March 12, 2017

Rebecca Tan
Ministry of the Environment and Climate Change
Climate Change and Environmental Policy Division
Air Policy Instruments and Programs Design Branch
77 Wellesley Street West, Floor 10
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RE: Comments on the Discussion Paper "Developing a Modern Renewable Fuel Standard For Gasoline in Ontario," EBR Registry No. 012-7923

Dear Ms. Tan:

Growth Energy and the U. S. Grains Council ("USGC") appreciate this opportunity to comment on design options under consideration for the proposed Renewable Fuel Standard ("RFS") for gasoline, as outlined in the "Discussion Paper: Developing a Modern Renewable Fuel Standard For Gasoline in Ontario" (the "Discussion Paper"). Growth Energy is the leading association of ethanol producers in the United States, with 85 members and 96 affiliated companies who serve the United States and Canada's need for renewable fuel. The U.S. Grains Council works in more than fifty countries and the European Union to develop new markets for U.S. barley, corn, grain sorghum and related products, including ethanol and distiller's dried grains with solubles. Collectively, we are the United States' ethanol producers and supporters.

We strongly support the use of renewable fuels such as ethanol that provide significant greenhouse gas ("GHG") benefits as well as reducing other air pollutants such as carbon monoxide and particulate matter. A well-designed RFS for gasoline that incorporates sound science, supports consumer choice, and sets ambitious but achievable goals must incorporate ethanol as part of the solution. Increasing the ethanol content of gasoline is the best and most cost-effective way to reduce GHG emissions associated with gasoline in the short term.

The Discussion Paper solicits comment from stakeholders on a modernized RFS that ensures Ontario's gasoline achieves a five per cent GHG reduction by 2020. Specifically, Ontario seeks comments on an appropriate minimum blending requirement to assist in attaining the objectives of the RFS, compliance flexibility mechanisms, lifecycle GHG considerations, and regulatory transparency.

Below we introduce the benefits of ethanol, then discuss two primary approaches to achieve Ontario's goal of a GHG-reduction from gasoline of five percent by 2020. *First*, Ontario may increase its renewable fuel standard for the minimum annual ethanol required to be blended into gasoline from the current average of five percent to ten percent or greater. *Second*, Ontario may implement a low carbon fuel standard ("LCFS") that requires decreasing carbon intensity of gasoline based on a baseline fuel that is a five percent ethanol blend, and exclusive of scientifically unsupportable indirect land use change ("ILUC") valuations. We offer general considerations regarding these two approaches. We respectfully suggest that given developments in Environment and Climate Change Canada's ("ECCC") efforts to develop a clean fuel standard, and the rapidity with which Ontario seeks to reduce the GHG intensity of its gasoline supply, it may be prudent for Ontario to increase its ethanol blend requirement in lieu of embarking on a more complex and administratively burdensome LCFS program.

* * *

I. Benefits of Ethanol

Increasing ethanol concentrations in fuel presents tremendous benefits to the public in the form of lower GHG emissions, lower levels of other pollutants, improved fuel properties, and economic benefits to Canada's critical agricultural economy. Most relevant to the Discussion Paper, corn ethanol achieves substantial reductions in GHG emissions when compared to petroleum. According to a January 2017 study published by the United States Department of Agriculture (attached as Exhibit A), corn ethanol currently achieves an approximately forty-three percent reduction in lifecycle GHG emissions compared to gasoline on an energy equivalent basis, and ethanol's GHG performance is only improving. Within the next five years, U.S. corn ethanol, on average, will comfortably exceed a fifty percent reduction in GHG. "The ongoing efficiency improvements along the corn ethanol production pathway have resulted in a continued reduction of ethanol's greenhouse gas life cycle emissions and widened its environmental advantage over petroleum."[1]

The main drivers of these substantial GHG reductions are: (1) farmers are producing corn more efficiently and using conservation practice that reduce GHG emissions, such as (a) reduced tillage, (b) cover crops, and (c) nitrogen management; (2) continued advancements in ethanol production technologies such as the use of combined heat and power and using landfill gas for energy, (3) increased corn yields, and (4) trucking and other ethanol transportation efficiencies.[2] If additional conservation practices and efficiency improvements are pursued, the USDA Study found that GHG benefits of corn ethanol are even more pronounced over gasoline—about 76 percent.

[1] S. Mueller, S. Unnasch "Greenhouse Gas Life Cycle Analysis of US-Produced Corn Ethanol for Export to Global Markets," University of Illinois at Chicago (August 2016) (attached as Exhibit B).

[2] *See* Exhibit A.

Moreover, as discussed further *infra* in Section III, early indirect land use change models dramatically exaggerated indirect emissions. More current data on actual patterns of changes and innovation within the farm sector show that such indirect emissions have not occurred at the magnitude anticipated.

Additionally, ethanol, which burns cleaner and cooler than oil is a low cost, high-oxygen octane enhancer. In fact, there is robust scientific literature regarding the benefits of a midlevel ethanol blend in the E20 to E30 range, in conjunction with a high compression ratio engine on both fuel efficiency and tailpipe GHG-emissions reductions. Multiple studies have shown that a high RON, midlevel ethanol blend (e.g., 96-RON E20 or 101-RON E30) when paired with various higher compression ratio engines (e.g., 11.9:1, 13.0:1) yields tailpipe CO_2 emissions reductions of at least 5%, which, in most instances were also coupled with efficiency gains that offset the lower energy content of the high octane fuel. [3] These tailpipe emission reductions are *additional* benefits to the lifecycle GHG improvements of ethanol over petroleum.

Further, ethanol replaces benzene and other harmful aromatics in gasoline and would provide ancillary emissions benefits to the GHG reductions.[4]

Canadian agriculture will also benefit from the stabilizing effect ethanol has on commodity prices by ensuring demand for recent record corn crops. Thus, in addition to significant environmental benefits, farmers and rural economies stand to gain from an Ontario RFS that incentivizes corn and cellulosic ethanol production.

II. Renewable Fuel Standard: Moving to E10 and Beyond

Corn ethanol is proven to substantially reduce GHGs and is presently available as an economic way to reduce the carbon intensity of transportation fuel.[5] Growth Energy and the USGC suggest that fastest, least administratively burdensome, and most effective way to achieve the goals outlined in the Discussion Paper would be to increase the current ethanol blending requirement from five percent to ten percent or greater. Only minor changes to Ontario

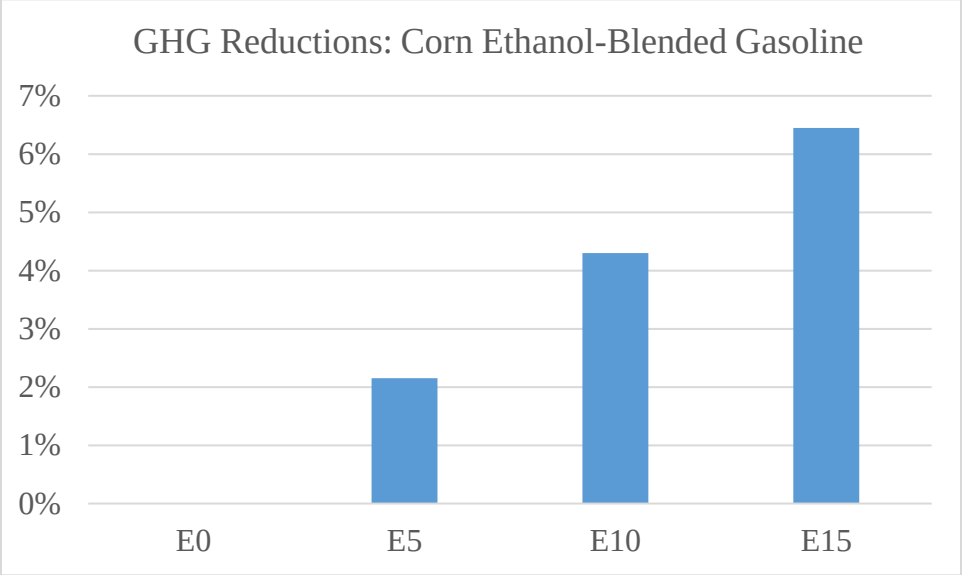
[3] *See* West B, McCormick, R., Wang M. et al., "Summary of High-Octane, Mid-Level Ethanol Blends Study," ORNL/TM-2016/42 (July 2016) (attached as Exhibit C); Leone, T., Anderson, J., Stein R. et al., "Effects of Fuel Octane Rating and Ethanol Content on Knock, Fuel Economy, and CO2 for a Turbocharged DI Engine," SAE 2014-01-1228 (April 1, 2014); Leone, T., Anderson, J. et al., "Fuel Economy and CO2 Emissions of Ethanol-Gasoline Blends in a Turbocharged DI Engine," SAE 2013-01-1321 (April 8, 2013).

[4] *See* S. Sobhani, "Air Pollution from Gasoline Powered Vehicles and the Potential Benefits of Ethanol Blending," Energy Future Coalition, United Nations Foundation (October 2016) (concluding that "[c]lear scientific evidence show that higher concentrations of aromatic hydrocarbons in gasoline result in increased gaseous and particulate pollution;" "aromatics…are found to be precursors of soot [and s]everal monocyclic and polycyclic aromatic hydrocarbons are themselves known carcinogens").

[5] *See* Exhibits A and B.

regulations would be required to implement a five percent increase in ethanol blending,[6] which would result in significant additional GHG-reductions towards Ontario's five percent goal.

The following chart shows the GHG reductions attained at varying level of corn ethanol concentrations in gasoline based on the USDA Study that shows U.S. ethanol achieves forty-three percent GHG reductions below gasoline on an energy equivalent basis.[7] The GHG reductions would be significantly greater than those demonstrated below if Ontario incentivizes blending of cellulosic ethanol and encourages flex-fuel vehicle drivers to purchase E85, as discussed *infra*.



An additional benefit of an RFS approach focused on increasing the ethanol blend rate in Ontario is that both regulators and the regulated parties are familiar with the regulatory requirements and compliance mechanisms given the existing five-percent mandate. The existing regulatory structure coupled with the overall ease of administration of a blending mandate commend it as an expeditious, practical, and cost-effective method to achieve significant GHG reductions towards Ontario's five percent goal in the short-term.

In the United States, approximately ninety-five percent of gasoline is E10;[8] and we also suggest that Ontario consider the United States' success with E15, a blend of fifteen percent ethanol in gasoline. E15 is a less GHG intensive, lower cost, higher-octane fuel option offered in hundreds of locations across the United States alongside regular and premium gasoline. In 2010 and again in 2011, U.S. Environmental Protection Agency approved the use of E15 in 2001 and

[6] *See* O. Reg. 535/05: Ethanol in Gasoline.

[7] Given the substantial contributions U.S. ethanol can make to achieving Ontario's goals, we would anticipate that it would not be excluded from the Ontario market.

[8] U.S. Energy Information Administration, "Almost all U.S. gasoline is blended with 10% ethanol," May 4, 2016, *available at* https://www.eia.gov/todayinenergy/detail.php?id=26092.

newer light-duty trucks and passenger vehicles and all flexible fuel vehicles after extensive research programs by the U.S. Department of Energy, automobile and oil industry research programs, and other government and industry research efforts. In fact, in part due to E15 growth in the United States, the average blend rate of ethanol in gasoline now exceeds ten percent,[9] which is the primary driver of GHG-reductions in the nation's gasoline. If Ontario were to establish an ethanol blending requirement of above ten percent, it would promote E15 as a choice for consumers. Higher E15 levels would in turn further lower the carbon intensity of its gasoline and could be used to offset any residual consumer demand for ethanol blended products at lower concentrations (or E0), thereby allowing regulated parties additional compliance flexibility. Of course, promoting E15 would require the removal of any regulatory barriers that exist in Ontario that would impede the use of higher ethanol blends. Elimination of these barriers is essential to realizing the full potential of ethanol to efficiently reduce GHG impacts of gasoline use.

In the United States, federal funding through the USDA's Biofuels Infrastructure Partnership ("BIP") Program has been critical in facilitating that rollout of higher ethanol blends and enabling consumers to purchase cleaner and lower cost ethanol blends such as E15 and E85. Given the widely acknowledged success of the BIP Program, we suggest that Ontario consider accompanying an RFS program with public/private partnership investment funds to assist in deferring costs related to infrastructure upgrades such as the installation of fuel pumps, tanks, and other retail fuel equipment that is needed to store, handle and dispense higher blends of ethanol such as E15 and E85.

Increasing the ethanol blend requirement in Ontario may also spur interest in E85, on which a subset of the Canadian fleet can run, because regulated parties could use this higher-ethanol blend to attain the blend requirement, while ensuring flexibility to offer lower ethanol-blended fuels. Based on the USDA Study, use of E85 results in GHG-emissions reductions approximately 37% below pure fossil fuel gasoline on an energy-adjusted basis; thus, Ontario should encourage its use in flex-fuel vehicles.

Aside from GHG reductions, the Discussion Paper indicates that another of Ontario's goals is to promote advanced biofuels with even lower GHG levels than corn ethanol. This goal is not at all inconsistent with an ethanol blending requirement. Ontario can simply modify the blending requirement to provide additional incentives for advanced biofuels. For example, to further incentivize production of extremely low carbon intensity cellulosic ethanol (which may have up to a 115 percent GHG reduction below fossil fuels depending on cellulosic feedstock type and conversion process)[10] and for even more compliance flexibility, we propose Ontario continue its current regulatory approach of crediting a regulated party 2.5 liters of ethanol for

[9] U.S. Energy Information Administration, Monthly Energy Review, Fuel Ethanol Overview (February 2017), *available at* https://www.eia.gov/totalenergy/data/monthly/#renewable.

[10] U.S. Department of Energy, Energy Efficiency & Renewable Energy, "Ethanol Vehicle Emissions," a*vailable at* http://www.afdc.energy.gov/vehicles/flexible_fuel_emissions.html.

every one liter of cellulosic sold in Ontario.[11] Ontario could introduce similar benefits for other advanced biofuels, allowing it to maintain the efficiency of a blending requirement while still promoting innovative ways to reduce GHGs.

As an alternative, Ontario could consider pairing an increased ethanol blending requirement with specific annual cellulosic ethanol targets, similar to those in the U.S. RFS. Such a program would necessitate a more complex regulatory framework for regulated parties and would require the agency to generate realistic, but ambitious cellulosic ethanol targets based on annual production data, but could be instrumental in further incentivizing commercialization of cellulosic ethanol technologies and providing a market for such low-GHG fuels.

In sum, raising the renewable fuel standard with respect to Ontario's ethanol blending requirement would accomplish the key considerations outlined in the Discussion Paper, and could easily satisfy Ontario's goal of attaining a five percent GHG-reduction in gasoline by 2020 with limited administrative effort and cost. Specifically, it would provide achievable, real GHG benefits, while still supporting consumer choice and ensuring compliance flexibility and transparency for regulated parties. It would be fairly simple to implement in the near-term and would not result in potential conflict with the clean fuel standard currently under consideration at the national level.

III. Key Considerations of an Ontario LCFS

As an initial matter, given ECCC's interest in developing a nationwide LCFS expressed in its recently released "Clean Fuel Standard: Discussion Paper," it may be prudent to forgo a province-level program due to significant administrative burdens associated with the program and the potential for conflict between the province and federal programs. Additionally, given the necessary regulatory lead-time for both regulators and regulated parties, it may be challenging to have a robust LCFS program, with associated credit markets and pathway approvals, in place in time to meet the goal articulated in the Discussion Paper of a five percent decrease in GHG intensity by 2020. However, if Ontario is inclined to pursue its own LCFS in the short-term, Growth Energy and the USGC offer the following general suggestions:

First, based on Ontario's current five percent blend requirement, the appropriate baseline fuel against which GHG reductions should be calibrated is E5. An E5 baseline will provide a fair playing field that rewards those Canadian entities that have already gone beyond existing blending requirements to reduce the carbon intensity of gasoline.

Further, it is essential that any LCFS eliminate regulatory barriers to higher (greater than ten percent) ethanol blends. An LCFS operates by requiring lower and lower average carbon intensity levels over time. Given that ethanol is the only practical way to reduce the carbon intensity of gasoline, gasoline carbon intensity only goes down when ethanol becomes less carbon intensive or concentrations of ethanol in gasoline increase. While innovations in ethanol production and the commercialization of cellulosic ethanol are promising routes to decreasing ethanol carbon intensity in the medium to long term, there are limits to the potential of ethanol

[11] See O. Reg. 535/05: Ethanol in Gasoline.

carbon intensity reductions within the next few years. Thus, the only way to guarantee continued reduction of gasoline carbon intensity levels in the short term is to allow ethanol levels to exceed ten percent. Failure to do so would almost certainly lead to tremendous negative consequences. If higher blends are not allowed, obligated parties will reach a point at which they will not be able to comply with an LCFS, leading to a spike in carbon intensity credit costs that will be passed along to consumers. Ontario must remove any regulatory barriers that would lead to this result.

Further, infrastructure funding is equally essential to ensuring that higher level ethanol blends allow LCFS compliance and keep carbon intensity credit prices low. Even if higher ethanol blends are legally permissible. Canadian fueling infrastructure must be able to accommodate higher blends. Canada should learn lessons from the United States' rollout of ethanol by providing funding for this transition upfront and in conjunction with an LCFS, rather than providing funding after carbon reduction requirements are in place.

Additionally, Growth Energy and the USGC agree with numerous experts that "indirect land use change" ("ILUC") is not sound science and should not be incorporated into lifecycle emissions analyses. As explained to the California Air Resources Board in the rulemaking for that state's LCFS, ILUC values are not adequately grounded in fact, and the models employed by California and Oregon that purport to reflect ILUC are woefully inaccurate.[12] Recent research shows that "land use intensification has been widely underestimated in land use modeling resulting in overstated native land conversions by earlier land use models."[13] Moreover, "establishing causality between conversion and expanded biofuels production proves more difficult,"[14] and such models inappropriately embrace a 30-year amortized emission period which further skews corn ethanol land use change assessments.[15]

At bottom, inclusion of ILUC in lifecycle analyses undermines the scientific validity of the entire LCFS program and the GHG reductions associated with corn ethanol. For these reasons, both the European "Fuel Quality Directive" and the British Columbia LCFS do not incorporate ILUC values. Growth Energy and the USGC would welcome the opportunity for consultation and collaboration with Ontario's technical experts and our own on this issue and others.

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[12] *See* Growth Energy Comments: California's Dangerous Gamble with Indirect Land Use Change (attached as Exhibit D).

[13] S. Mueller, "Updated Life Cycle Greenhouse Gas Data for Corn Ethanol Production," University of Illinois at Chicago Energy Resource Center (March 2016), at 6 (attached as Exhibit E).

[14] *Id.* at 8.

[15] *Id.* at 12-13.

We caution Ontario to ensure its modern RFS, unlike California's LCFS, does not incentivize alternative fuels that result in increases in criteria pollutants, despite reductions in GHG intensity.[16] Additionally, the California LCFS, due to inclusion of erroneous ILUC values and the state's exclusion of ethanol blends above E10 (with the exception of limited-availability E85) is a regulatory framework that causes the GHG-emissions savings of corn and cellulosic ethanol to largely go unrealized, an outcome which Ontario should strive to avoid.

Growth Energy and the USGC also caution that Ontario structure any modern RFS so as to avoid specifically targeting imported corn ethanol for exclusion through an adverse "default value" for U.S. corn ethanol. Any such measures would ultimately drive up costs to consumers while simultaneously increasing GHGs in Ontario as the regulated parties shift their blending to other jurisdictions. We hope any modern RFS program would maintain the United States and Canada's strong bilateral trade relationship and ensure United States access to the Ontario market.

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In conclusion, the USGC and Growth Energy appreciate Ontario's stakeholder engagement as it contemplates approaches for a modern RFS. We look forward to discussing these and other considerations as a framework develops.

Sincerely,

Christopher Bliley
Vice President of Regulatory Affairs
Growth Energy

Michael Dwyer
Chief Economist
U.S. Grains Council

[16] *See e.g., POET, LLC v. California Air Resources Board* (2013) 218 Cal.App.4th 681.