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April 23, 2021

Alberta Environment and Parks

Via email: engagement@gov.ab.ca

Re: Review of Alberta's *Technology, Innovation and Emissions-Reduction* program

Thank you for the opportunity to submit comments on Alberta Environment and Parks' consultation on Technology and Innovation for Heavy Industry and Bio-Based Solutions. Fertilizer Canada greatly appreciates your engagement with industry as climate policies are developed in Alberta.

Fertilizer Canada represents manufacturers, wholesale, and retail distributors of nitrogen, phosphate, potash, and sulphur fertilizers – the cornerstone of Canada's agri-food economy. Fertilizer is currently responsible for 50 per cent of global food production by replenishing agricultural soils with essential nutrients. Fertilizer is crucial in meeting the food, fuel, and fibre needs of the growing world population, and Canadian fertilizer accounts for 12 per cent of the global fertilizer supply. We also contribute approximately $24 billion annually to Canada's economic activity, supporting the employment of over 76,000 individuals throughout the supply chain. However, as an energy-intensive, trade-exposed (EITE) industry, our member companies are highly vulnerable to carbon leakage and investment moving abroad due to inefficient regulatory burden.

Alberta is home to one of the largest concentrations of nitrogen production facilities in North America, consisting of seven facilities that produce ammonia and its primary upgrade products (urea and ammonium sulphate), and nitric acid and its primary upgrade product (ammonium nitrate). Nitrogen manufacturing is a significant contributor to Alberta's manufacturing and value-added economy. In Alberta, fertilizer manufacturing generates a direct economic benefit of $2.3 billion, adding $800 million to GDP as well as almost 3,000 jobs. Our nitrogen production facilities upgrade Canadian natural gas, the most efficient and lowest carbon dioxide (CO_2) emission feedstock and fuel source, into nitrogen fertilizers which keep agricultural soils productive.

Opportunities for Technology and Innovation

Nitrogen is an essential nutrient required for plant growth. However, until the discovery of the Haber-Bosch process in the early 1900s, nitrogen could not be chemically

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produced. Large scale production of ammonia and ammonia-based products via the Haber-Bosch process transformed the efficient delivery of plant nutrients and now contributes significantly to crop production and is necessary to feed our population today. To date, there is no comparable process to produce nitrogen-based fertilizers at this scale.

Fertilizer Canada recognizes the importance of environmental sustainability for our industry, and to this end we have begun conducting a technology roadmap outlining technologies at various stages of development that could drive further environmental performance improvements. Our technology review assesses each emerging technology against current commercial saleability, construction and implementation timelines, economic viability and investment certainty, and regional/jurisdictional specific considerations. However, it is important to reiterate that there is no known technology that can economically or commercially compete with the Haber-Bosch process.

We greatly appreciate the Government of Alberta's commitment to advancing carbon capture, utilization, and storage (CCUS) technologies. This technology not only offers opportunities for the oil and gas industry, but also presents significant opportunities for Alberta's fertilizer industry. Many of our facilities are well suited to adopt CCUS as access to pure CO_2 stream is often located near other petrochemical facilities. CCUS for fertilizer facilities could contribute meaningful emission reductions in Alberta but require policy or regulatory frameworks that encourage the adoption of this technology. Additionally, although Alberta was an early adopter of such technologies, our members are concerned that Alberta is falling behind developments in other jurisdictions as progress in Alberta appears to have slowed.

Our technology roadmap recognizes the potential benefits of implementing CCUS at fertilizer facilities; however, there are also challenges associated wit the implementation and utilization of this technology. CCUS projects, like many other innovative technologies, require significant investments of finances and time for implementation. We commend the Government of Alberta for previous investments in CCUS development, including the Industrial Energy Efficiency CCUS grant program through the Technology Innovation and Emissions Reduction (TIER) fund. However, we note that this program was well over-subscribed, and many companies who may have benefitted from these grants were unable to access them, creating "winners" and "losers" within the same industries.

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Fertilizer Canada and our member companies were pleased to see a $5 billion commitment to Net Zero accelerator projects and an investment tax credit opportunity for capital invested in CCUS projects within the recently released Government of Canada *2021 Budget: A Recovery Plan for Jobs, Growth, and Resilience.*

Our facilities in Alberta are well positioned to benefit from these investments and, as an EITE industry in Canada, should be a priority in any regional CCUS infrastructure planning to ensure our industry can further its environmental performance while maintaining its competitiveness in a global market. These investment opportunities can provide EITE industries with the necessary economic certainty required to de-risk these types of investments. The Government of Canada plans to move quickly with a 90-day consultation period with stakeholders on the design of the investment tax credit for CCUS projects. **Fertilizer Canada and our member companies ask that the Government of Alberta actively participate in this 90-day consultation period and strongly advocate that the fertilizer industry is well positioned to utilize and benefit from this investment tax credit opportunity for capital invested in CCUS projects. Further, we are concerned that the investment tax credit is not intended for Enhanced Oil Recovery projects and ask that the Government of Alberta work with our industry to advocate for the inclusion of this project category.**

We would also welcome an opportunity to review and discuss our technology roadmap with the Government of Alberta. The technologies available for our industry will involve significant new investments and disruption to operating facilities which may require government support to be implemented successfully.

Ammonia: An Opportunity for Alberta's Hydrogen Economy

Hydrogen Storage and Transport

Hydrogen has a large potential in Canada and around the world – as a fuel, for heat and as a feedstock for industrial processes. However, due to its chemical composition, hydrogen is very difficult to store and transport. Not only is hydrogen a combustible gas that requires high pressure tanks, but it also has a very low boiling point as a liquid which requires it be stored and transported.

Ammonia is made of a single nitrogen atom and three hydrogen atoms and with a higher boiling point can be stored and transported as a warm liquid at low pressure. As a readily used fertilizer, ammonia is already safely stored and transported in large volumes via pipelines, railways, trucks, and ports in Canada, and globally in storage tanks and ports. Canada's industry sets exceptionally high standards for product handling and stewardship,

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through world-class codes of practice, advanced tank car design and robust regulation. The Canadian fertilizer industry offers a unique opportunity to safely produce, store and transport hydrogen as ammonia through existing production and transportation infrastructure.

A required increase in transportation infrastructure presents social and economic challenges for the efficient transportation of hydrogen. For example, railway transport introduces costly tariff agreements or constructing a pipeline to Pacific ports through British Columbia could be challenged by social or political concerns. These challenges will need to be addressed proactively if Alberta hopes to export hydrogen as a global commodity. With its track record of safe and efficient transport of ammonia across Canada and globally, the Canadian fertilizer industry should be consulted to leverage existing infrastructure and knowledge.

Ammonia as a Fuel Source

After storage and transportation of ammonia, hydrogen can be separated from the nitrogen atom and used as fuel or feedstock. Additionally, ammonia can also be used as a low carbon intensity fuel without the need to extract hydrogen from the molecule. Since ammonia carries three hydrogen atoms for every nitrogen atom, it has a very high hydrogen density which allows it to be used as a fuel through combustion or with solid oxide fuel cells[1]. An international export market for ammonia as a fuel is being supported by global investments. Japan is currently investigating ammonia as a fuel for power generation[2] and by the International Marine Organization is looking to hydrogen and ammonia as low-carbon, alternative fuel sources[3]. Japan is committed to utilizing ammonia as a fuel for power generation, the Korean New Deal outlines the need to import blue ammonia as part of their strategy, and blue ammonia as emerged as one of the most promising fuels to meet the ambitious greenhouse gas mitigation targets of the international Marine Organization.

Market Demand for Low-Carbon Fuel

As the world seeks to mitigate climate change and meet its net zero targets, the global demand for low-carbon fuels will continue to grow significantly. The Canadian fertilizer industry is uniquely positioned to meet this demand through experienced production of

[1] Science and technology of ammonia combustion
[2] Japan Ministry of Economy, Trade and Industry, International Resource Strategy
[3] Argus Media. Ammonia to lead shipping in decarbonization.

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hydrogen and ammonia but requires significant investment opportunities to modify equipment and chemical processes.

Through the Haber-Bosch process outlined above, grey hydrogen is produced when manufacturing ammonia and other ammonia-based products. Most nitrogen production facilities in North America produce grey hydrogen, with a few producing blue hydrogen through implementation of CCS technologies. Green hydrogen, or carbon-free hydrogen, can be produced through electrolysis of water, but implementation of this technology has not yet been seen in Canada due to its technical and economic challenges.

The transition from grey to blue or green hydrogen will require investments, new and adjusted infrastructure, and access to low-cost alternative energy sources. Alberta's nitrogen manufacturers already safely produce, store and transport hydrogen as ammonia. It is recommended that Alberta's future climate policies create opportunities for existing hydrogen producers to achieve reductions in carbon intensity and work with Alberta's existing ammonia production facilities to realize the potential of a low-carbon fuel economy.

Regulatory Certainty and Federal Carbon Policies

Fertilizer Canada and our member companies are deeply concerned about the potential impacts of federal carbon policies. The ongoing review of the federal Output-Based Pricing System (OBPS) has indicated a planned increase in the federal carbon price to $170 CAD/tonne of CO_2e by 2030. This increase within a limited timeframe is unprecedented and warrants serious consideration of the real impacts this policy will have on Canadian EITE industries. Combined with a proposed increase in the stringency in the federal Output – Based Standards (OBS), our member companies are subject to additional increases in carbon price which continues to compete against investments in new, low – carbon technologies. With a potential increase in both the price of carbon and stringency of OBS, it is more important than ever to re-consider the return mechanism of the TIER fund to allow our companies the opportunity to invest in existing and proven technologies as well as new, emerging technologies. An increase to $170 CAD/tonne of CO_2e by 2030 in Canada will significantly jeopardize our competitiveness in a global market and unintentionally encourage carbon leakage. Further to the price of carbon, if implemented, a Carbon Boarder Adjustment must be a policy instrument to achieve environmental objective to protect the competitiveness of Canadian EITE sectors, where other countries do not bear the same carbon costs as do Canadian producers that results from domestic climate policy framework. Canadian manufacturing facilities are amongst the safest, most environmentally responsible and sustainable in the world. **Fertilizer Canada asks the Government of Alberta to actively protect the global competitiveness of our industry by providing the necessary economic certainty and synchronize TIER's price and stringency**

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increases with realistic timelines for deploying new technologies for our industry. Additionally, we ask that your government review the return of the TIER funds to the contributing industry to ensure a majority of these contributed funds are made available to our member companies to adopt existing proven and new, low-carbon technologies.

We are also concerned with the negative impact of frequent regulatory changes on investment and overall competitiveness. When regulations are continuously adjusted without clear timelines on when these changes will occur, companies are discouraged from making any long-term investments in new technologies that will have positive impacts on environmental sustainability. **Fertilizer Canada strongly encourages the Government of Alberta to seek long-term agreements (i.e. 5-10 years) with the Government of Canada on carbon policies in order to ensure regulatory certainty which will encourage investment in the technologies that are crucial for achieving environmental goals, protect the competitiveness of Canadian industry, and maintain Canada's reputation as a reliable global trading partner. Our industry understands that elements of the TIER system need to meet federal OBPS levels to maintain equivalency. To better understand this process and to better advocate for protection of the TIER program in Alberta, Fertilizer Canada asks for more information as it relates to the equivalency requirements for both price of carbon and stringency of benchmarks.**

Fertilizer Industry Climate Objectives

Fertilizer Canada recognizes the importance of environmental sustainability for our industry, and our member companies have shown strong leadership on environmental issues. Our facilities already produce fewer emissions than competitors outside of Canada, making Canadian fertilizer some of the most environmentally sustainable fertilizer produced around the world. Moreover, our member companies have begun setting their own sustainability targets to improve environmental performance. For example, Nutrien has set a target of 30 per cent emissions reduction from 2018 levels by 2030, and CF Industries has set a target of reducing CO_2e emissions by 25 per cent from 2015 levels by 2030 and net zero emissions by 2050. We are proud that our members have taken on these commitments, and we believe that these examples, along with targets set by other members, complement our industry's support for 4R Nutrient Stewardship.

<u>Nitrous Oxide Emission Reduction Protocol (NERP)</u>

As the world seeks to sustainably intensify food production, farmers will continue to rely on fertilizer to increase production efficiency while conserving our soil, water and air. To meet

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this challenge, farmers will require more than just new and innovative technologies; they will require a framework for understanding and implementing the core principles and practices of sustainable agriculture.

4R Nutrient Stewardship has been designed for this purpose. For more than a decade, Fertilizer Canada has worked with Canadian farmers and the fertilizer industry to promote 4R Nutrient Stewardship - a science-based approach to fertilizer management that involves applying the Right Source @ Right Rate, Right Time, Right Place ®. Use of the 4Rs maximizes plant nutrient uptake, optimizes yield and increases profitability, while also minimizing fertilizer runoff, leaching and nitrous oxide emissions.

As a science-based framework of best management practices (BMPs), 4R Nutrient Stewardship enables growers in any region to reduce greenhouse gas (GHG) emissions and impacts to soil and water resources while maintaining crop yields and profitability. 4R Nutrient Stewardship is an innovative approach to nutrient management and allows for growers to develop a suite of BMPs with their agronomist based on their operations' climate, landscape, and resources. In Alberta, growers implementing an advanced level of 4R Nutrient Stewardship BMPs for nitrogen management could have the potential of reaching emission reduction of 35 per cent.

Improved nitrogen management within a 4R Climate Smart Protocol (known as the Nitrous Oxide Emission Reduction Protocol (NERP) in Alberta) is a science-based protocol for improving nitrogen management in cropping systems and estimating the nitrous oxide emission reduction associated with better nitrogen management based on 4R Nutrient Stewardship BMPs. It is a robust protocol designed to meet international standards for estimation and verification of carbon offsets but is simple in concept and is driven by data that producers are either already collecting or are interested in collecting to improve their overall farm management system.

Although NERP is a protocol within the Alberta TIER system, revisions to the protocol must be made to reduce barriers to uptake by growers. Since the development and launch of NERP in 2010, there has been no uptake at the farm level. It was found that without consideration and incorporation of the following criteria, it was virtually impossible to successfully apply the protocol on the ground. **We ask that the Government of Alberta review the following identified barriers and work with our industry to complete a technical review of the protocol to address these concerns.**

- **Flexibility with development and adoption of a project-specific dynamic baseline.** Fertilizer Canada supports the development of a project-specific, dynamic baseline that considers the N_2O emissions resulting from a field not implementing 4R Nutrient Stewardship BMPs. Specific project types without available regional data, like NERP, require the development of a project-specific baseline. In this situation,

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we recommend the development of an ecodistrict baseline. Crop Insurance could be used as a practical approach for baseline development as it collects the required data for this calculation such as crop yield, location, and nutrient application rate.

The Government of Alberta investigated crop insurance as a mechanism to monitor yield which provides several learnings. Since yield is measured as dry matter, a moisture test was added as a requirement within the Alberta protocol. This is problematic as a moisture test for every cart weight is impractical and not typically completed. The crop insurance system and grain buying facilities all treat grain mass as if it's at or below the generally accepted maximum "moisture" parameters for safe storage (referred to as "dry grain)"; 14.5% for wheat, 14.8% for feed barley, 10% for canola and so on. Penalties for being over moisture are applied at sales point in the grain handling system. We encourage the review and revision of this requirement with the offset system consideration of scaled weight carts for yield monitoring.

- **Landowner sign-off should be removed.** In the case of projects that only have emission reductions (i.e. N2O reductions from soils), we recommend that the person taking the action (land manager/lessee or the landowner) is the 'owner' of the reduction. Landowner sign-off for these project types needs to be excluded from the protocol requirement list. Implementation of the BMPs required to qualify for emission reductions under NERP are entirely under the control of the grower. As carbon is not being stored in the soil there are no reversals to consider. The emission reductions are all accounted for in the crop vintage year, this ownership eliminates possible double counting and reduces the risk of leakage. Requiring landowner signoff increases the administrative burden for the grower without providing any material benefit for verification.

- **Protocol should be on a field-by-field basis.** For N2O emission reductions from agricultural soils, Fertilizer Canada recommends that deviations in fields that do not meet the protocol should result in the field being excluded from the protocol for that season, not the whole farm. The level of on-farm record keeping required by a farm to meet the verification standard can allow tracking of fertilizer use and yield by field. Therefore, nitrogen application rates and crop yield from non-applicable fields can be subtracted in the calculation to determine farm offset credits.

  Similar to the above example, a five-year average yield from crop insurance was investigated within the Alberta protocol as an alternative to meet yield requirements if weighed results were not available. This proved to be problematic with inconsistencies in yearly farm yield averages where yields for specific fields were unavailable or omitted. Crop insurance accounts for yield discrepancies amongst

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fields and has build a robust system to ensure yields, by field, are reported accurately. Crop insurance provides a robust verification method to assess yield which should be deemed equivalent within any offset system. If the farmer does not use crop insurance, cart weights of scale tickets can be required as described above.

At a national level, Environment and Climate Change Canada (ECCC) recently released their climate plan "A Healthy Environment and a Healthy Economy" which sets a national target of reducing emissions from fertilizer by 30% below 2020 levels. Any federal emissions reduction target must be based on emissions intensity and consider emissions per unit of crop produced to maintain growing agricultural exports. Focusing on absolute emissions from the sector will have severe consequences to the competitiveness of farmers and the fertilizer industry. To achieve this target in a method that maintains Canadian Agriculture's competitiveness, 4R Nutrient Stewardship will need to be endorsed and implemented to achieve this target.

As our industry and its grower customers work toward two sustainability target goals – 15 million acres under 4R Designation and 4R Certification by 2025 and a reduction in fertilizer emissions by 30% below 2020 levels by 2030 – we want to take this opportunity to reiterate that the parallel revision of NERP in Alberta is necessary and should be prioritized.

Canadian growers are asking that the 4R Climate Smart Protocol be prioritized to provide them with the opportunity to be rewarded for their sustainable actions to reduce GHG emissions on Canadian farmland. The Canadian Canola Growers Association (CCGA), Grain Growers of Canada, the Canadian Federation of Agriculture (CFA), and the Soil Conservation Council of Canada are key partners that actively support 4R Nutrient Stewardship and advocate for the revision of NERP in Alberta.

Fertilizer Canada and our members ask the Government of Alberta to recognize 4R Nutrient Stewardship as key Bio-Based Solution by prioritizing the revision of NERP in the province to specifically address the technical concerns outlined above. Our industry stands ready to work with the Government of Alberta to ensure the revised protocol meets the requirements of the provincial offset system but is also functional on Alberta cropland.

Concluding Remarks

Thank you again for this opportunity to comment on the Technology and Innovation for Heavy Industry and Bio-Based Solutions consultation. Fertilizer Canada and our member companies stand ready to work with the Government of Alberta to develop policies that

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achieve our shared goals for economic growth and environmental sustainability. Fertilizer Canada would welcome the opportunity to schedule a virtual meeting to further discuss these comments and identify areas of alignment with the Government of Alberta.

Sincerely,

McKenzie Smith

Director, Nutrient Stewardship & Regulatory Affairs

Fertilizer Canada

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Justin Wheler, Executive Director, Climate Implementation and Compliance

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