The Road to 2050

Bridging the Gap Between Challenges & Solutions in the Agriculture & Food Sector.

Agriculture & Food

CORE

CLEANTECH CLUSTER

July 2020

Bridging the Gap Between Challenges and Solutions in the Agriculture and Food Sector

The Province of British Columbia, through their progressive CleanBC program has set province-wide GHG emissions reduction targets of 40%, 60% and 80% for 2030, 2040, and 2050. The agriculture and food sector has a pivotal role to play in achieving these targets and transitioning to a low carbon economy.

CORE Cleantech Cluster and Foresight are producing a series of roadmap landscapes in the six sectors of CORE's focus. The intent is to provide a snapshot of the roadmaps that exist in each, and how they are being used to achieve these emission goals industry-wide. The goal of this roadmap landscape series is to help identify gaps in the required elements, as well as places where roadmaps either don't exist or are insufficient to achieve the government's targets.

In BC, there is no widely used industry roadmap in place to guide the agriculture and food industry toward these targets. The approach to date has been region-by-region, community-by-community, and based primarily on adaptation and ensuring food security and safety. Regional adaptation programs are active in multiple regions of the province, from sustainable management of water and forage resources in the Cariboo to farm-level flood mitigation in the Fraser Valley.[1]

What's At Stake

- Agriculture and food production is responsible for one quarter of the world's greenhouse gas emissions.[2]
- BC's agriculture, food and seafood, including primary production in agriculture, aquaculture, commercial fisheries and the processing of food and beverages, is a $14.95 billion industry.[3]
- BC is a food processing hub, with over 3,400 food processors/distributors in BC.[4]
- In order to keep up with population demands, global agricultural production will have to increase by an estimated 38 percent by 2030 and 60 percent by 2050.[5]

The biggest risk in this industry is the status quo. Change is simply too profound and happening too quickly to ignore.

Considering climate mitigation as a priority strategy is the pathway to the biggest opportunity in this sector - becoming a leader in carbon sequestration, climate change mitigation and regenerative, profitable agricultural practices.

This people-first, community-focused approach to climate action in the agriculture and food sector is necessary and aligns with both the economic and social goals of the province, as well as the nature of the industry. With over 17,000 small farms, and hundreds of varieties of crops, livestock and end food products, the agri-food system is a complex, distributed, and tightly-integrated production chain with multiple objectives (e.g. food security, biodiversity, and the livelihood of farmers).[6]

The urgency of these issues and the complexity of the agrifood system should not forestall a system-wide approach to climate mitigation strategies, which will be necessary for this industry to meet current Clean BC goals and achieve the 6.1 MT in future CO2e reductions that will be needed to reach 2030 targets.[7]

Climate mitigation strategies should be given priority consideration. Agriculture could have a pivotal role to play in meeting Canada's climate goals, not just in cutting emissions and moving to renewable energy, but also in reducing atmospheric CO2 through the CO2 sequestration capacity of soil. A growing body of research is showing that regenerative agriculture, supported by innovative technology, could be a major solution to climate change due to soil carbon sequestration.[8]

Mobilizing this sector to enable more carbon-negative, sustainable and regenerative practices through the use of innovative technology could achieve three goals at once:

1) mitigating the risk of climate change and its adverse effect on food security,

2) increasing the value of agricultural exports though developing a market and expertise in carbon sequestration and bio-products in the context of agriculture/food, and,

3) reducing GHG emissions and achieving CleanBC targets.

> Through bold thinking and a strategic roadmap, we can increase the value of agricultural exports, create new economic growth opportunities within the sector, and make British Columbia into a global agricultural leader.
>
> - Food Security Task Force

The COVID-19 pandemic has also put agriculture and food production in the forefront of an economic upheaval and level of uncertainty that has not been seen in generations. Food security, economic security and health and safety have become urgent, front-page news items.

The Organization for Economic Co-operation and Development recently published a policy note regarding the impact of COVID-19 on the food and agriculture sector. They listed the following as challenges that have become even more urgent as a result of the crisis:

(i) the ongoing emergency of climate change, and the need for the food system to be resilient to a range of extreme weather events;

(ii) the need to ensure sustainable productivity growth to feed a growing world population in a changing climate, while simultaneously reducing the sector's greenhouse gas emissions;

(iii) maintaining biodiversity, against the background of land use change related to agriculture, the management of new varieties and disease risks from monocultures; and

(iv) a range of animal and plant diseases, including those which affect human health directly, via food borne disease (as with the BSE crisis), human-to-human transmission (as with zoonotic coronaviruses), and by inducing human antimicrobial resistance (when antimicrobials are applied inappropriately in the livestock sector), as well those which impact food security by reducing animal and crop production (as with African Swine Fever and Fall Armyworm).[13]

Cleantech has a substantial role to play in addressing these challenges and ensuring the food system is more sustainable and resilient. With technical expertise across multiple categories, including 'smart farming' (big data, AI, analytics, sensors, IoT, platforms), processes for conversion of bio-waste (waste to bioproduct, waste to energy), soil science (plant feed/ fertilizers/ pesticides), and plant genomics/novel food production, there is an opportunity for BC Cleantech to provide exportable solutions as it achieves CleanBC emission reduction goals.

> Absent new, smart and bold farming methods to regenerate soil, we will be ill-equipped to meet the challenge of feeding 10 billion people by 2050. [10]
>
> - Lucent Biosciences

How are we getting there?

The Food Security Task Force report published Feb 2020, recommended that BC develop and implement an agritech strategy to "support B.C. farmers to transition to lower carbon practices through technology and innovation"[9]. The following observations and recommendations are offered in support of that goal and are in alignment with it.

Observations:

- Provincial accounting for agriculture's emissions excludes emissions associated with stationary farm equipment (e.g. heating greenhouses), and on-farm transportation (e.g. tractors)[11]. It also does not take into account the potential for sequestration. This, unfortunately, gives the impression that the sector has less impact (and therefore less ability to effect change) than it actually does.
- There is no mechanism for monetising carbon sequestration at the farm level.
- Agriculture has long growing and production cycles, with returns often measured over years and reporting cycles that do not conform to standard quarterly business cycles. There is a lack of funding mechanisms that take this into account and offer sufficiently long-term horizons. These funding gaps are an obstacle for farmers and producers looking to invest in new technologies or transition to regenerative methods.
- The cost for methane reduction / management for livestock can be high, and the financial incentives to support farm holders are either not in place or not high enough.
- Regenerative practices that rebuild soil organic matter such as maintaining surface residues, integrating livestock, using more diverse crops, limiting the disturbance of the soil through low till or no till farming, and intensive grazing management are known methods of sequestering carbon.[12] However, many current regenerative systems are not scalable as they are built around a family farm scale of implementation.

> Why is no one talking about agriculture as a solution to climate change? [14]
>
> Karn Manhas. CEO & founder of Terramera

Recommendations:

The agriculture and food industry in BC is less consolidated than other sectors and innovative methods to reduce GHG emissions, such as regenerative farming and smart farming, are not scalable as currently practiced. Reaching CleanBC reduction targets in this sector requires the widespread adoption of new agricultural practices and significant changes to how things are done and how they are funded. It may require both legislated policy changes and financial incentives. It would require cooperation and commitment across a diverse range of farmers, growers, food producers, and other stakeholders.

However, this is not impossible. Cooperation and commitment are not in short supply either in the province as a whole, or in the agriculture and food sector. The distributed, community-focused networks in agriculture and food may well be even more suited for collaborative action than other top-down, big industry led sectors. With an appropriate technology roadmap, and supporting policies and accounting mechanisms, this industry could move rapidly into a carbon sink and climate solution for the whole province. The post-covid economic recovery is an ideal and crucial window of opportunity. The following are concrete recommendations for action:

- A project for developing a BC based roadmap for the agricultural and food sector should be launched that focuses on both food security and GHG emissions reduction.
- A method for accounting for and certifying carbon sequestration should be agreed upon and adopted as a provincial standard. Market mechanisms should also be developed.
- Funded industrial challenges should be launched that focus on specific emission reduction categories. (For example, finding sustainable methods to heat greenhouses, manure-to-energy projects, reducing enteric methane emissions). This could happen in lockstep with a technology roadmap project.
- Capacity building programs should be introduced to 1) ensure farmers understand the benefits available from existing techniques and technologies and 2) gain practical, hands-on training in how these technologies will change operations and practices and support technology adoption.
- The capacity building programs should include incentives and programs encouraging the adoption of electric vehicles and equipment.
- Develop longer term funding mechanisms targeting this industry. This could include green bonds, pension plans with long term horizons, and tax incentives.

> We are doing our best . . . We want to make our home here. Trouble is we have not capital.
>
> -Testimony of J.T. Thorgnsson to the BC Royal Commission on Agriculture 1914[15]

Roadmaps & Funding Programs Snapshot

As noted, there is no widely used technology roadmap in place to guide the agriculture and food industry in BC toward achieving GHG emission reduction targets while ensuring food security. However, the following are examples of technology roadmaps and funding programs developed for this sector that have been guiding other regions in Canada and globally:

	SUB-SECTOR	DESCRIPTION
Growing our Future: Scaling Regenerative Agriculture in the United States	**Agriculture**	Forum for the Future is a leading international sustainability non-profit. They have published a roadmap for scaling regenerative agriculture in the United States.
Livestock Solutions for Climate Change	**Livestock**	Food and Agriculture Organizations of the United Nations published a report focused on livestock.
Agriculture and Climate Change: Reducing emissions through improved farming practices	**Farming Practices**	McKinsey & Company published a roadmap report focused on action steps to achieve the IPCC 1.5°C goals.
Maple Leaf Foods Carbon Strategy	**Food Processing**	The Maple Foods Carbon Strategy outlines their approach to becoming the first major food producer to become carbon neutral.
Emission Reduction Alberta - Food, Farming & Forestry Challenge	**Agriculture, Forestry, Land Use**	$40 Million industrial challenge program focused on emissions reductions in food, farming and forestry in Alberta.

About the Project

The CORE Cleantech Cluster is driving economic development goals of job growth, company growth, investment attraction and trade opportunities in British Columbia by activating, coordinating and developing collaboration opportunities and energizing an innovation ecosystem centred around cleantech and sustainability.

A more detailed analysis of the Agriculture and Food Sector and its role in the cleantech innovation ecosystem is available in the report Accelerating British Columbia's Clean Economy: A Cleantech Cluster Strategy for the Province of British Columbia.

Foresight

About Foresight Cleantech Accelerator Centre

This roadmap landscape report is funded through Foresight Cleantech Accelerator Centre. Foresight is Western Canada's Cleantech Innovation Centre which supports the identification and validation of cleantech opportunities and the successful commercialization of solutions.

[1] https://www.bcagclimateaction.ca/regional/rap/

[2] Poore, J., & Nemecek, T. (2018). Reducing food's environmental impacts through producers and consumers. Science, 360(6392), 987-992.

[3] https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/agriculture-and-seafood/statistics/industry-and-sector-profiles/fast-stats/fast_stats_2018.pdf

[4] https://climatesmartbusiness.com/wp-content/uploads/2014/06/CS-Food-and-Beverage-Sector-Industry-Brief-digital.pdf

[5] https://engage.gov.bc.ca/app/uploads/sites/121/2020/01/FSTF-Report-2020-The-Future-of-Food.pdf

[6] McKinsey & Company (2020) Agriculture and Climate Change: Reducing emissions through improved farming practices

[7] https://blog.gov.bc.ca/app/uploads/sites/436/2019/02/CleanBC_Highlights_Report_Updated_Mar2019.pdf

[8] https://e360.yale.edu/features/soil_as_carbon_storehouse_new_weapon_in_climate_fight

[9] https://engage.gov.bc.ca/app/uploads/sites/121/2020/01/FSTF-Report-2020-The-Future-of-Food.pdf

[10] https://soileos.com/fixing-the-soil-to-feed-the-planet/

[11] https://www2.gov.bc.ca/assets/gov/environment/climate-change/data/provincial-inventory/bc-methodology-book_ghg-provincial-inventory.pdf

[12] https://regenerationinternational.org/2018/10/09/reversing-climate-change-through-regenerative-agriculture/

[13] http://www.oecd.org/coronavirus/policy-responses/covid-19-and-the-food-and-agriculture-sector-issues-and-policy-responses-a23f764b/

[14] https://agfundernews.com/why-is-no-one-talking-about-agriculture-as-a-solution-to-climate-change.html

[15] Province of British Columbia, Full Report of the Royal Commission on Agriculture (Victoria: William H. Cullin, 1914)