third largest export industry (accounting for 10 per cent of total domestic exports), the announcement of the federal carbon tax introduced concerns over how the higher costs of production may impact overall farm profitability, as well as their competitiveness in a global market. When the tax was announced in 2016, for example, Canadian agriculture had combustion emissions from on-farm fuel use of 12.5 million tonnes (Environment and Climate Change Canada 2021a). Based on these emissions, farmers would have been anticipating $125 million in carbon tax payments in 2019, growing to $625 million in 2022. Relative to 2016 fuel expenses of $2,650 million (Statistics Canada 2021b), this corresponded to an anticipated increase in fuelling costs of nearly five per cent in 2019, growing to nearly 24 per cent in 2022. In addition to the direct cost of the carbon tax on agricultural fuels, farmers also anticipated increases in indirect costs as a result of the carbon tax being applied in sectors such as fertilizer manufacturing, electricity and freight transport (Agricultural Producers Association of Saskatchewan 2021). Of particular concern to farmers is if they are no longer able to profitably sell their product at global prices, there may be a decrease in production and a lowering of their global market share.

The enabling legislation for Canada's carbon tax, the *Greenhouse Gas Pollution Pricing Act* (GGPPA), partially addressed this concern by providing an exemption for farmers from the carbon tax on gasoline and light fuel oil (diesel) that is used in farm trucks and tractors, other farm vehicles that are not licensed to operate on a public road, industrial machines and stationary and portable engines (Canada Revenue Agency 2020). Also eligible for a partial exemption (80 per cent) from the carbon tax is natural gas and propane that is used for heating or the production of carbon dioxide in the operation of a commercial greenhouse. Explicitly excluded from the carbon tax exemption, however, is any other farm fuel that is used for heating or cooling of a building or similar structure.

In 2019, combustion emissions from agriculture in the four provinces in which the federal carbon tax applies were approximately 11,800 kt CO_2e, with 9,300 kt attributable to off-road transportation and 2,500 kt attributable to stationary

combustion.[2] Off-road transportation captures emissions from agricultural vehicles such as tractors and combines (Environment and Climate Change Canada 2021c). Under the provisions of the GGPPA, these emissions are exempt from the carbon tax. Stationary combustion, in comparison, captures emissions from on-site machinery operation and heating (Environment and Climate Change Canada 2021d). Some portion of these emissions face the full carbon tax.

The two most significant sources of agricultural emissions that are not eligible for a carbon tax exemption are grain and oilseed drying and the heating of barns and other farm buildings. A breakdown of emissions by farm type and fuel use for the stationary combustion category is not available so it is difficult to assess the emissions attributable to these sources. Agriculture and Agri-Food Canada (AAFC) estimates that grain and oilseed farmers in Alberta, Saskatchewan, Manitoba and Ontario made $33 million in carbon tax payments in 2019 (Agriculture and Agri-Food Canada 2021b). This suggests emissions from grain drying in these provinces were approximately 1,650 kt CO_2e in 2019 (corresponding to 66 per cent of the stationary combustion estimate for agriculture).

The initial impact of the carbon tax on farmers in 2019 was compounded by a particularly wet year, leading to a large increase in drying costs for grain. In Ontario, for example, a wet spring delayed crop planting. The shorter growing season meant corn did not dry to typical levels in the field and was instead harvested at moisture levels of 30 per cent or more. This is eight percentage points higher than a typical year and required double the amount of fuel for drying (Greig 2020). The Grain Farmers of Ontario, a commodity organization, estimated the carbon tax cost for corn drying in 2019 was $5.50 per acre (Grain Farmers of Ontario 2020). For the same year, Keystone Agricultural Producers of Manitoba estimated the carbon tax for drying corn at $3.59 per acre when using propane and $3.42 per acre when using natural gas (Keystone Agricultural Producers of Manitoba 2020).

The wet harvest of 2019 contributed to a strong lobby to have the agricultural carbon tax exemptions extended to include additional sources (Heppner 2020). A private member's bill, Bill C-206, *An Act to Amend the Greenhouse Gas Pollution Pricing Act (qualifying farming fuel)*, was introduced by a Conservative Party of Canada MP in February 2020 and proposed to add propane and marketable natural gas to the list of qualifying farm fuels that are eligible for exemption from the carbon tax. The Liberal Party, however, is not supporting the bill. Rather, the 2021 federal budget included an alternative provision for farmers, providing a commitment to "return a portion of the proceeds from the price on pollution directly to farmers in backstop jurisdictions (currently Alberta, Saskatchewan, Manitoba and Ontario), beginning in 2021-22" (Government of Canada 2021a).

---

[2] Canada's official greenhouse gas inventory (Environment and Climate Change Canada 2021a) reports agriculture and forestry emissions aggregated together for both the stationary combustion and off-road transportation categories. The Appendix of Dobson, Winter and Boyd (2019) provides a suggested methodology for disaggregating the combined estimate into separate estimates for agriculture and for forestry. The calculation of the agriculture estimate reported here follows this methodology.

The burden of the carbon tax on farmers is a source of current debate. Estimates of average carbon tax costs for all grain and oilseed drying, released by AAFC, based on data submitted by the provinces, range from $0.16 per acre in Alberta to $1.92 per acre in Ontario (Agriculture and Agri-Food Canada 2021b) (Table 1). Estimates of average carbon cost payments per farm range from $210 (Alberta) to $774 (Saskatchewan).

Exact carbon costs due to grain and oilseed drying depend on a range of assumptions and conditions, notably crop type and climate. As a result, it is difficult to make comparisons across the provinces. The estimates for Alberta and Saskatchewan, for example, are based off of historical data while the estimates for Ontario and Manitoba are specific to the wet harvest of 2019. Ontario's estimates are further increased by the province having a higher proportion of corn in its crop mix, which is harvested at higher moisture and is more expensive to dry than other crops. Farmers and industry organizations have argued the AAFC estimates, which are averaged across all farms and all grain production in each province, are an underestimate of true costs (Rabson 2020a). First, they do not account for the fact that not all farms have on-site grain dryers. Second, they downplay the higher costs faced by farmers of grains that are more expensive to dry. While AAFC acknowledges that average costs will be higher for a larger farm, the potential discrepancy is large. For example, in Saskatchewan, individual farmers have reported direct carbon tax costs of up to $10,000 from grain drying (Rabson 2020a). This is nearly 13 times higher than the AAFC estimate of the average carbon tax cost per farm ($774) for grain drying in Saskatchewan.

As the Ontario and Manitoba cost estimates are specific to the extreme weather conditions of 2019, it is difficult to assess how they will change with the rising carbon price. In contrast, as the Alberta and Saskatchewan estimates are for an average year, both total carbon tax costs per farm and costs per acre for grain drying can be expected to increase proportionally with the carbon tax. For example, at a carbon tax of $40 per tonne in 2021, the estimates of grain drying costs will double to $0.32 per acre ($420 per farm) in Alberta and $1.02 per acre ($1,548 per farm) in Saskatchewan. The doubling of costs means that even with average weather conditions in 2021, farmers could be facing comparable carbon tax bills to their harvest in 2019.

Table 1: AAFC Reported Estimates of Carbon Tax Costs for Grain and Oilseed Drying, 2019

Province	Average carbon cost per acre	Average carbon cost per farm	Average carbon cost as a % of operating costs	Average carbon cost as a % of net income	Base year for estimate	Crop
Alberta	$0.16	$210	0.05%	0.17%	Historical data	All grains and oilseeds
Saskatchewan	$0.51	$774	0.18%	0.62%	Historical data	Wheat
Manitoba	$0.33	$467	0.10%	0.32%	2019	All grains and oilseeds
Ontario	$1.92	$750	0.38%	1.51%	2019	All grains and oilseeds
	$5.50	N/A	N/A	N/A	2019	Corn

Source: Agriculture and Agri-Food Canada (2021b)

CARBON PRICING SUPPORT FOR EMISSIONS-INTENSIVE AND TRADE-EXPOSED INDUSTRIES

Looking beyond agriculture, most carbon pricing support in Canada is targeted at large emitters via the federal output-based pricing system (OBPS) or comparable provincial programs. These programs are designed to support large emitters, as well as facilities in industries that are emissions-intensive and trade-exposed (commonly referred to as EITE industries). The federal OBPS regulation identifies 10 industrial activities — oil and gas production; mineral processing; chemicals; pharmaceuticals; iron, steel and metal tubes; mining and ore processing; nitrogen fertilizers; food processing; pulp and paper; automotive; and electricity generation — and 78 products within these industries as eligible for carbon pricing support.

The measures of emissions intensity and trade exposure — individually and together — indicate the likelihood of facilities within an industry experiencing negative competitiveness impacts as a result of the carbon tax. Specifically, a high emissions intensity indicates a facility is likely to face high costs due to the carbon tax, while a high trade exposure indicates that domestic facilities are less likely to have influence over the price of their products and that the carbon tax will be a cost disadvantage relative to international competitors. A high trade exposure also suggests a higher likelihood of carbon leakage, in which domestic facilities lose market share as production shifts towards jurisdictions with less stringent environmental regulations and lower costs.

In the four provinces in which the federal carbon tax applies, the federal OBPS is in place in Manitoba and Ontario. Alberta has a provincial OBPS program while Saskatchewan has both the federal program (for electricity generators and natural gas transmission pipelines) and a provincial program (for all other industrial facilities). In all three programs, one of the criteria for a facility to be eligible to participate is that it has minimum emissions of 10,000 kt CO_2e annually (Government of Saskatchewan 2017; Environment and Climate Change Canada 2019; Government of Alberta 2019). The only facilities to meet this threshold in agriculture are a small number of greenhouses, which already receive a partial exemption from the carbon tax.[3]

In the context of the carbon tax, this leaves agriculture in a unique position within Canada. The industry has significant trade volumes, with domestic exports valued at $48 billion in 2020.[4] This places it as the third largest export industry in Canada, behind only mineral products ($107 billion, 22 per cent of total domestic exports) and vehicle and aircraft manufacturing ($71 billion, 15 per cent). Industry emissions

3 In 2019, there were 35 greenhouses in Ontario and one in Alberta with emissions that exceeded 10,000 tonnes of CO_2e annually (Environment and Climate Change Canada 2021b). In the four provinces in which the federal carbon tax applies, no other agricultural facilities exceeded this threshold.

4 Author calculation using data from the Canadian International Merchandise Trade Database (Statistics Canada 2021a).

through on-farm fuel use also exceed priced emissions from many heavy industry and light manufacturing subsectors in Canada.[5]

These high absolute trade and emissions levels do not automatically imply that agriculture is an EITE industry and will suffer negative competitiveness impacts as a result of the carbon tax. For example, a study of the agricultural sector in British Columbia found the province's carbon tax did not have a statistically significant impact on competitiveness or trade levels in the sector in the first three years after the tax was introduced (Rivers and Schaufele 2015). More generally, EITE definitions for determining carbon pricing support are jurisdiction specific and depend on the results of emissions intensity and trade exposure calculations.[6] Both the Alberta and federal OBPS programs have formal EITE definitions that are applied to industries with facilities that meet the 10,000 kt CO_2e emissions threshold for carbon pricing support.[7] Application of these existing EITE definitions to agriculture would be a useful first step in better identifying the negative competitiveness risk to the industry of the carbon tax, as well as the risk of carbon leakage.

If the agriculture industry meets EITE criteria, then this supports the extension of carbon pricing support to all sources of priced emissions in the industry. That is, if the benefits of providing an EITE industry with carbon pricing support outweigh the negatives then this will hold true — and should be equally applied — across all sources of priced emissions within an industry.[8] This is consistent with federal and provincial OBPS programs, which provide large emitters and EITE industries with carbon pricing support for all sources of emissions that would otherwise be subject to the carbon tax.

---

5 Emissions from on-farm fuel use in agriculture in 2019 were 13.6 Mt CO_2e. This compares to 13.9 Mt CO_2e for all of light manufacturing (which includes numerous manufacturing subsectors such as food processing, pharmaceuticals and automotive), 11.5 Mt for cement, 10.1 Mt for smelting and refining, 8.8 Mt for mining, 8.3 Mt for pulp and paper, and 2.4 Mt for lime and gypsum. The only heavy industry subsectors with higher priced emissions are chemicals and fertilizers (21.4 Mt) and iron and steel (14.6 Mt) (Environment and Climate Change Canada 2021a).

6 For examples and discussion of different EITE definitions in Canada and internationally, see Dobson and Winter (2018). As a high-level overview, emissions intensity is typically equal to either an industry's total emissions or its total expected carbon costs (equal to emissions multiplied by the carbon price) divided by an industry's gross value added. Trade exposure is consistently defined across jurisdictions as an industry's exports plus imports divided by its production plus imports.

7 Alberta has identified greenhouse, nursery and floriculture production (except cannabis) as the only agriculture subsector with EITE status (Government of Alberta 2020). The federal OBPS, in comparison, does not include any agriculture subsectors on its list of industries with EITE status (Environment and Climate Change Canada 2019).

8 The main benefits of providing an industry with carbon pricing support are decreased costs of production and (potentially) increased production while the main costs are a decrease in government revenues and an increase in emissions. As noted earlier in the main text, a key characteristic of an EITE industry is the possibility for carbon leakage. When carbon leakage occurs, a decrease in domestic production and domestic emissions is offset by an increase in production and emissions from elsewhere in the world. If carbon pricing support policies for domestic industries are effective in preventing carbon leakage, then this will limit any increases in global emissions. Further, the decrease in government revenues may be outweighed by an increase in domestic producer surplus from higher production and lower costs (Fischer and Fox 2010; Fowlie, Reguant and Ryan 2016).

CARBON PRICING SUPPORT OPTIONS FOR AGRICULTURE

The composition of the agriculture industry by thousands of small producers creates unique challenges in providing the industry with carbon pricing support. One of the key considerations in extending additional support to the industry is whether it is feasible to follow the standard set by existing agricultural fuel exemptions and make support available to all farmers, or whether further support should follow the example of current federal and provincial OBPS programs and set minimum emissions thresholds for eligibility. This consideration is in turn influenced by the form that any future carbon pricing support for agriculture may take.

The simplest approach for future carbon pricing support is that advocated by Bill C-206, which would extend the current farm-fuel exemptions to include marketable natural gas and propane. By following the format for current farm-fuel exemptions, this support would easily extend to all farmers in the industry.

While simple and comprehensive, the downside of this approach is that it does not provide a carbon price signal or an emissions reduction incentive. Partial exemptions, such as those provided to natural gas and propane used by greenhouse growers, encounter a similar challenge in that the stringency of the carbon price signal is significantly reduced. From the perspective of achieving the joint goals of protecting the competitiveness of farmers while still providing an emissions reduction incentive for farm-fuel use, an expansion of farm-fuel exemptions is therefore not an optimal policy.

The second option for future carbon pricing support is lump sum rebates to farmers. This would effectively be a farm equivalent of the Climate Action Incentive payments paid out to households in the four provinces in which the federal carbon tax applies. With the Climate Action Incentive payments being distributed based on personal income tax returns, it seems plausible that lump sum rebates could be extended to all farmers via a similar system that connects their payment to a farmer's income tax return.

Lump sum rebates that are independent of fuel use, emissions or emissions intensity preserve the full strength of the carbon price signal. Specifically, it is optimal for a farmer to invest in any emissions reduction opportunity with a marginal cost at or below the carbon price as a farmer will receive the cost savings from a decreased carbon tax burden while continuing to receive the full amount of the lump sum rebate. Due to the diversity of agricultural operations within Canada, any lump sum rebate program would likely need to be contingent on farm-specific characteristics such as farm type and size. Rebates could also account for influencing factors on farm fuel use that are largely exogenous to the farmer, such as temperature and precipitation.

While the federal budget provided few specifics on the government's plan to return a portion of carbon tax proceeds to farmers, one key detail is that it will be based on carbon tax revenues collected in the prior fiscal year. This suggests the

government is likely considering a lump sum rebate of some kind. However, any rebate should be completely divorced from agricultural fuel use and emissions — either current or historical. If not, then this again risks dulling the signal of the carbon price. For example, if a farmer anticipates that lower fuel use and carbon tax payments in the current year will translate into a lower rebate in the following year then this can reduce the incentive to invest in emissions reductions.

The last option for carbon pricing support to farmers is output-based rebates. This would follow a similar model to the federal and provincial OBPS programs but with farmers likely receiving a monetary rebate as opposed to the emissions credits that are provided in current OBPS programs. Similar to a lump sum rebate, an output-based rebate preserves the full strength of the carbon price signal. The key difference, however, is that the output of a facility determines the amount of the rebate, with the rebate increasing with every additional unit of production. This provides an additional marginal benefit to a facility from increasing its output. This production incentive means that output-based rebates tend to result in higher levels of domestic production relative to a lump sum rebate.[9] As a result, they also tend to be the most effective policy for reducing carbon leakage (Demailly and Quirion 2008; Fischer and Fox 2010; Fowlie, Reguant and Ryan 2016).

A key consideration in an output-based rebate system is how to define output products and benchmarks (the amount of rebate a farmer is eligible to receive per unit of output). This is a particular challenge in agriculture as, relative to other sectors, combustion emissions tend to have a weaker relationship to output. For example, the amount of fuel required to heat a barn in winter is likely to be more heavily dependent on temperature and size of the barn than on the animal population.

The relationship between combustion emissions and output is stronger for grain and oilseed drying, as the quantity of harvested grain and oilseed determines the amount that needs to be dried. As noted earlier, however, weather conditions play a significant role in determining the moisture level of the crop at harvest, and therefore, how much fuel is required to dry the crop to an optimal moisture level for storage. It is possible that relative to a year with average weather conditions, a farmer in a year with wet and cold weather could have lower yield and higher fuel use. Also of note is that weather conditions within a particular year can differ significantly across regions. These factors make it challenging to define a single benchmark for any grain or oilseed that would be constant across time and across the country, while still providing a predictable and appropriate level of support to farmers.

---

9 Note that an increase in output will typically also result in an increase in emissions, in which case the amount of rebate a facility receives will increase with its emissions. However, as this relationship is indirect, the full stringency of the emissions price is maintained. That is, a facility is still incented to reduce its emissions intensity to the point at which the marginal cost of further reductions is equal to the carbon tax. This means the optimal emissions intensity should still be reached, with the higher level of emissions a trade-off from providing support to producers to encourage higher levels of domestic production.

In the face of these challenges, establishing product benchmarks for an output-based rebate system for farmers requires careful consideration. For carbon tax costs associated with building heating, where there is likely to be a weaker link between output and fuel use, a lump sum rebate may be preferred.

For grain and oilseed drying, a number of options may be considered. A first option is to establish regional benchmarks for each grain and oilseed based on average weather conditions. These benchmarks could be held constant, or they could vary from one year to the next based on a defined relationship to observed weather conditions. This choice is a trade-off between providing predictable support to farmers versus support that is better matched to a farmer's weather-driven fuel consumption from one year to the next. A second option could be to define the benchmark in terms of moisture removal rather than output. That is, set the benchmark as the amount a farmer is eligible to receive per tonne of moisture that needs to be removed from harvested crops. This has the benefit of being a single, predictable benchmark that could be equally applied to all grains and oilseeds in all regions and across all years. The downsides of this approach are that it would require additional reporting (and potentially verification) and could also distort a farmer's decision on the timing of harvest.

An additional challenge for an output-based rebate system for farmers is the cost of managing the potential number of program participants. In the four provinces in which the federal carbon tax applies, there were 1,025 industrial facilities with annual emissions exceeding 10,000 tonnes CO_2e in 2019, which may be eligible to participate in an OBPS program (Environment and Climate Change Canada 2021b). In comparison, the 2016 Census of Agriculture reported 139,552 total farms in these same provinces, of which 58,535 are oilseed and grain growers (Statistics Canada 2021c). To ensure administration of an output-based rebate system is manageable and cost effective, it may be necessary to limit participation to agricultural large emitters by establishing an emissions threshold for participation. This is especially relevant if the system were to include a third-party verification requirement for production or other information submitted by farmers.

DISCUSSION

There are two analyses from AAFC that look at the impact of the carbon tax on Canadian farms (Agriculture and Agri-Food Canada 2018, 2021b). The first analysis, released in 2018, looks at costs across all subsectors of agriculture while the second is the previously referenced analysis that focuses on the costs of grain and oilseed drying. Both studies take into account provincial and federal exemptions to the carbon tax, with the resulting estimates generally showing the remaining burden as only a small portion of the average farm's net operating costs and net income. This methodology is in contrast to EITE assessments, which typically take into account all of a sector's emissions.

These results appear to form at least part of the basis for the federal government's initial decision to not include all uses of natural gas and propane in farm fuel exemptions from the carbon tax. For example, the cost estimates from the second study (previously presented in Table 1) were cited by the minister of agriculture in June 2020 as the reason for not moving forward with tax relief for carbon costs from grain and oilseed drying (Rabson 2020b).

As noted earlier, the Liberal Party subsequently changed tack in its spring 2021 budget when it committed to providing at least a partial rebate to farmers on carbon taxes paid. The other federal parties are also in favour of increasing support to farmers, having passed Bill C-206 in the House of Commons prior to the end of the 43rd Parliament. It therefore seems likely that additional support for farmers will soon be introduced.

The three options for expanding carbon pricing support to farmers have trade-offs between administrative costs, minimizing carbon leakage and maintaining the incentive of the carbon price. By following the current model, an expansion in farm fuel exemptions is likely to be the least administratively costly to implement and could readily be made available to all farmers. However, a new exemption would effectively remove all agricultural combustion emissions from a price incentive under the GGPPA. Lump sum and output-based rebates, in contrast, maintain this incentive (provided the amount of the rebate is not directly determined by fuel use, emissions or emissions intensity), with output-based rebates also being more effective in reducing carbon leakage. Output-based rebates, however, have significantly higher administrative costs and program participation would likely need to be limited to farmers who exceed a specific emissions threshold. The influence of weather on natural gas and propane use also creates challenges in setting benchmarks for agricultural output.

The argument put forth in favour of expanding farm fuel exemptions, particularly in the context of grain drying, is that alternative, lower emissions technologies are not available to farmers and that, in the absence of these alternatives, a carbon price incentive cannot have its intended effect (Government of Canada 2021b). It is beyond the scope of this paper to assess the commercial availability of alternative technologies, although it is worth noting that available grain dryers have a range of energy efficiencies and heat-recovery systems can be added on to further decrease energy use (Dyck 2017). Lower emitting options, such as biomass[10] and electric heat pumps, are also emerging with some technologies being developed in direct response to the carbon price (Epstein et al. 2018; PAMI 2021; Wichers 2021). As an expansion of farm fuel exemptions risks dulling the incentive to further innovate and commercialize new technologies, it should at most be introduced as a short-term, temporary measure. This will also ensure the incentive for farmers to shift towards new technologies is in place as they become commercially available.

[10] While the burning of biomass also releases carbon dioxide, these emissions are biogenic in origin and are not taxed under the GGPPA.

From the perspective of a support mechanism that can be in place for the near and long term, lump sum and output-based rebates are arguably a preferred approach. In the near term the rebates can be set at a higher level to reflect that farmers may have limited options in regard to switching technologies. Long term, as more efficient technologies are commercialized and made more readily available, rebates can then be ratcheted down.

An additional source of support to farmers is AAFC's Agricultural Clean Technology Program, which aims to help accelerate the availability and adoption of more energy-efficient technologies. The program consists of two streams. The first is the research and innovation stream, which supports research, development, demonstration and commercialization of technologies. The second is the adoption stream, which provides direct support to farmers looking to make investments in lower emissions intensity technology (Agriculture and Agri-Food Canada 2021a). The adoption stream includes $50 million targeted specifically towards the purchase of more efficient grain dryers, as well as an additional $10 million to help farmers move off diesel and adopt other cleaner energy options (Agriculture and Agri-Food Canada 2021c). With both streams ultimately aiming to lower the cost of new technology adoption, this program acts as a complement to direct carbon pricing support offered through either lump sum or output-based rebates.

CONCLUSION

The different applications of the federal carbon tax to agricultural fuel use leaves the industry straddling two identities. While this mismatch is set to be resolved with the introduction of additional carbon pricing support for natural gas and propane use, a formal EITE assessment, based on all of agriculture's emissions, would still provide useful information. In particular, it would help to better inform the degree to which the sector is at risk of carbon leakage, as well as the degree to which ongoing support is required to help maintain the competitiveness of Canada's farmers. It would also be useful in determining how and whether support for the industry should change over time. Completing the assessments at the subsector level, as has been done for most industrial sectors in Canada, could provide further insight on how to best target carbon pricing support to different types of farmers going forward.

Extending carbon pricing support to additional emissions sources in the agriculture industry does not mean that current carbon tax exemptions for farm fuel use should be expanded. A shift in this direction would further weaken the carbon price signal in agriculture. Rather, it is preferable for future support to agriculture to take the form of either lump sum or output-based rebates, both of which can be designed to preserve the full incentive of the carbon price. This will ensure the carbon tax does not undermine the competitiveness of Canada's farmers, and conversely, that support for farmers does not undermine the centrepiece of Canada's emissions reduction plan.

REFERENCES

Agricultural Producers Association of Saskatchewan. 2021. *Preliminary Costs of the Federal Carbon Backstop on Saskatchewan Agriculture.* http://apas.ca/pub/documents/News%20Releases/2021/apas-carbon-costing-january-7-2021.pdf.

Agriculture and Agri-Food Canada. 2018. *Financial Impacts of Carbon Pricing on Canadian Farms.* https://agriculture.canada.ca/sites/default/files/legacy/pack/pdf/carbon_price_presentation1-eng.pdf.

———. 2021a. "Backgrounder: Helping Farmers and Agri-businesses Adopt Clean Technologies to Reduce Emissions and Enhance Competitiveness." Last modified June 4, 2021. https://www.canada.ca/en/agriculture-agri-food/news/2021/06/backgrounder-helping-farmers-and-agri-businesses-adopt-clean-technologies-to-reduce-emissions-and-enhance-competitiveness.html.

———. 2021b. *Estimated Costs of Carbon Pollution Pricing in Relation to Grain Drying in 2019*. https://multimedia.agr.gc.ca/pack/pdf/grain_drying_cost_2019-eng.pdf.

———. 2021c. "Helping Farmers and Agri-food Businesses Adopt Clean Technologies to Reduce Emissions and Enhance Competitiveness," news release, June 4, 2021. https://www.canada.ca/en/agriculture-agri-food/news/2021/06/helping-farmers-and-agri-businesses-adopt-clean-technologies-to-reduce-emissions-and-enhance-competitiveness.html.

Canada Revenue Agency. 2020. "Definitions Related to the Fuel Charge." Last modified February 21, 2020. https://www.canada.ca/en/revenue-agency/services/tax/technical-information/fuel-charge-definitions.html.

Demailly, Damien, and Philippe Quirion. 2008. "Changing the Allocation Rules in the EU ETS: Impact on Competitiveness and Economic Efficiency." FEEM Working Papers 2008/089. https://www.feem.it/en/publications/feem-working-papers-note-di-lavoro-series/changing-the-allocation-rules-in-the-eu-ets-impact-on-competitiveness-and-economic-efficiency/.

Dobson, Sarah, and Jennifer Winter. 2018. "Assessing Policy Support for Emissions-Intensive and Trade-Exposed Industries." *The School of Public Policy Publications SPP Research Paper* 11 (28). https://doi.org/10.11575/sppp.v11i0.43673.

Dobson, Sarah, Jennifer Winter, and Brendan Boyd. 2019. "The Greenhouse Gas Emissions Coverage of Carbon Pricing Instruments for Canadian Provinces." *The School of Public Policy Publications SPP Research Paper* 12 (6). https://doi.org/10.11575/sppp.v12i0.53155.

Dyck, James. 2017. "Reducing Energy Use in Grain Dryers." Ontario Ministry of Agriculture, Food and Rural Affairs. http://www.omafra.gov.on.ca/english/engineer/facts/17-001.pdf.

Environment and Climate Change Canada. 2016. "Government of Canada Announces Pan-Canadian Pricing on Carbon Pollution," news release, October 3, 2016. https://www.canada.ca/en/environment-climate-change/news/2016/10/government-canada-announces-canadian-pricing-carbon-pollution.html.

———. 2019. "Voluntary Participation Policy for Output-Based Pricing System." Last modified June 28, 2019. https://www.canada.ca/en/environment-climate-change/services/climate-change/pricing-pollution-how-it-will-work/output-based-pricing-system/voluntary-participation-policy.html.

———. 2020. *A Healthy Environment and a Healthy Economy: Canada's Strengthened Climate Plan to Create Jobs and Support People, Communities and the Planet.* https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/climate-plan-overview/healthy-environment-healthy-economy.html.

———. 2021a. Canada's Official Greenhouse Gas Inventory. http://data.ec.gc.ca/data/substances/monitor/canada-s-official-greenhouse-gas-inventory/.

———. 2021b. Greenhouse Gas Reporting Program (GHGRP): Facility Greenhouse Gas (GHG) Data. https://open.canada.ca/data/en/dataset/a8ba14b7-7f23-462a-bdbb-83b0ef629823.

———. 2021c. *National Inventory Report 1990–2019: Greenhouse Gas Sources and Sinks in Canada, Part 1.* https://unfccc.int/ghg-inventories-annex-i-parties/2021.

———. 2021d. *National Inventory Report 1990–2019: Greenhouse Gas Sources and Sinks in Canada, Part 2.* https://unfccc.int/ghg-inventories-annex-i-parties/2021.

———. 2021e. "Pricing Carbon Pollution from Industry." Last modified February 12, 2021. https://www.canada.ca/en/environment-climate-change/services/climate-change/pricing-pollution-how-it-will-work/industry/pricing-carbon-pollution.html.

———. 2021f. "The Federal Carbon Pollution Pricing Benchmark." Last modified August 5, 2021. https://www.canada.ca/en/environment-climate-change/services/climate-change/pricing-pollution-how-it-will-work/carbon-pollution-pricing-federal-benchmark-information.html.

Epstein, Adam, William Lubitz, Greg Dineen, and James Dyck. 2018. "Grain Drying Utilizing Air Source Heat Pumps for Reduced Cost and Greenhouse Gas Emissions." The Canadian Society for Bioengineering Paper No CSBE18-109. https://library.csbe-scgab.ca/docs/meetings/2018/CSBE18109.pdf.

Fischer, Carolyn, and Alan Fox. 2010. "On the Scope for Output-Based Rebating in Climate Policy: When Revenue Recycling Isn't Enough (or Isn't Possible)." Resources for the Future DP 10-69. http://www.rff.org/research/publications/scope-output-based-rebating-climate-policy-when-revenue-recycling-isn-t-enough.

Fowlie, Meredith, Mar Reguant, and Stephen P. Ryan. 2016. "Market-Based Emissions Regulation and Industry Dynamics." *Journal of Political Economy* 124 (1): 249–302. https://doi.org/10.1086/684484.

Government of Alberta. 2020. *TIER Opt-In Fact Sheet.* https://www.alberta.ca/assets/documents/ep-fact-sheet-tier-opt-in.pdf.

Government of Canada. 2021a. *Budget 2021: A Recovery Plan for Jobs, Growth and Resilience.* https://www.budget.gc.ca/2021/home-accueil-en.html.

———. 2021b. House of Commons Debates. https://www.ourcommons.ca/DocumentViewer/en/43-2/house/sitting-122/hansard.

Government of Saskatchewan. 2017. *Prairie Resilience: A Made-in-Saskatchewan Climate Change Strategy.* https://www.saskatchewan.ca/business/environmental-protection-and-sustainability/a-made-in-saskatchewan-climate-change-strategy/saskatchewans-climate-change-strategy.

Grain Farmers of Ontario. 2020. "The Effects of Carbon Tax on Ontario Grain Farmers is Indisputable," news release, June 11, 2020. https://gfo.ca/news-releases/the-effects-of-carbon-tax-on-ontario-grain-farmers-is-indisputable/.

Greig, John. 2020. "Carbon Cost Increases Concern Farmers." *Farmtario*, February 24, 2020. https://farmtario.com/news/carbon-cost-increases-concern-farmers/.

Heppner, Kelvin. 2020. "Farm Groups Put the Pressure on Ottawa to Act on Carbon Tax." *Real Agriculture*, February 24, 2020. https://www.realagriculture.com/2020/02/farm-groups-put-the-pressure-on-ottawa-to-act-on-carbon-tax/.

Keystone Agricultural Producers of Manitoba. 2020. *Carbon Tax Costs to Dry Grain and Heat Barns.* https://www.kap.ca/wp-content/uploads/2020/08/2020-07-31-Letter-to-Minister-Bibeau-re-carbon-tax-data.pdf.

OECD. 2020. *Taxation in Agriculture*. Paris: OECD Publishing. https://doi.org/10.1787/073bdf99-en.

PAMI. 2021. *Electrification of Grain Drying to Reduce the Impact of Carbon Pricing - Preliminary Investigation.* https://pami.ca/wp-content/uploads/2021/05/Carbon_Reduced_Grain_Drying_Final_Mar-17-21.pdf.

Rabson, Mia. 2020a. "Farmers Contest Minister's Claim that Grain Farmers' Carbon Costs are Tiny." *CBC*, June 13, 2020. https://www.cbc.ca/news/canada/manitoba/grain-farmers-carbon-costs-agriculture-minister-1.5611070.

———. 2020b. "Ottawa Decides against Adding Grain Dryers to the List of Carbon Tax Exemptions." *The Globe and Mail*, June 10, 2020. https://www.theglobeandmail.com/canada/article-ottawa-decides-against-adding-grain-dryers-to-the-list-of-carbon-tax/.

Rivers, Nicholas, and Brandon Schaufele. 2015. "The Effect of Carbon Taxes on Agricultural Trade." *Canadian Journal of Agricultural Economics* 63 (2): 235–257. https://doi.org/10.1111/cjag.12048.

Statistics Canada. 2021a. Canadian International Merchandise Trade Database. https://www5.statcan.gc.ca/cimt-cicm/home-accueil.

———. 2021b. Table 32-10-0049-01 Farm Operating Expenses and Depreciation Charges (x 1,000). https://doi.org/10.25318/3210004901-eng.

———. 2021c. Table 32-10-0403-01 Farms Classified by Farm Type. https://doi.org/10.25318/3210040301-eng.

Wichers, Geralyn. 2021. "Morris-based Company Debuts Crop-residue Fuelled Grain Dryers." *Manitoba Co-operator*, April 13, 2021. https://www.manitobacooperator.ca/crops/morris-based-company-debuts-crop-residue-fuelled-grain-dryers/.

About the Author

Sarah Dobson is a Research Associate in the Energy and Environmental Policy Research Division at the School of Public Policy, University of Calgary. Her research interest focuses on studying the design, implementation and evaluation of energy and environmental regulatory policy. Sarah's recent work with the School of Public Policy focusses primarily on climate change policy, with an emphasis on carbon pricing coverage, carbon pricing support policies for large industrial emitters and methane emissions policy.

ABOUT THE SCHOOL OF PUBLIC POLICY

The School of Public Policy has become the flagship school of its kind in Canada by providing a practical, global and focused perspective on public policy analysis and practice in areas of energy and environmental policy, international policy and economic and social policy that is unique in Canada.

The mission of The School of Public Policy is to strengthen Canada's public service, institutions and economic performance for the betterment of our families, communities and country. We do this by:

- *Building capacity in Government* through the formal training of public servants in degree and non-degree programs, giving the people charged with making public policy work for Canada the hands-on expertise to represent our vital interests both here and abroad;
- *Improving Public Policy Discourse outside Government* through executive and strategic assessment programs, building a stronger understanding of what makes public policy work for those outside of the public sector and helps everyday Canadians make informed decisions on the politics that will shape their futures;
- *Providing a Global Perspective on Public Policy Research* through international collaborations, education, and community outreach programs, bringing global best practices to bear on Canadian public policy, resulting in decisions that benefit all people for the long term, not a few people for the short term.

The School of Public Policy relies on industry experts and practitioners, as well as academics, to conduct research in their areas of expertise. Using experts and practitioners is what makes our research especially relevant and applicable. Authors may produce research in an area which they have a personal or professional stake. That is why The School subjects all Research Papers to a double anonymous peer review. Then, once reviewers comments have been reflected, the work is reviewed again by one of our Scientific Directors to ensure the accuracy and validity of analysis and data.

The School of Public Policy
University of Calgary, Downtown Campus
906 8th Avenue S.W., 5th Floor
Calgary, Alberta T2P 1H9
Phone: 403 210 3802

DISTRIBUTION
Our publications are available online at www.policyschool.ca.

DISCLAIMER
The opinions expressed in these publications are the authors' alone and therefore do not necessarily reflect the opinions of the supporters, staff, or boards of The School of Public Policy.

ISSN
ISSN 2560-8312 The School of Public Policy Publications (Print)
ISSN 2560-8320 The School of Public Policy Publications (Online)

DATE OF ISSUE
November 2021

MEDIA INQUIRIES AND INFORMATION
For media inquiries, please contact Morten Paulsen at 403-220-2540. Our web site, www.policyschool.ca, contains more information about The School's events, publications, and staff.

RECENT PUBLICATIONS BY THE SCHOOL OF PUBLIC POLICY

SOCIAL POLICY TRENDS: THE LABOUR FORCE PARTICIPATION RATE OF WOMEN WITH YOUNG CHILDREN
https://www.policyschool.ca/wp-content/uploads/2021/11/Labour-Force-Participation-Update.pdf
Ron Kneebone | November 2021

MACKENZIE VALLEY GAS PIPELINE IN RETROSPECT
https://www.policyschool.ca/wp-content/uploads/2021/11/NC27A_Mackenzie-Valley-Gas-Pipeline_Munzur.pdf
Alaz Munzur | November 2021

A MULTIPLE ACCOUNT BENEFIT-COST ANALYSIS OF COAL MINING IN ALBERTA
https://www.policyschool.ca/wp-content/uploads/2021/11/EFL53_Coal-Mining_Winter-et-al.pdf
Jennifer Winter, Megan Bailey, Emily Galley, Chris Joseph and Blake Shaffer | November 2021

THE ROLE OF HYDROGEN IN DECARBONIZING ALBERTA'S ELECTRICITY SYSTEM
https://www.policyschool.ca/wp-content/uploads/2021/11/EFL49A_AB-Electricity_Neff-et-al.pdf
Jordan Neff, Chris Bataille and Blake Shaffer | November 2021

THE ROLE OF HYDROGEN IN CANADA'S TRANSITION TO NET-ZERO EMISSIONS
https://www.policyschool.ca/wp-content/uploads/2021/11/EFL49_Net-Zero-Emissions_Bataille-et-al.pdf
Chris Bataille, Jordan Neff and Blake Shaffer | November 2021

ALBERTA'S ECONOMIC AND FISCAL FUTURE
https://www.policyschool.ca/wp-content/uploads/2021/11/Albertas-Economic-and-Fiscal-Future.pdf
November 2021

AN URBAN NATION: THE SHIFTING FORTUNES OF CANADIAN CITIES
https://www.policyschool.ca/wp-content/uploads/2021/11/UP33_Urban-Nation_McQuillan-Laszlo.pdf
Kevin McQuillan and Michael Laszlo | November 2021

LOCAL CONDITIONS AND THE PREVALENCE OF HOMELESSNESS IN CANADA
https://www.policyschool.ca/wp-content/uploads/2021/10/HSP90_Rates-of-Homelessness_Kneebone-Wilkins.pdf
Ron Kneebone and Margarita Wilkins | October 2021

THE KEY ROLE OF NO-CARBON NATIONAL OIL COMPANIES IN GLOBAL CLIMATE ACTION: LEVERAGING THE G20 FORUM TO ACCELERATE ENERGY TRANSITION
https://www.policyschool.ca/wp-content/uploads/2021/10/NoCarbon-Oct27.pdf
Leonardo Beltrán-Rodríguez and Juan Roberto Lozano-Maya | October 2021

WHY EXISTING REGULATORY FRAMEWORKS FAIL IN THE SHORT-TERM RENTAL MARKET: EXPLORING THE ROLE OF REGULATORY FRACTURES
https://www.policyschool.ca/wp-content/uploads/2021/10/UP32_Short-Term-Rental-Market_Tedds-et-al.pdf
Lindsay Tedds, Anna Cameron, Mukesh Khanal and Daria Crisan | October 2021

SHAPING AGRICULTURAL POLICIES IN THE ANTHROPOCENE ERA: WHAT CAN WE LEARN FROM THE DPSIR FRAMEWORK?
https://www.policyschool.ca/wp-content/uploads/2021/10/JSC11_DPSIR-Framework_Lhermie.pdf
Guillaume Lhermie | October 2021

SOCIAL POLICY TRENDS: PROSPER AND LIVE LONG
https://www.policyschool.ca/wp-content/uploads/2021/10/HSP84-SPT-Oct-Prosper-and-Live-Long-Kneebone.pdf
Ron Kneebone | October 2021

A NEW APPROACH TO IMPROVING SMALL-BUSINESS TAX COMPETITIVENESS
https://www.policyschool.ca/wp-content/uploads/2021/10/FMK1_Small-Business-Tax_Mintz-et-al.pdf
Jack Mintz, Patrick Smith and V. Balaji Venkatachalam | October 2021