

## WHAT WE HEARD

### Green Growth Technologies for a More Resilient Agri-Food System: A CAPI Digital Dialogue

Launched in May 2020, the Canadian Agri-Food Policy Institute (CAPI) and the Arrell Food Institute collaborated on the [Growing Stronger](#) initiative to determine how COVID has impacted the Canadian Food System and how we can build a more resilient system going forward. As part of this partnership CAPI hosted a small virtual dialogue titled “Green Growth Technologies for a More Resilient Agri-Food System” on October 28, 2020. The dialogue was moderated by **John Knuble**, Senior Advisor to InnovAction, McKinsey and Longview Communications, formerly long-standing Deputy Minister in the Government of Canada, including ISED and AAFC. The panel consisted of: **Dr. Martine Dubuc**, Associate Deputy Minister, Environment and Climate Change Canada; **Jeff Fitzpatrick-Stilwell**, Senior Manager, Sustainability and Agriculture Lead, McDonald’s; and **Peter Phillips**, Distinguished Professor, Johnson Shoyama Graduate School of Public Policy, University of Saskatchewan. The panelists set the stage by providing their insights on the government’s approach and plans for agri-food green growth, how companies are responding to the consumer demand for sustainable products, and the Canadian innovation and technology landscape that could support or hinder green growth in the sector. These presentations were followed by a robust discussion with invited participants from both industry and government.

Based on information that was gathered before and during the Growing Stronger initiative, at CAPI’s previous [dialogue](#) in April 2020 on the impact of COVID, and from submissions, webinars, dialogues and one on one interviews, it became clear that despite the scale of the challenges, to a large extent, the agri-food system had remained remarkably intact and adapted quickly to the pandemic. It was evident however, that there were some vulnerabilities in the system that must be addressed if the sector is to become more resilient in the future. One such vulnerability related to the dependence of the sector on labour and the role that new technologies, particularly green technologies could play in advancing the sector’s future sustainability and resilience.

This led CAPI to undertake the recent dialogue on green growth technologies. The findings of which will feed into the Arrell Food Summit on November 18-20, 2020 and CAPI’s Big Solutions Forum *Creating Prosperity from Chaos* in March 2021. The theme of CAPI’s dialogue is particularly timely given the importance of climate change, resilience and economic recovery post COVID in the Government of Canada’s recent [Speech from the Throne](#). One of the four foundations outlined in the Speech focused on taking action on climate change, with a focus on green growth and net zero Greenhouse Gas (GHG) emissions by 2050. The agri-food system certainly has a role to play as a climate change solutions-provider and in contributing to economic growth that is both sustainable and profitable for the future health and well-being of Canadians. But this requires innovation and investment in the types of technologies and practices that will help achieve these goals. This dialogue attempted to understand better the conditions under which this can take place in the agriculture and agri-food sector.

## Background

### Agriculture and agri-food's contribution to the Canadian economy

The agriculture and agri-food system is a significant contributor to Canadian GDP, accounting for just under 7% over the past 10 years.<sup>1</sup> It employs approximately 2 million Canadians. The food and beverage processing sector's share of total manufacturing GDP, at 16.4%, makes it the largest manufacturing industry in Canada. Primary agriculture represents about 2% of Canadian GDP. It can play a critical role in clean growth and sustainability through sustainable production practices and carbon(C) sequestration.

Canada also happens to be one of the largest net exporters of agricultural products in the world, ranking 5<sup>th</sup> in terms of exports. Canada stands to benefit from the growing global demand for food that is projected by 2050 as a result of a growing world population and higher income growth, particularly in Asia and Africa. It is essential however, that Canada boost agricultural production to meet this demand in a sustainable fashion through innovation and productivity growth in order to preserve Canada's natural capital for the benefit of future generations both at home and abroad. And with the growing importance of environmentally friendly and sustainable products for domestic and global consumers, Canada's agriculture and agri-food sector needs to develop new ways to respond to this demand.

### Agriculture and Agri-food as a Climate Change Solution Provider

Sustainable production will ensure that Canada's agriculture and agri-food system can contribute to climate change mitigation while also generating environmental benefits, such as clean air, water, soil health and enhanced biodiversity. Agriculture is often cited as a major contributor to GHG emissions at a global level. However, in Canada, net GHG emissions from agriculture accounted for only 8.1% of the total of Canada's 729 Mt of CO<sub>2eq</sub> in 2018. This is down from 8.4% in 2016. Emissions from livestock production account for about half of this, while 42% of these emissions come from crop production, which have been growing over time. In terms of emissions intensity, agricultural emissions as a share of GDP have continued to decline over time (Figure 1). However, agriculture has a unique role to play in storing C to offset emissions, through C sequestration and healthy soils, the unsung heroes of climate change. Over the past three decades, as a result of adopting new technologies and production practices, Canadian farmers, particularly on the Prairies, have made significant progress in sequestering C in their soils through the increased use of no-till, crop rotation, new crops, reduced summer fallow, rotational grazing and other best management practices and technologies. Farmers in Eastern Canada have increasingly made use of cover crops to boost soil health and 4R nutrient management practices to reduce emissions from fertilizers.<sup>2</sup>

Livestock production, which has increasingly come under scrutiny as a contributor to climate change, has made significant progress in reducing its emissions as well. Between 1981 and 2011, Canadian GHG

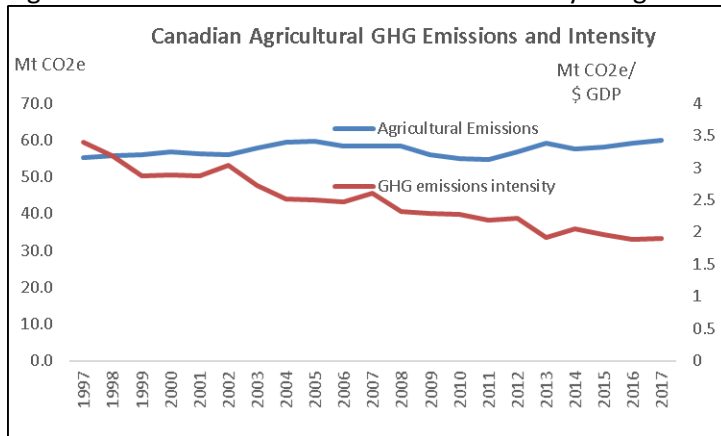
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<sup>1</sup> The AAFS includes farm input suppliers, primary agriculture, food and beverage processing, food wholesale and retailing and food service, which is a broader definition than that used by Barton in his agri-food analysis (primary agriculture and food, beverage and seafood processing only). Source: Agriculture and Agri-food Canada (AAFC), "An Overview of the Agriculture and Agri-food System, 2017." Accessed at: <http://www.agr.gc.ca/eng/about-us/publications/economic-publications/an-overview-of-the-canadian-agriculture-and-agri-food-system-2017/?id=1510326669269>.

<sup>2</sup> The 4R program, introduced and promoted by the Fertilizer Institute, and in Canada by Fertilizer Canada, provides information and training as well as certification on the optimal application of manure and fertilizers to ensure the right source, the right rate, the right time and the right place for sustainable and profitable agricultural production. Accessed at: <http://www.nutrientstewardship.com/>.

emissions intensity from livestock fell by 14% as a result of improved reproductive efficiency, reduced time to slaughter, increased crop yields, and a shift towards high-grain diets that enable cattle to be marketed at an earlier age.<sup>3</sup> This has made Canada one of the most GHG efficient producers of animal protein in the world at 12 kg CO<sub>2eq</sub> per kg of live weight, less than half the world average.<sup>4</sup> In terms of the emissions per unit of protein produced, Canada is one of the most efficient producers of beef, dairy, poultry and eggs (Figure 2). Thus, Canada’s agriculture sector is certainly doing its part to help contribute to climate change mitigation. In order for this progress to continue, there must be investments in R&D and innovation, commercialization, scale-up and knowledge transfer to the sector so that it can continue to achieve these goals of remaining sustainable and improving its resilience.

Figure 1: GHG Emissions and Emissions Intensity in Agriculture

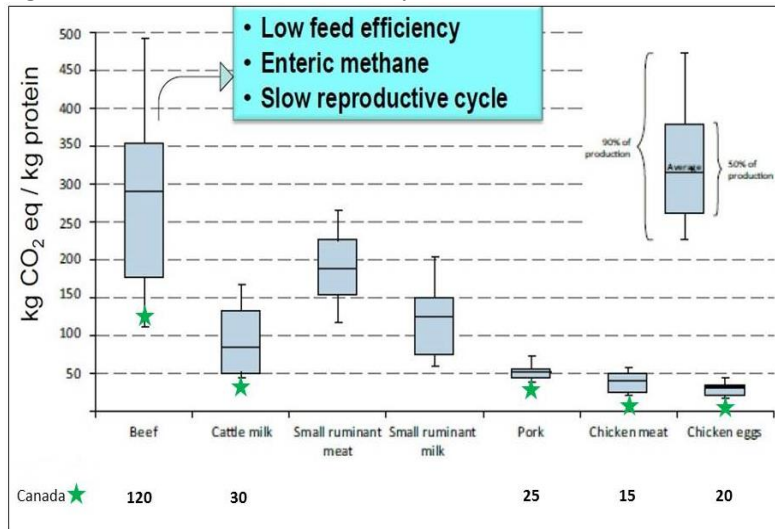


Source: ECCC, National Inventory Report and Statistics Canada

<sup>3</sup> G. Legesse, et al., “Greenhouse gas emissions of Canadian beef production in 1981 as compared with 2011,” *Anim. Prod. Sci.* 56, 2016, pg. 153-168. Accessed at: <http://dx.doi.org/10.1071/AN15386>.

<sup>4</sup> Canadian Cattlemen’s Association, “Beef Industry Strategies for Reducing Greenhouse Gases and Building the Green Economy,” Accessed at: <http://www.cattle.ca/assets/0c1041cd87/Strategies-for-Reducing-Greenhouse-Gases-from-Beef-Production-in-Canada-26.07.16.pdf>.

Figure 2: GHG Emissions Efficiency of Livestock, Canada and the World



Source: FAO, GLEAM and AAFC estimates

At the same time, various players downstream in Canada’s food processing and foodservice sectors are responding to consumers’ demand for environmentally friendly products and carbon neutrality by sourcing certified sustainable inputs and investing in production processes that reduce waste and carbon emissions. For example, Maple Leaf Foods has committed to carbon neutrality, reducing its environmental footprint and its GHG emissions by 30% by 2030.<sup>5</sup> Similarly, McDonald’s Canada has worked with the Canadian cattle industry and the Canadian Roundtable for Sustainable Beef (CRSB) to ensure that its hamburger meat is certified Canadian Grade A beef and have been raised sustainably according to specific standards. McDonald’s also is committed to ensure its coffee, fish, palm oil and fibre products are 100% sustainably sourced. The summary below of what we heard at the dialogue provides more insight into how the agriculture and agri-food sector is faring in achieving green growth and the challenges that need addressing.

## What We Heard at the Dialogue

### 1) Government has set the stage by prioritizing a green economic recovery and meeting Climate Change targets by 2030

Dr. Martine Dubuc, Associate Deputy Minister at Environment and Climate Change Canada (ECCC) provided a summary of government priorities particularly related to the Pan Canadian Framework on Climate Change. The top priority of the government is meeting or exceeding climate change targets, achieving net zero emissions by 2050, a “green economic recovery” and ensuring the health and safety of Canadians. Climate change continues to be a very significant risk for the agriculture sector so efforts to mitigate and adapt are of the utmost importance. Given the role of agriculture in conserving and protecting Canada’s biodiversity and reducing the impacts of agricultural production on the environment, the sector needs to continue to do its part. Dr. Dubuc thanked farmers, ranchers and foresters for their contributions to reducing emissions and building resilience. She also acknowledged

<sup>5</sup> Maple Leaf Foods. Sustainability: Carbon Strategy. Accessed at: <https://www.mapleleaffoods.com/sustainability/carbon-strategy/>.

agriculture's role in removing C and sequestering it in agriculture soils to the tune of 6 Mt CO<sub>2eq</sub> in 2018, but also pointed out that emissions from fertilizer use and crop production have been increasing.

Dr. Dubuc listed a myriad of government programs in ECCC and AAFC that target emission reductions, conservation, research on climate change, and programs for adaptation, networking and sharing data and information to inform planning decisions. She argued the government is a strong supporter of innovation particularly around clean tech for building a greener, more sustainable food system and she concluded that there is a need to collaborate in finding solutions to fight the pandemic and climate change.

### *Industry response to government policies and regulations to promote green growth in Agri-food*

Comments from the discussion were focused on how agriculture does not appear to be acknowledged in discussions around climate change as a solutions-provider. There are issues with the methodology that is used for estimating GHG emissions from agriculture, both for the estimates of methane (CH<sub>4</sub>) from livestock and how C sinks are taken into account. As a result, there is a view that agricultural emissions are being over counted in government estimates, leading to consumers and civil society having the wrong impression about agriculture's role in GHG emissions.

Others argued that there is a huge disconnect between producers and the government's priorities for green growth in agriculture. Agriculture is already a green sector. Producers' main concern is enhancing productivity and profitability, which often correspond with lower GHG intensity. Efficient agriculture reduces CO<sub>2</sub> emissions and further sequesters C in soils. The environment may be down on the list of priorities, nevertheless, farmers continue to be stewards of their land. Producers need to know efforts to produce more sustainably are profitable or they will not adopt the technology or practices. There are also many farmers who cannot afford to implement sustainable practices to store carbon, preserve biodiversity or reduce the environmental footprint. Programs will have to provide incentives if they are to be widely adopted.

On the regulatory side, there needs to be an improved governance structure as the current structure is not working well. Government must be an enabler, not just a regulator, and this is particularly important now that industry and government must work together to achieve these goals. There needs to be improved interaction and connection between industry and government to find solutions. Currently the two are not well aligned and there is too much fragmentation and a misunderstanding of how industry and government should work together. It is important to continue the dialogue for the government to hear from producers on the ground who can provide this perspective on challenges and problems, so that solutions can be found together.

## **2) How and why industry is responding to consumers as a driving force for industry sustainability initiatives**

Jeff Fitzpatrick-Stilwell, Senior Manager of Sustainability and Agriculture Lead at McDonald's discussed the importance for industry to listen to consumers and understand the values they share. He reported that consumers are no longer just *interested*, they are *concerned* about where their food comes from and how it is produced. While consumers want brands that reflect their values, price is still their top priority. McDonald's, in sourcing its inputs, focuses on climate change, food waste, circularity, building resiliency (through regenerative agriculture), and farmer viability since producers still have to remain profitable and make a living doing what they do. They are at the heart of the food business. McDonald's was the first restaurant company to set a climate change target under the Science-Based Target Initiative. McDonald's set, and met, ambitious 2020 targets for key commodities (i.e. sustainable

sourcing of coffee, fish, palm oil and fibre) and was the first to work with the CRSB, to certify sustainable beef in Canada and sell it in its establishments.

Fitzpatrick-Stilwell pointed out that new technologies in agriculture are important drivers for McDonald's and key for delivering on sustainability through genetics, precision agriculture and genomics, to drive crop yields and productivity growth but also to develop farm products with the characteristics needed to sell to consumers, such as potatoes with a longer storage life. Technology also allows them to measure, report and evaluate sustainable production practices and transfer this knowledge across the chain, so they can show how agriculture is part of the solution to reduce GHG emissions and save the environment. Ultimately, the success of the chain depends on strategic collaboration, alignment and mutual support across the chain and a focus on outcomes, rather than on who is doing better.

#### *Understanding consumers is not always easy*

Some industry participants expressed frustration with the fact that industry may innovate and develop green technologies, but if the result does not match up with what consumers want, then it may not be adopted (e.g. biotechnology). Also, to have a consistent message across the chain to meet consumer preferences, it is essential that supply chain members collaborate and work together for a common outcome and to show a united front. Agricultural producers, food processors, distributors, retailers and foodservice players need to be part of the plan to show how the industry is reducing its C footprint and can be part of the solution.

#### *Transparency through developing data, metrics and consistent standards are key for success*

Being able to measure sustainability with metrics and standards for food is key if the sector wants to appear truthful and responsive. This is also important to prevent a myriad of different standards being developed by different players measuring different things, that can only lead to confusion on the part of consumers and high costs for supply chain players. Supply chain collaboration on the development of consistent standards and metrics is key to this success. Sustainability standards also need to be developed at an international level and in collaboration with trading partners in order to improve transparency and prevent trade barriers. This will require a codex-type international oversight of sustainability standards and regulations.

### **3) Green technology development and adoption for agriculture and agri-food requires the right conditions**

Professor Peter Phillips focused on the innovation landscape for agriculture and agri-food. Canada has a strong reputation for its ability to engage in research. Between 2009 and 2014, Canada ranked ninth in the world for production of research publications as Canada's publication output increased by 26%, greater than in many other developed countries.<sup>6</sup> And 36% of top-cited researchers in the world identify Canada as one of the top five countries in their field. However, other indicators of R&D investments show a decline over time relative to other OECD countries. This, if left unattended will erode Canada's competitiveness in the global economy.

With regards to agriculture, Phillips asserted that in the agriculture and food system, technology development and adoption is not easy as it requires innovation across the whole supply chain to succeed. He argued that there has been a significant amount of science research done already in

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<sup>6</sup> Graham, Katherine A.H. and Allan M. Maslove. How Ottawa Spends, 2018-2019: Next? How Ottawa Spends. Ottawa, ON: Carleton University, School of Public Policy and Administration, 2018. DOI: <http://doi.org/10.22215/hos/2018-19>, Pg. 130.

Canadian agriculture, but we have to get better at scaling up and have been slow to do so. If Canadian firms are unable to grow innovations to scale, this prevents businesses from realizing the benefits of R&D. Globally, about \$10 billion is spent annually on public agricultural research, primarily on crop varieties, farm inputs and machinery, while \$30 billion is spent by the private sector on more downstream research for differentiating products. Canada has significant leverage to benefit from this spending as there are 200,000 high quality farmers who can turn on a dime and are ready and willing to adopt new technologies quickly. But it must ultimately be profitable for them to do so.

There have been substantial program funds allocated to innovation in recent years, such as through the superclusters, the Canadian Agricultural Partnership (CAP) program and the Strategic Innovation Fund. Canada has plenty of innovation space and assets to encourage technology development and adoption, including at many agricultural colleges and universities across the country, and through superclusters like Pulse Innovation Canada. But the system is structurally fragmented and lacking in delivery. Phillips argues that we have not been doing a very good job for a number of reasons, including:

1. Canada is lacking in priority setting and evaluation, so there is no downstream evaluation of research impacts;
2. Institutionally we are structurally fragmented. Activities are parsed by province, sector and technology, so that many projects do not necessarily connect to priorities;
3. Few projects are well connected to international opportunities;
4. Assets in Canada represent about 3.5% of the world research assets so they are not insignificant. One challenge is they are not well linked to global efforts. Canada is a major investor in the International Maize and Wheat Improvement Center (CIMMYT) in Mexico, for example, but when it has results, Canada often does not follow-up. By comparison, the U.S. follows up on its international investments and as a result, it gets about \$90 in return for every \$1 it puts into CIMMYT; and
5. There are gaps in our regulatory and policy systems. Regulatory and policy responses are slow and limit the ability for Canada to benefit from first mover advantage.

Canada is moving towards a more integrated innovation system for advancing commercialization such as by funding Genome Canada and the Superclusters, which have large scale research goals. This appears to be moving us towards more integrated projects that may be more successful in the long term.

Finally, COVID has provided an important lesson for agriculture. We have shown tremendous resilience in the face of crisis created by the pandemic. We also have learned from the response of the One Health and the Vet colleges to the COVID threat, we can link up and deliver coordinated, strategic research that is needed by our industrial and policy system.

#### *Industry argues there are weaknesses in Canada's agriculture innovation system*

Ultimately, being able to make use of green technology for a sustainable and resilient agriculture and agri-food will require that all partners in the supply chain work together and see the green economy as an opportunity to be approached from a solutions-oriented perspective. The Supercluster model has provided a strong ecosystem that addresses alignment and fragmentation issues in Canada's innovation system. And while we have the science and there are inventions taking place, we are lacking in coordination to share the knowledge with consumers and with government to show how our industry is doing its part to find solutions for the green economy.

Some of the challenges the sector faces as it moves forward to adopt and implement green technology solutions arise from the regulatory system, which is reportedly poorly coordinated across government,

particularly when new innovative solutions are found and the agri-food industry wants to adopt and implement them. Just like needing industry superclusters, Canada needs superclusters of regulators.

Innovation requires proper infrastructure. A major challenge is the lack of internet connectivity and broad band in rural areas, which prevents data collection and sharing that is needed for knowledge sharing and to implement innovative technology solutions and practices.

Innovation also requires incentives. We need to motivate the rapid adoption of digital platforms that allow tracking and tracing for validation. This will allow us to deal with variable rates of C capture across farms and regions, as an example. Being able to share technological information across the supply chain provides information and opportunities. It is all about an efficient system so this is why we have to see where new technologies feed through the system. There are lots of problems out there that need solutions. R&D can provide the solutions but for the new technologies to be implemented, farmers and other industry players need access to and must work with scientists in governments or universities to help commercialize and scale-up innovations.

### **Final Thoughts**

The Government of Canada has set its priorities around climate change and a green economic recovery. The agriculture and agri-food system is prepared to rise to the task and has already a strong track record of innovating and adopting new technologies and practices that ensure Canada's economy can grow, while ensuring our resources are maintained for future generations. The sector's ability to contribute to solutions with much better outcomes goes way beyond supplying feedstock for biofuel production (i.e. clean tech). The Canadian agriculture and agri-food sector is doing its part as a climate change solutions-provider, while preserving the environment. However, it has a major challenge in communicating with governments and consumers about its performance and ongoing progress.

Supply chain participants from farmers to processors to retailers to foodservice players are taking steps to reduce their environmental footprint and respond to consumers' demand for sustainable food products both at home and abroad. They are rising to the challenges and are prepared to take the opportunities from the green growth strategy. However, it is still essential that farmers and food businesses remain viable and profitable. They must continue to invest in new technologies and practices that will allow them to continue to make progress on this front. However, the conditions need to be right, and they need to be rewarded for their efforts. Both government and industry need to work together to find solutions and provide the right incentives to continue to produce food for the world in a sustainable and resilient fashion for the future health and wellness of Canadians and the benefit of the global commons.