A Midwestern Low Carbon Fuel Standard is Not a Climate Solution:
Minority Report on the Clean Transportation Standard Work Group Report to the Legislature
February 1, 2024

As members of the Clean Transportation Standard (CTS) Work Group, we have learned more about opportunities and limitations of low carbon fuel standard (LCFS) programs. We were initially skeptical about an LCFS, based on prior research, and what we have learned through this process has reaffirmed our belief that the LCFS advanced by this work group would be counterproductive to needed climate change action in Minnesota.

The Clean Transportation Standard Work Group Report to the Legislature (hereafter referred to as the CTS Report) to be released on February 1, 2024, notes that a "CTS could be the largest single policy for reducing carbon pollution from transportation in Minnesota." Yet, the work group's endorsement of a CTS is highly misleading, as the work group did not explore alternative strategies for reducing greenhouse gasses. This minority report highlights some of the critiques of a CTS raised by some work group members which were not addressed in the CTS Report and should be considered by policymakers seeking the most effective strategies and policies to move us swiftly along a path to Minnesota's carbon free future.

I. SUMMARY

Flaws in the CTS Work Group Process

The process used by the administration to evaluate an LCFS through the CTS work group was fundamentally flawed. These flaws include:

- **Membership.** The composition of the CTS work group includes many representatives of industries that have a direct financial conflict of interest. To address the climate crisis, we must phase out the systems that make their industries profitable.
- **A "Stakeholder" Process, Not A Scientific Process**. As it relates to both climate science itself and the current state of technology, the CTS work group failed to establish the following set of well-researched and widely accepted facts:
    - **Climate Goals.** The IPCC asserts that to limit global warming to 1.5 C, we must globally reduce greenhouse gas emissions (GHGs) by 43% by 2030 from 2019 levels, while getting on a trajectory to net zero emissions by 2050.[1] We know that to stabilize the climate (at any higher temperature), we need to eliminate fossil fuels in multiple sectors. It is not enough to use fossil fuels marginally less. Investing in technologies that can only achieve marginal reductions in climate emissions keeps us from reaching the necessary emissions reductions. We must not delay by investing in the kinds of "bridge fuels" that will always pollute and

[1] Intergovernmental Panel on Climate Change, *Climate Change 2023 Synthesis Report: Summary for Policymakers*, 2023, https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_SPM.pdf.

that still must be phased out.

- **Electrification vs. Ethanol & Other Biofuels.** National experts on climate emissions from transportation recognize that electrification is superior to any liquid fuels when it comes to achieving our emissions reduction goals. Any vehicle type that can be electrified should be electrified. Electric vehicles (EVs) are already significantly less polluting today and this existing advantage for EVs over vehicles with internal combustion engines will only grow as our electric grid continues to decarbonize. Since 2010, as described in this Oxford Study, the costs have plummeted for the three key technologies (solar, wind and batteries) which now allow for rapid and economic electrification and this drop is predicted to continue. By contrast, as described by the World Resources Institute, "advanced biofuels" have consistently failed to meet promised performance.

- **Outdated Assumptions on Ethanol.** While the popular rhetoric around ethanol says it is less polluting than gasoline, recent analyses of the full lifecycle costs of ethanol production and consumption suggest that this is dangerously false. One such study, from the University of Wisconsin, "... found that the carbon intensity of corn ethanol produced under the RFS is no less than gasoline and likely at least 24% higher."[2]

- **Assumptions on "Technology Neutrality."** The CTS Work Group accepted the LCFS' inherent assumption that a "technology neutral" approach is always beneficial. Using a "technology neutral" tool can be beneficial when the market and/or policymakers are choosing between technologies that are equally effective to reach emissions targets. For example, Minnesota's 100% law allows flexibility between multiple forms of renewable energy like solar and wind. This makes sense because both solar and wind have a path to zero emissions. By contrast, assuming "technology neutrality" between superior technologies (like electrification) and inferior technologies (like ethanol) is a mistake which invites mischief in an already-complicated rulemaking process.
- **Assumptions about the Greenhouse Gases, Regulated Emissions, and Energy use in Technologies (GREET) model.** The CTS report recommends the GREET model for estimating carbon intensity (CI). To their credit, staff to the CTS work group acknowledged that the GREET model was a.) not designed to be used for regulatory purposes, b.) not a "predictive" model, and c.) not good at estimating land use impacts. But it was not acknowledged that these flaws mean the GREET model is inherently

[2] Lark T., et al., *Environmental Outcomes of the US Renewable Fuel Standard*, PNAS, 2022;119(9), https://www.pnas.org/doi/full/10.1073/pnas.2101084119.

biased in favor of biofuels. (Notably, ethanol's biggest promoters in Congress tried to require that GREET be used to estimate carbon intensity so as to lock in this bias.) Since 2010, as described in this Oxford Study, the costs have plummeted for the three key technologies (solar, wind and batteries) which now allow for rapid and economic electrification and this drop is predicted to continue. By contrast, as described by the World Resources Institute, "advanced biofuels" have consistently failed to scale up as promised and the result has been just more ethanol.

- **Failure to Answer Legislators' Concerns on Ecosystem Impacts.** When an LCFS was considered in previous sessions of the legislature, multiple legislators and organizations expressed the concern that the sole use of carbon intensity (CI) in an LCFS fails to consider other environmental impacts of biofuel production and consumption. After months of work group meetings, these impacts are still not incorporated into the LCFS and are instead considered "externalities" to be dealt with via "complementary policies."
    - **Water Pollution** - standard row crop agriculture to produce feedstocks for biofuels exacerbate pesticide and nitrate contamination of drinking water supplies.
    - **Aquifer Depletion** - both the growing of feedstock and the production of ethanol/biofuels are extremely water intensive.[3]
    - **Soil contamination and erosion** - standard row crop corn growing contaminates the soil with pesticides and contributes to loss of valuable topsoil.[4]

  On page 9, the CTS Report assumes that an LCFS will help address water pollution, but does not support that assumption with any evidence, nor does it recognize the problem of total water use by ethanol production. It is likely an LCFS will exacerbate both problems.
- **Reliance on "Complementary Policies" That Don't Work.** In response to repeated concerns about the water impacts listed above, staff suggested existing policies that are not working, like the Ag Water Certification Program. "Despite spending hundreds of millions of dollars over decades on studies, stakeholder meetings, incentives and educational and voluntary programs, the state has made no measurable progress in

[3] Harball E., *Rising Use of Corn Ethanol Stresses Midwestern Aquifers*, Scientific American, Jan. 28, 2013, https://www.scientificamerican.com/article/rising-use-of-corn-ethanol-stresses-midwestern-aquifers/; Wu M., Xu H., , Argonne National Laboratory, Consumptive Water Use in the Production of Ethanol and Petroleum Gasoline – 2018 Update, https://publications.anl.gov/anlpubs/2019/01/148043.pdf.

[4] Altieri M., *The Ecological Impacts of Large-Scale Agrofuel Monoculture Production Systems in the Americas*, Apr. 21, 2009, Bulletin of Science, Technology & Society, https://journals.sagepub.com/doi/abs/10.1177/0270467609333728?casa_token=dqkRg1c48JAAAAAA:sJRRpe45OUVUFYspYa_b4dxTPAOu7Z-QR_pnGwmXob_8K450ja_unVRwbXQcYvBwbfPZSJtD2tZq.

reducing nitrate pollution."[5] These voluntary practices usually rely on taxpayer dollars as incentives and have little if any measurable benefits to water. Even in the aggregate these voluntary efforts will not solve our nitrogen problems - problems that will grow larger if the acres of corn devoted to ethanol production increase.

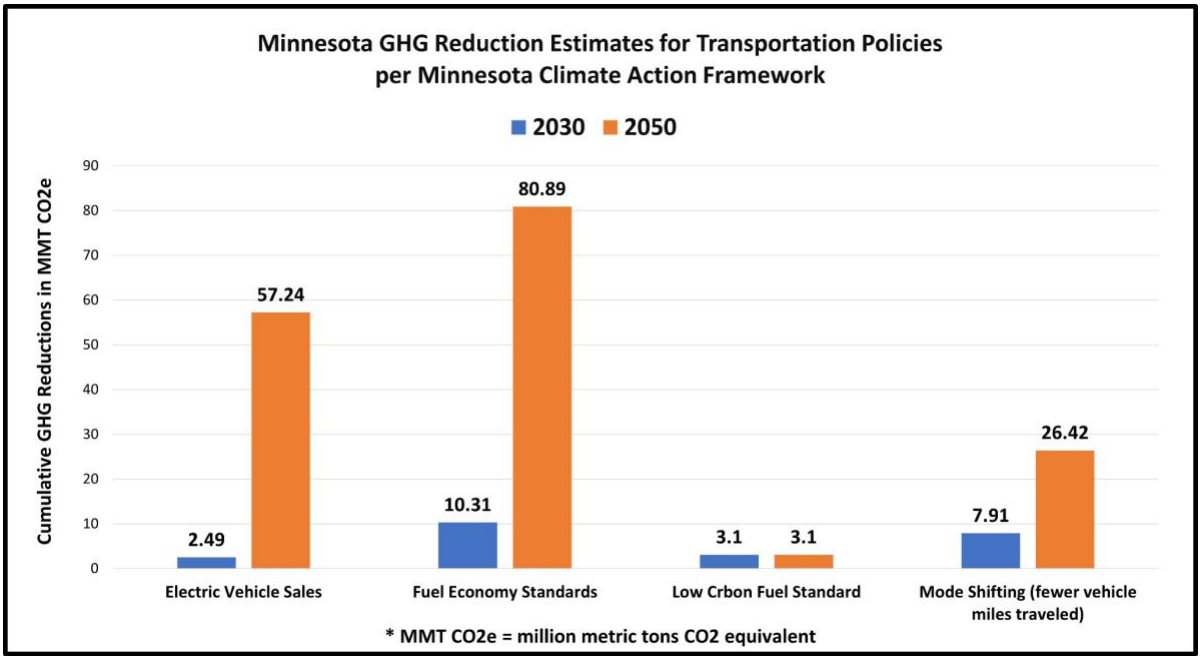
- **Unwillingness to Hear from Experts Who Disagree.** CTS work group members heard from many presenters who already support implementation of an LCFS, but the organizers refused to hear from or add as members independent researchers with a different perspective on LCFS. This includes Dr. Richard Plevin, from University of California Berkeley (now retired), who helped to develop the LCFS in California and has since become a skeptic, and Dr. Jason Hill from the University of Minnesota, who applied to serve on the CTS work group.
- **Failure to Consider Alternatives.** The CTS report acknowledges that the work group concluded that a CTS can't meet the carbon reduction goals set forth in the CTS statute, but it still states: "A CTS could also be the largest single policy for reducing carbon pollution from transportation in Minnesota." Absent an examination of alternative strategies, this statement is highly misleading.

  Moreover, carbon intensity estimates are subjective, uncertain, and as commonly implemented (e.g., in models like GREET) fail to represent actual policy outcomes. Claims about CTS benefits incorrectly presume that CI values are predictive of outcomes.

  While the CTS report acknowledges that we need other policies, no other policies were evaluated or discussed with respect to their ability to reduce carbon. The CTS Work Group assumed that an LCFS was the right tool without considering alternatives. According to the Minnesota Climate Action Framework's Greenhouse Gas Analysis, an LCFS is estimated to achieve only a small decrease in GHG emissions by 2030, compared with other solutions. EV sales, fuel economy standards and reducing vehicle miles traveled reap significantly higher GHG reductions in both the short and long term. These results align with the IPCC's analysis of transportation options.[6]

[5] Hargarten J., Bjorhus J. *Nitrate Contamination of Minnesota Waters Shows Little Sign of Going Away, Despite Years of Effort*, StarTribune, https://www.startribune.com/nitrate-pollution-minnesota-groundwater-farm-fertilizer-mpca-wells-epa/600310942/ (Nov. 28, 2023).

[6] IPCC, 2022, at 42, Figure SPM.7: Overview of mitigation options and their estimated ranges of costs and potentials in 2030.



Source: Minnesota's Climate Action Framework Greenhouse Gas Emissions Analysis.

While the CTS report acknowledges that an LCFS is only one tool in the toolbox, there was no discussion in the work group or in the report on how it fits into the broader climate action framework for the transportation sector. In addition, there was no discussion or explanation about why the GHG reduction projections shifted from those modeled in the climate action framework. Work group consultants modeled the ability of a CTS to attain the goals specified in the CTS statute: 25% below the 2018 baseline level by the end of 2030, 75% by 2040, and 100% by 2050. Since the work group agreed that the statutory goals were unattainable – through an LCFS – consultants also modeled GHG reductions for business as usual (no CTS), moderate and multiple accelerated scenarios. Results in even the moderate case departed widely from those in the Climate Action Framework.

Problems with a Low Carbon Fuel Standard

We did learn important information about a Low Carbon Fuel Standard by reviewing the material of those researchers the CTS Work Group was unwilling to hear from. Here's some of what we learned.

- **No Independent Measurement of Carbon Intensity.** There are multiple published papers on CI modeling and the flaws of LCFS policies. These flaws include that we don't actually know whether existing LCFS programs implemented in other states have led to a net reduction in emissions because there is no independent measurement of their

effectiveness, nor is measurement even possible. Proponents of the LCFS *assume positive results* from the LCFS itself. Net global displacement of gasoline by diesel or liquid fuels is assumed to occur and other potential outcomes of the LCFS are not included.

- **Economic Effects Not Incorporated.** GREET does not incorporate economic effects, including perverse economic effects. Potential positive effects of an LCFS could be negated by economic effects (which are not modeled) and we wouldn't know. Economic effects include the impact of an LCFS incentivizing investments that perpetuate the business model of polluting liquid fuels or the impact of increasing the supply of liquid fuels, which lowers their price and increases consumption. The impact of taking up limited land for production of biofuels on the price of food is also not included.[7]
- **Selective Application of West Coast Approaches.** Promoters of an LCFS in Minnesota note that California, Oregon, and Washington have implemented LCFSs. But they fail to add that in those states the LCFS is part of a suite of tools. All three states have passed Advanced Clean Cars II, which will aggressively phase out cars with internal combustion engines. "California's is the most aggressive regulation to establish a definitive mechanism to meet required zero-emission vehicle (ZEV) sales that ramp up year over year, culminating in 100% ZEV [Zero Emission Vehicle] sales in 2035."
- **Reliance on Carbon Capture and Pipeline Infrastructure.** A large coalition of oil and ethanol business interests who are pushing hard for an LCFS are also pushing for the unprecedented creation of nation-wide carbon dioxide pipelines networks.[8] One such network has been proposed for Minnesota and other midwestern states to capture CO_2 from ethanol plants and other industrial facilities. As explained in section 5 on pages 16-17, captured carbon would be piped to North Dakota where it will almost certainly be used to push more oil out of the ground in a process called enhanced oil recovery (EOR). The ethanol interests and the pipeline industry benefit from the increased commodification of carbon dioxide. Even if direct credits for EOR are prohibited, this commodification of CO_2 creates a perverse economic incentive to never stop producing

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[7] Pavlenko N., et al.,*Opportunities and Risks for a National Low-Carbon Fuel Standard*, International Council on Clean Transportation, https://theicct.org/publication/low-carbon-fuels-us-mar22/ (Mar. 31, 2022). This white paper describes the opportunities and risks for a national LCFS and concludes that a technology-neutral fuel policy as modeled by current state programs would greatly increase the demand for food-based fuels. Such a scenario would perpetuate the health and ecosystem harms from ethanol production and prioritize short-term increases in biofuel use over critical land use for food production.

[8] Davies K., *Princeton Maps Reveal US Plans for Massive CO2 Pipeline Buildout*, DeSmog, https://www.desmog.com/2023/05/31/princeton-maps-ccs-us-plans-co2-pipeline-buildout/ (May 31, 2023); *see also* Great Plains Institute, *New Analysis: Carbon Capture and Storage Infrastructure for Midcentury Decarbonization*, https://betterenergy.org/blog/new-analysis-carbon-capture-and-storage-infrastructure-for-midcentury-decarbonization/ (June 30, 2020).

CO2, a cycle which has been described as "the more you burn, the more you earn." As noted above, economic effects such as these are not included in the GREET model. (*Note*: The business plan for oil and ethanol and its relationship to an LCFS is described in detail in section 5 on pages 16-19.)

- **Nearly $800 Million to "Upgrade" Gas Stations & Distribution Systems.** Minnesota's existing fuel-dispensing infrastructure, including underground storage tanks (USTs), pipes and dispensers, is not designed to handle higher blends of ethanol like E15 or E20, which the ethanol industry wants to sell. The industry-dominated Governor's Council on Biofuels therefore recommended spending approximately $771 million to $784 million to "upgrade" gas stations to handle higher ethanol blends. Even if the 15% of E15 that is ethanol had the climate benefits they claim—which research suggests it doesn't—the other 85% is still gasoline, which we need to stop using. So these "upgrades" would constitute a massive reinvestment in the liquid fuel infrastructure that science tells us is a dead-end pathway. This spending would also have an opportunity cost as Minnesota could have far greater positive effects on climate by investing nearly $800 million in electrification or other solutions. Notably, a similar recommendation to spend money on gasoline and ethanol infrastructure suddenly appeared in a draft CTS report without previously having been discussed by the group.
- **Cost of the Rulemaking Process.** Even if the tool itself were not flawed, the multi-year rulemaking process required to implement an LCFS would require huge expenses in staff time both on the part of government officials and independent watchdog groups. It is the nature of a complicated market-based tool that there are many ways for it to be corrupted. Environmental watchdogs do not have the legal resources to monitor such an endeavor. By contrast, and as shown by the CTS Work Group itself, the industry groups who financially benefit from particular outcomes have nearly unlimited time and resources to devote to such purposes. The administration's choice to leave details of the program to rulemaking effectively cuts legislators out of true decision making. Legislators are being asked to vote for a program that will have an end result which will likely look very different from the program they supported and expected.

Conclusions

The industry representatives on the CTS Work Group made it clear that they do not want to change the status quo and are supportive of the kinds of policies and technologies that would further entrench their grip on the transportation sector, such as carbon capture, enhanced oil recovery, and "upgrading" existing fueling infrastructure to allow for higher blends of ethanol. The ongoing influence of these groups on the administration is highly concerning. These same industry representatives have also repeatedly argued that they cannot meet the carbon reduction targets in the 2023 legislative mandate for a CTS Work Group and report (2023 Laws

of Minn., Ch. 68, Sec. 124.). This isn't surprising, given that making such reductions could hurt their bottom line. Instead, their proposed answer to that problem is to extend the time we have to decarbonize, as if physics and the climate can be negotiated with. That's the wrong answer.

In one key regard, we agree with the industry representatives. They do not think they can meet the targets with their technologies and this LCFS tool. And we agree. So, we must change the technologies and tools, not the targets. IPCC Goals require reducing emissions 45% by 2030 while getting on a trajectory to zero by 2050. A suite of tools should be implemented to meet this target, including policies to reduce Vehicles Miles Traveled (VMT), reform land use, and aggressively electrify all sectors funded in part by taxes on polluters.

In conclusion, this administration's proposal for an LCFS is, like ethanol itself, out of date. They have both been left behind by advancements in new technologies and new policies which are aligned with a modern understanding of the climate crisis. Worse, this administration's LCFS, which relies on the commodification of pollution and dead-end pathways like carbon capture for enhanced oil recovery, will likely extend the lifespan of polluting industries. We recommend that the Legislature not pursue a Low Carbon Fuel Standard. The flaws of this approach are evident in the LCFS itself and magnified by the outdated assumptions and obvious biases of the administration in favor of more ethanol, which inherently relies on the expansion of existing ethanol infrastructure and the construction of hundreds of miles of new carbon dioxide pipelines across the state.

II. DETAILED COMMENTS

We highlight in this minority report flaws in the CTS work group process and several problems with an LCFS which are not identified or clearly described in the draft CTS Work Group report. Our main concerns center around harms to human and ecosystem health from an LCFS and the questionable effectiveness of this policy in reducing greenhouse gas emissions.

A. Work Group Process

While the legislative mandate of the CTS Work Group was narrow: "… to study and address information gaps and opportunities related to a clean transportation fuel standard….," we think it is important to comment on the Work Group process and the need to examine the larger issues in implementing an LCFS in Minnesota which are not addressed in the report.

We appreciate the work of state agencies in carrying out this process and are aware of the challenges of managing a large work group of diverse stakeholders with varying levels of expertise and viewpoints. Unfortunately, the draft report reflects both the failings of the mandate and the work group process.

The makeup of the group itself and the proceedings were heavily tilted towards perspectives supportive of industry and the status quo. For example, we heard from many experts on the benefits of an LCFS, including Dr. Farzad Taheripour, whose work in this area was funded by several industry groups and Argonne National Laboratory, developer of the GREET model.[9,10] But the work group did not hear from any of the willing and qualified speakers who are critical of an LCFS or of the common assumptions that go into such standards. Despite known ecosystem harms from industrial-scale corn growing and ethanol production, only one speaker addressed the polluting effects of current agricultural practices, which would likely be perpetuated by an LCFS program.

There were very few opportunities for the entire work group to have in-depth discussions about any of the "recommendations" mentioned in the report. Given the size of the work group, members were often split up into smaller groups, and their conclusions were then reported back to the larger group to agree or disagree with via a survey. Some members did not feel they had the background knowledge to adequately answer survey questions. As a result, some members felt that the recommendations did not reflect their own positions or understandings of the topic.

B. Shortcomings of an LCFS

1. An LCFS Assumes that the Carbon Intensity of Ethanol is Lower Than Gasoline

An LCFS relies on the assumption that the carbon intensity (CI) of ethanol is lower than gasoline. Experts in this field have cast doubt on that assumption. Some studies show that it may be higher than gasoline due to land use changes. Despite this, the CTS Report models corn ethanol-based biofuel as generating credits in the early years.

The Argonne National Laboratory GREET model bases its claims that corn ethanol reduces GHG emissions by over 40% on the Wang et al. 2012 study (which found that GHG emissions reductions were 19-48%), incorporating limited land use change (LUC) and excluding indirect land use change (ILUC). However, recent studies that include examination of ILUC call into question whether corn ethanol reduces GHG emissions and whether the Renewable Fuel Standard (RFS) program has achieved its carbon reduction goals.

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[9] Steve Hanley, *Ethanol Burns Clean, But Creates More Emissions Than Gasoline*, CleanTechnica, https://cleantechnica.com/2022/09/13/ethanol-burns-clean-but-creates-more-emissions-than-gasoline/ (Sept. 13, 2022) ("Taheripour has received research funding from several biofuels industry trade groups since 2012, including the Renewable Fuels Association, National Corn Growers Association, Indiana Corn Soybean Alliance, and National Biodiesel Board, according to a Reuters review of his research funding disclosures. Reuters was not able to determine the total amount of industry grants Taheripour has collected or the amount he may have received from other sources. Taheripour said his funding sources do not affect his research methods or outcomes.").

[10] Tyner, W. E., Taheripour F., Zhuang Q., Birur D., & Baldos U., *Land Use Changes and Consequent CO2 Emissions due to US Corn Ethanol Production: A Comprehensive Analysis* (2010), and Taheripour F., et al., *Biofuels and their by-products: Global economic and environmental implications* (2010), were partially funded by Argonne National Laboratory.

A 2022 study by Lark et al[11] that retrospectively looked at the results of the RFS between 2008 and 2016 found that carbon emissions from corn ethanol could be up to 24% greater than gasoline. The authors conclude that "…contemporary corn ethanol production is unlikely to contribute to climate change mitigation."[14] Additional independent studies have also found that expanding biofuels production results in increased GHG emissions due to land use changes (LUC.)[12,13,14] Other studies question reliance on the modeling used to measure CI due to uncertainties in metrics, including Brandao et al 2022,[15] Pavlenko et al 2022,[16] and Plevin et al 2017, who concludes: "… fuel CI is inevitably subjective and unverifiable. We conclude that regulating or taxing observable emissions would more reliably achieve emission reduction."[17]

2. Consideration of Human Health and Ecosystem & Harms & Limitations of GREET (Greenhouse gases, Regulated Emissions, and Energy use in Technologies)

The CTS Report states, "A CTS can … reduce air, water pollution, improve soil, and water health in Minnesota." This statement is misleading and not supported by evidence. A robust discussion of the well-known harms to public health, ecosystems, water, air, and soil, are not included in the Report and were not addressed in depth during the work group process. Public health impacts from gasoline and ethanol production were also not addressed. The report mentions the advantages that Minnesota has as the first corn growing state to implement an LCFS policy. However, as the first corn-growing state, it is critical that we also examine the health and ecosystem harms caused by continued use of gasoline and ethanol.

Concerns about water and soil health are mentioned, but they're assumed to be taken care of by the existing policies and programs listed in Appendix B. Yet those same programs and related regulations are failing to prevent such harm. For example, despite several programs designed to combat water pollution, pesticide and nitrate pollution continues to be an issue, contaminating well water in Minnesota and polluting the Mississippi River, which is then

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[11] Lark T., et al., *Environmental Outcomes of the US Renewable Fuel Standard*, PNAS, 2022;119(9), https://www.pnas.org/doi/full/10.1073/pnas.2101084119.

[12] Searchinger, T., et al., *Use of U.S. Croplands for Biofuels Increases Greenhouse Gases Through Emissions from Land-use Change*, Science, 319(5867), 1238–1240, https://iopscience.iop.org/article/10.1088/1748-9326/3/3/034001 (Feb. 29, 2008).

[13] Gibbs, H. K., et al., *Carbon Payback Times for Crop-based Biofuel Expansion in the Tropics: The Effects of Changing Yield and Technology*, Environmental Research Letters, 3(3), 034001, https://iopscience.iop.org/article/10.1088/1748-9326/3/3/034001 (July 2008).

[14] Fargione, J., et al., *Land Clearing and the Biofuel Carbon Debt*, Science, 319(5867), 1235–1238, https://www.science.org/doi/10.1126/science.1152747 (Feb. 2008).

[15] Brandão, M., Heijungs, R., & Cowie, A. L., *On Quantifying Sources of Uncertainty in the Carbon Footprint of Biofuels: Crop/Feedstock, LCA Modelling Approach, Land-use Change, and GHG Metrics*, Biofuel Research Journal, 9(2), 1608–1616, https://www.biofueljournal.com/article_148830.html (June 2022).

[16] Pavlenko, 2022.

[17] Plevin, R. J., Delucchi, M. A., & O'Hare, M., *Fuel Carbon Intensity Standards may not Mitigate Climate Change*, Energy Policy, 105, 93–97, https://www.sciencedirect.com/science/article/abs/pii/S030142151730112X?via%3Dihub (June 2017).

transported to the Gulf of Mexico and contributes to the dead zone. The experience with Enbridge Line 3 also illustrates that state agencies are failing to monitor and prevent harm. Enbridge has faced few consequences for permit violations, including at least 4 aquifer breaches and 28 frac-outs which waste precious water resources, contaminate wetlands, and soil, and threaten wild rice and other native food sources.[18,19] Failures in Line 3 monitoring raise questions about state capacity to monitor and prevent potential safety and ecosystem harm from the CO_2 pipeline that is proposed for Minnesota.

The GREET model which is proposed for use in a Minnesota CTS estimates the CI of transportation fuels, but fails to account for public health, environmental justice and ecosystem impacts.

Public health and environmental justice externalities. Extending the life of liquid fuels continues harmful impacts of gasoline and ethanol in urban and rural communities. Black, Indigenous, and People of Color (BIPOC) communities living near oil and gas extraction facilities will continue to be exposed to toxic pollution, putting them at greater risk for cancer, respiratory problems, and other negative health effects. This issue was raised by 20 California health and environmental justice groups in a letter to the California Air Resources Board (CARB) regarding the state's 2022 Scoping Plan. The letter recommends that California prioritize direct emissions reductions, rather than market mechanisms such as cap and trade, which they call "policy dead ends." The letter also notes that, "A robust accounting and analysis of the lifecycle greenhouse gas and health implications will also demonstrate the significantly larger benefits of direct emissions reductions relative to cap-and-trade, CCUS, and offset programs like the Low Carbon Fuel Standard (LCFS)."[20]

Rural communities in Minnesota disproportionately suffer the air and water pollution emitted from the increased use of pesticides and chemical fertilizers associated with ethanol production. Pesticides contaminate water, soil, and air and pose the most risk to agricultural workers and their families.[21] Use of nitrate fertilizer contaminates well water with health harming nitrates. Exposure to nitrates in drinking water increases risk for 'blue baby syndrome', and "… other health effects such as increased heart rate, nausea, headaches, and abdominal

[18] *Mapping the Enbridge Line 3 Frac Outs*, Watch the Line, Aug. 20, 2021, https://watchthelinemn.org/2021/08/20/mapping-the-enbridge-line-3-frac-outs/.

[19] *Understanding the Line 3 Aquifer Breach and Spills*, Minnesota Environmental Partnership, https://www.mepartnership.org/line3/aquifer-breach/.

[20] Environmental Justice Recommendations for 2022 Scoping Plan, Letter to Liane M. Randolph, California Air Resources Board, https://ww2.arb.ca.gov/sites/default/files/2022-03/Letter%20to%20CARB%20-%20EJ%20Recommendations%20for%202022%20Scoping%20Plan%2003-09-22.pdf.

[21] Donley, N., et al., *Pesticides and Environmental Injustice in the USA: Root Causes, Current Regulatory Reinforcement and a Path Forward*. BMC Public Health, 22(1), 708. https://doi.org/10.1186/s12889-022-13057-4.

cramps. Some studies also suggest an increased risk of cancer, especially gastric cancer, associated with dietary nitrate/nitrite exposure, …."[22]

Water, air quality, and soil health externalities. An LCFS will increase demand for liquid biofuels like corn ethanol, which will likely expand land conversion, further putting Minnesota's forest and prairie ecosystems at risk. In addition, corn growing and ethanol production use an enormous amount of pure-quality water, usually obtained from underground aquifers, which can be at risk of depletion when biorefineries are concentrated in a certain area. "A biorefinery that produces 100 million gallons of ethanol per year, for example, would use the equivalent of the water supply for a town of about 5,000 people."[23] Region 6 states, including Minnesota, use about 21.5 gallons of water, including irrigation and production, to produce each gallon of ethanol.[24] Extensive water use is especially concerning in the Midwest, where many aquifers are already overdrawn.[25]

As noted, corn growing requires the application of nitrogen fertilizer and pesticides which cause water pollution and soil degradation. Additional risks of monoculture farming include pests, contamination from pesticide spraying, loss of biodiversity, and lowered soil fertility.[26] Standard row crop agriculture also contributes to the loss of valuable topsoil. "Researchers at the USDA's Economic Research Service specifically mention large biofuel production mandates as a cause for increasing erosion in the Northern Plains and Mississippi Delta."[27]

Current government incentives and subsidies may provide short-term profits for corn-growing farmers and windfall gains for agribusiness, but over time agricultural communities lose vital resources, such as soil quality, and real income. Minnesota's rural communities will reap greater benefits for healthy soil, air, and water by investing in agroecology (an integrated approach applying ecological and social concepts to the design and management of sustainable agriculture and food systems) rather than bolstering corn ethanol production.

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[22] Minnesota Department of Health, *Nitrate in Well Water*, https://www.health.state.mn.us/communities/environment/water/wells/waterquality/nitrate.html.

[23] Harball E., 2013.

[24] Wu M., 2018.

[25] Wardle, A. R., *A Review of the Environmental Effects of the Renewable Fuel Standard's Corn Ethanol Mandate*, Sept. 26, 2018, Center for Growth and Opportunity, https://www.thecgo.org/research/environmental-effects-of-renewable-fuel-standards/.

[26] Altieri M., 2009.

[27] Malcolm S. & Aillery M., *Growing Crops for Biofuels Has Spillover Effects*, Amber Waves, Mar. 1, 2009, https://www.ers.usda.gov/amber-waves/2009/march/growing-crops-for-biofuels-has-spillover-effects/#:~:text=Feedstock%20production%20for%20biofuels%20may,may%20reduce%20stored%20soil%20carbon.

3. An LCFS Supports Investments in Fossil Fuel Infrastructure

As noted, the IPCC concludes: "The continued installation of unabated fossil fuel infrastructure will 'lock-in' GHG emissions."[28] An LCFS builds upon the current fossil fuel infrastructure and is clearly tied to additional fossil fuel infrastructure, including through the building of CO2 pipelines. An LCFS extends the life of liquid fuels, which includes gasoline blended with ethanol. In short, an LCFS program, while promising significant carbon reductions, defaults to business as usual.

The CTS Report states that, "compliance with a CTS will require a range of investments in low carbon fuel production, retail distribution infrastructure, and advanced vehicle technologies" (p.23) and that biofuels infrastructure will be needed (p.33). It's wasteful and unnecessary to invest in any fossil fuel infrastructure since we must phase out liquid fuels to reach our carbon-free goals.

LCFS programs align the interests of fossil fuel and biofuel industries in slowing down electrification and extending the life of liquid fuels used in internal combustion engines, as described below.

4. An LCFS Depends on Carbon Capture, Utilization, and Storage (CCUS)[29] to Reduce Carbon Intensity

It is clear that the ethanol industry will rely on CCUS to reduce the CI of their fuel cycle by an estimated 28 g/MJ.[30] Proponents argue that because ethanol facilities produce such a pure stream of CO_2 (typically around 99%) that requires limited processing before transport, capturing CO_2 at ethanol plants is the "low-hanging fruit" that will provide the foundational knowledge and economic reassurances that CCUS investors want before tackling more complicated and expensive capture technologies in other industries. But whether and in what circumstances CCUS should be applied is a much more complicated issue.

CCUS has been touted as an essential tool to help decarbonize many sectors of the economy. But to date, CCUS across several applications (fossil fuel-generated power plants, natural gas processing, and ethanol plants) has failed to successfully deliver the carbon emissions reductions as promised. A comprehensive analysis of some of the biggest and most often referenced CCUS projects, conducted by the Institute for Energy Economics and Financial

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[28] IPCC, 2022.

[29] There is no single agreed-upon definition of CCUS, which can lead to confusion. Here, we define CCUS as a technology or process that captures CO_2 at a point source (i.e. a smokestack at a power plant) and subsequently used in a product (the "U" in CCUS). The overall climate impact of CCUS depends on the lifetime of the product, the product it displaces, and the source of the CO_2. Under our definition, CCUS refers to all carbon capture technologies, whether captured CO_2 is used or sequestered. Adapted from InfluenceMap, *Corporate Policy Engagement on Carbon Capture and Storage (CCS)*, Dec. 2023, https://influencemap.org/report/CCS-and-Corporate-Policy-Engagement-24754.

[30] Oregon Department of Environmental Quality, *Approval of Proposed Red Trail Energy LLC's Tier 2 Application for Ethanol Fuel Pathways With and Without Carbon Capture and Storage*, Dec. 27, 2023, https://www.oregon.gov/deq/ghgp/Documents/cfpRedTrailCCSdecision.pdf.

Analysis, concluded that "the 90% emission reduction target generally claimed by the industry has been unreachable in practice."[31] And where CO_2 has been captured, it has required significant water and energy use.[32] Applied independently, CCUS also fails to reduce other pollutants, such as SOx, NOx, methane, and hazardous air pollutants like lead, arsenic, and mercury. And in some instances, CCUS technology can actually increase existing emissions.[33]

The transportation of captured CO_2 presents additional environmental and human health concerns. Pipelines carrying concentrated CO_2 under high pressure (often between 1,200 and 2,200 psi) pose significant threats to human health in the event of a leak or rupture, given the inherent properties of CO_2. CO_2 is an asphyxiant and toxicant that is heavier than air, tending to accumulate in low-lying areas. Communities located along CO_2 pipeline routes are at risk for life-threatening exposures that can incapacitate people and emergency response systems. In addition, pipelines are usually sited in or near BIPOC, low-income, rural communities and on or near Indigenous treaty lands, oftentimes exacerbating existing environmental harms. Previous experiences with pipeline networks have also shown that the construction of such pipelines alone results in significant environmental harm.[34]

Recent studies on the use of CCUS as a tool for decarbonization cast further doubt on the usefulness of these technologies. Dr. Jacobson, a Professor of Civil and Environmental Engineering at Stanford University compared the opportunity cost of Summit Carbon Solution's plan (capturing CO_2 from an ethanol refineries, building a pipeline to transport that CO_2 to sequester the CO_2, and then blend the produced ethanol to produce E85) to investing the same money in wind turbines to directly power EVs or to replace coal plants. The study found that "investing in wind turbines to provide electricity for BEVs [battery electric vehicles] is far more beneficial in terms of consumer cost savings, CO_2e emissions, land use, and air pollution than making the same investment in a plan to capture CO_2 from ethanol refineries, pipe the CO_2 to an underground storage facility." In short, the study concluded that:

> "redirecting investments from carbon capture equipment and pipelines for ethanol refineries to wind and solar farms for powering BEVs will benefit the climate, health, and land use tremendously while saving consumers enormous sums of money."

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[31] Robertson, B. & Mousavian, M., *The Carbon Capture Crux*, IEEFA, Sept. 2022, https://ieefa.org/articles/carbon-capture-decarbonisation-pipe-dream.

[32] *See, e.g.*, Mark Z. Jacobson, *Should Transportation be Transitioned to Ethanol with Carbon Capture and Pipelines or Electricity? A Case Study*, Environ. Sci. Technol., 16843, 16844 (2023) ("The electricity needed to dehydrate, compress (to 74.5 bar) and heat the CO_2 until it is in a supercritical state is estimated to be ~90 kWh/tonne-CO_2 compressed. This extra electricity is a new demand on the grid that is not needed for any purpose.").

[33] Robertson, at 61-63.

[34] Tekeste, M., et al., *Effect of Subsoil Tillage During Pipeline Construction Activities on Near-Term Soil Physical Properties and Crop Yields in the Right-of-Way*, Soil Use and Management, July 2021, https://bsssjournals.onlinelibrary.wiley.com/doi/abs/10.1111/sum.12623.

At its core, CCUS applied to ethanol facilities does not change the status quo. Instead, it allows polluting industries and processes to continue with business as usual with vague and unproven promises of measurable emissions reductions at the scale and speed that is required to avoid 2°C warming. This is especially concerning given that historically, nearly all applications of CCUS have supported the continuation of the fossil fuel industry through enhanced oil recovery. Recent statements made by oil and gas executives and states suggest that this trend will continue for the foreseeable future. In early 2021, the American Petroleum Institute (API) produced a document about the organization's position on CCUS, saying that it "enables the use of petroleum and natural gas by providing an opportunity to capture and/or offset emissions, while also offering the opportunity to lower the carbon profile of oil and natural gas production through EOR."[35]

Prohibiting Credits for EOR is Not Enough. Proponents of the LCFS claim that concerns about EOR can be addressed simply by prohibiting credit generation for CCUS used for EOR. The CTS Work Group report states that a majority of members agree with such a prohibition. But a prohibition on credit generation is not enough. By incentivizing a longer lifespan for ethanol and further commodifying carbon dioxide pollution from ethanol plants, an LCFS is also incentivizing CO_2 pipelines. Improving the business model of the pipeline industry by further commodification of carbon dioxide is another example of "economic effects" that are not included in the GREET model which is preferred by the ethanol industry and recommended by the CTS work group.

As noted on pages 16-17 of this report, if a pipeline is constructed across Minnesota into North Dakota, the pipeline is a "common carrier". As such, there is no way for the Minnesota Legislature to ensure that the CO_2 captured and transported via those pipelines will not end up being used for EOR.

Even if CCUS worked as promised at ethanol plants within the state, it is impossible for Minnesota to prevent the use of that CO_2 for EOR once it leaves the boundaries of the state. As such, it is impossible to guarantee that CCUS used at ethanol plants in Minnesota actually reduces the carbon emissions—and therefore the carbon intensity—of the ethanol produced.

5. Relationship of an LCFS to Oil Industry and Biofuel Industry Business Plans

Longtime observers will note that the oil industry and the biofuel industry used to have conflicting agendas at the State Capitol. But this is no longer the case. Where previously they fought one another over ethanol mandates, now they have a common foe and multiple common interests.

Common Interest #1 – Slow Down Electrification. Electric vehicles (EVs) are a common foe for both the oil industry and the biofuel industry. National experts on climate emissions from

[35] Drugmand D., *Big Oil's Been Secretly Validating Critics' Concerns about Carbon Capture*, DeSmog, https://www.desmog.com/2023/02/13/exxon-shell-bp-api-concerns-carbon-capture/ (Feb. 13, 2023).

transportation recognize that electrification is superior to any liquid fuels. EVs are already significantly less polluting today for two primary reasons. First, the far greater efficiency of electric motors compared to internal combustion engines. The U.S. Department of Energy reports that EVs convert over 77% of the electrical energy from the grid to power at the wheels. Conventional gasoline vehicles only convert about 12%–30% of the energy stored in gasoline to power at the wheels.[36] Second, the current electricity supply is already greener due to expanded use of renewable energy like solar and wind. The existing climate benefits of EVs over vehicles with internal combustion engines will only grow as our electric grid continues to become cleaner. This means any vehicle type that can be electrified should be electrified.

The oil industry and the biofuel industry stand to lose from electrification and therefore both benefit from slowing down the adoption of electric vehicles and the expansion of EV charging infrastructure.

Common Interest #2 – ICE Engines & Upgrading Gas Stations. Biofuel proponents also don't hide their objective to extend the life of liquid fuel infrastructure. In May 2023, five members of the U.S. House—seeking to promote ethanol—offered a bill to require use of the GREET model when measuring carbon emissions. In their press release, Rep Wesley Hunt said, "Liquid fuels are the backbone of our society, which is why I'm ecstatic to support this legislation," and "Congress must promote programs that encourage the internal combustion engine, which will remain commonplace in our society for generations to come."

In Minnesota there has been significant interest in increasing funding/spending to "upgrade" gas stations and fuel distribution systems. Current infrastructure to deliver gasoline is not designed to handle higher blends of ethanol like E15 or E20, which the ethanol industry wants to sell. The industry-dominated Governor's Council on Biofuels therefore recommended spending approximately $771 million to $784 million to "upgrade" gas stations to handle higher ethanol blends. Even if the 15% of E15 that is ethanol had the benefits they claim—which research shows it doesn't—the other 85% is still gasoline, which we need to stop using. So, these "upgrades" would constitute a massive reinvestment in liquid fuel infrastructure that science tells us we must end. There is also an opportunity cost associated with these "upgrades," since Minnesota could have far greater positive effects on climate by investing nearly $800 million in electrification or other solutions.

Notably, the recommendation on ethanol infrastructure suddenly appeared in a draft CTS report without having been discussed by the group. After protests from work group participants, the references were edited down to be somewhat less explicit. Page 23 of the CTS Report now says, "compliance with a CTS will require a range of investments in low carbon fuel production, retail distribution infrastructure, and advanced vehicle technologies." Page 33 says

[36] U.S. Department of Energy, *All-Electric Vehicles,* https://www.fueleconomy.gov/feg/evtech.shtml#:~:text=EVs%20have%20several%20advantages%20over,to%20power%20at%20the%20wheels.

that if an LCFS is implemented, "fuel retailers could respond by investing in biofuel infrastructure."

Common Interest #3 – Enhanced Oil Recovery in North Dakota Requires CO_2 from Ethanol Plants. The oil industry in North Dakota and their allies have made it clear they need more CO_2 to extract more oil from their existing oil fields.

Ron Ness, the President of the North Dakota Petroleum Council tells us why: "The use of EOR (enhanced oil recovery) techniques is critical to our future success. By injecting CO_2 in wells as they decline in productivity, EOR will substantially extend the life of a well and the amount of oil that can be recovered from that well."[37] Ness has also been quoted as saying:

> "We have the opportunity to extend the life of the Bakken another 30 to 50 years, and produce another 5 to 8 billion more barrels, just because of technology."[38]

In an August 2023 report by KFYR-TV, the Director of the North Dakota State Department of Mineral Resources, Lynn Helms, said of CO_2-EOR:

> "We've got to find a way for carbon capture and utilization to become a part of North Dakota's economy or we will leave billions of barrels of oil in the ground."[39]

John Harju, Vice President of Strategic Partnerships at the Energy and Environmental Research Center in Fargo, North Dakota, has expressed similar beliefs:

> "I think if we don't get adequate volumes of CO_2 to our Bakken system, we're going to leave 90-plus percent of the oil in the ground."[40]

Most importantly, Ness, Helms, and others have explicitly said that because North Dakota does not produce enough CO2 itself, it will need to import CO2 *from other states*.[41]

As a "Common Carrier," Pipeline Is Essential to Oil Industry. While most of the companies currently proposing CO_2 pipelines have tried to distance themselves from EOR, there is no way to guarantee that the CO_2 captured and transported via those pipelines will not end up being used for EOR.

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[37] Ron Ness, *The Future of Oil and Natural Gas Industry in North Dakota is Bright*, North Dakota Petroleum Council, https://www.ndoil.org/the-future-of-oil-and-natural-gas-industry-in-north-dakota-is-bright/.

[38] Paul Jurgens, *North Dakota Expects to Reach 5 Billion Barrel Mark in Oil Production in 2024*, KFGO, Dec. 29, 2023, https://kfgo.com/2023/12/29/north-dakota-expects-to-reach-5-billion-barrel-mark-in-oil-production-in-2024/.

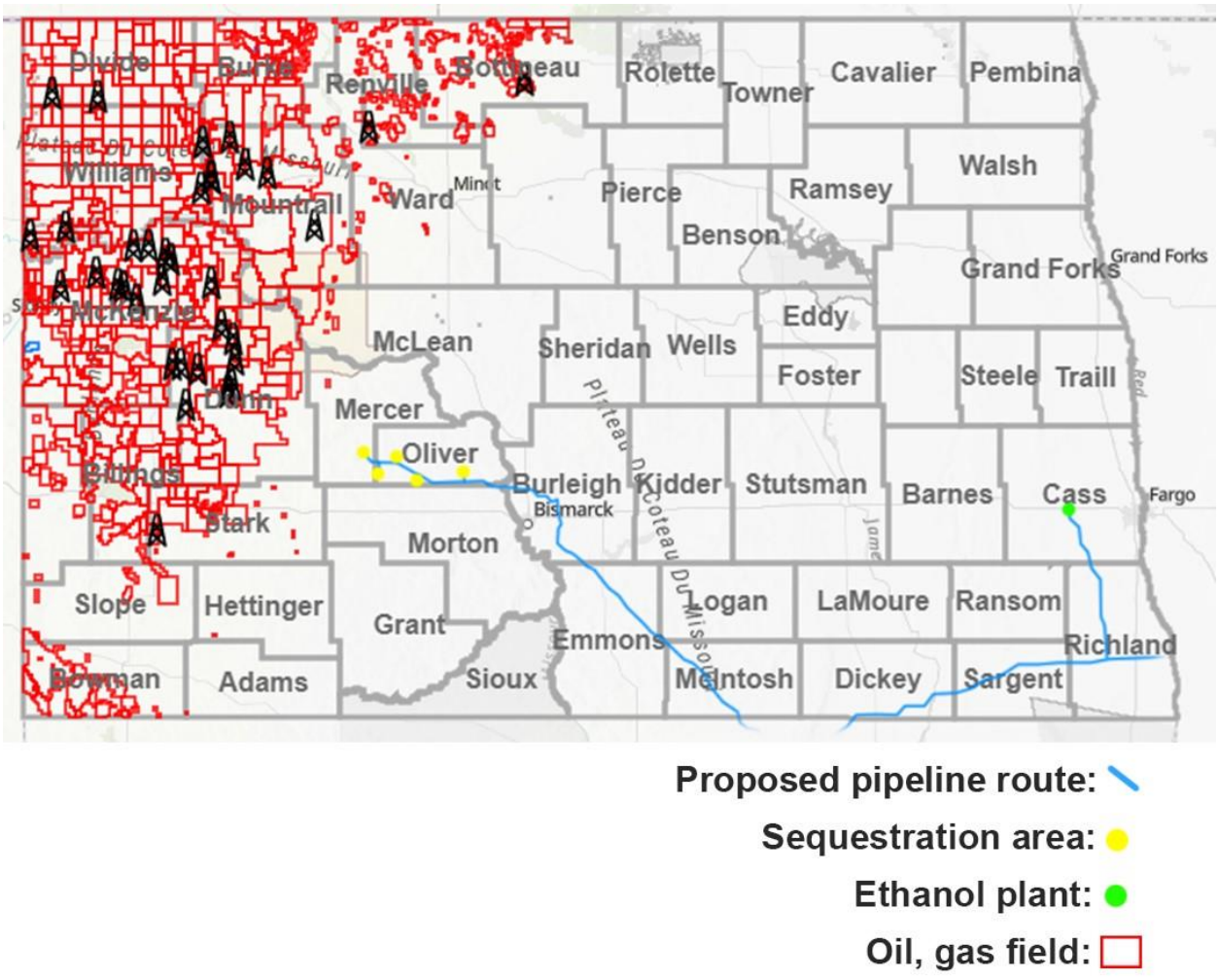
[39] Michael Anthony, *North Dakota Department of Mineral Resources Warns More CO2 Needed to Sustain Oil Production Long-Term*, KFYRTV, Aug. 16, 2023, https://www.kfyrtv.com/2023/08/16/north-dakota-department-mineral-resources-warns-more-co2-needed-sustain-oil-production-long-term/.

[40] Jurgens, 2023.

[41] Jurgens, 2023.

Take, for example, Summit Carbon Solutions. Summit is pursuing its plan to capture CO_2 from ethanol plants and pipe it to North Dakota where it will be available for enhanced oil recovery. Summit has partnered with more than 30 ethanol plants in the Midwest – including Minnesota—with plans to capture carbon dioxide from the fermentation process of ethanol plants, compress the captured CO_2, and pipe it to North Dakota where it will be stored in the ground.

Summit Carbon Solutions website only says it plans to "enhance the long-term economic viability of the ethanol and agriculture industries." But as described in a Nov 10, 2023 South Dakota Searchlight article "Critics allege CO2 pipelines 'farm the government' for climate money while helping oil industry," its chief operating officer says Summit will be a "common carrier" so the piped CO_2 could be used for EOR. A lawyer quoted in this article accurately describes the shared business plan of the oil and ethanol industries and includes this map from the North Dakota Public Service Commission:



"Their climate change mask is being removed," said Omaha-based lawyer, Brian Jorde, who represents hundreds of landowners opposing Summit's pipeline. "Do you honestly believe the

majority of that CO_2 will not be used for enhanced oil recovery? This is all the biggest joke on the taxpayer."

Plans for Enhanced Oil Recovery and LCFS Policies Date Back to 2015. The plans to use CO_2 for EOR date back to at least September 2015 when the Governors of the fossil-fuel-rich states of Wyoming and Montana gathered like-minded state officials and experts in CO_2 EOR, and staff from the Great Plains Institute to work on "Expansion of CO_2 capture from power plants and industrial facilities; Buildout of pipeline infrastructure to transport that CO_2; and Use of CO_2 in oil production…."[42] (page 4).

Their December 2017 Report, "Capturing and Utilizing CO_2 from Ethanol: Adding Economic Value and Jobs to Rural Economies and Communities While Reducing Emissions" noted that "(f)ermentation in ethanol production yields 99.9 percent pure CO_2…" (page 6)and that CO_2 from ethanol production through EOR is the "most commercially-ready pathway…." (page 7)

But the paper also noted that "the cost of carbon capture, compression, dehydration and pipeline transport from ethanol fermentation exceeds revenue from selling that CO_2 to the oil industry." (page 7). The report said that additional financial incentives from the federal government could close the gap so the group's "highest policy priority" was obtaining additional federal incentives. The group added that "(a)t the state level, policies to reduce the carbon intensity of transportation fuels, particularly *low-carbon fuel standard (LCFS) policies*, could compliment federal incentives…." (emphasis added). An LCFS, the Report continues, "could complement federal incentives in stimulating private investment in carbon capture and CO_2 pipeline development." (page 8). The crucial relationship of LCFS programs to EOR is described in detail starting on page 25. Concerningly, the Report explicitly opposed policies that require monitoring to ensure that companies storing carbon keep the carbon stored for 100 years.

For years, biofuel proponents have claimed their industry will eventually transition away from ethanol to less-polluting alternatives. But despite generous federal subsidies for their industry, they have consistently failed to produce less polluting fuels which could be categorized as "advanced biofuels" under the Renewable Fuel Standard (RFS). Fuels in this category "must demonstrate a life cycle GHG emissions reduction of 50%." To compensate for their failure to develop less polluting fuels, they are seeking to make corn ethanol appear less polluting through CCUS.

The 2017 Report explores the role of federal subsidies for biofuels and how the biofuels industry still needs both the revenue from sale of CO2 for EOR and also credit for having (at least theoretically) reduced its emissions.

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[42] State CO2-EOR Deployment Work Group, *Capturing and Utilizing CO_2 from Ethanol: Adding Economic Value and Jobs to Rural Communities and Communities While Reducing Emissions*, https://betterenergy.org/wp-content/uploads/2017/12/Capturing-and-Utilizing-CO2-from-Ethanol.pdf (Dec. 2017).

Role of Great Plains Institute. Advocacy for this business plan to capture Carbon Dioxide for Enhanced Oil Recovery (CO_2 for EOR) is led by the Carbon Capture Coalition which is convened by the Great Plains Institute. Its members include multiple entities that financially benefit from that business plan, including the oil and ethanol industries. One of its participants is Summit Carbon Solutions, the proposer of a CO_2 pipeline to North Dakota. The Carbon Capture Coalition was known as the National Enhanced Oil Recovery Initiative (NEORI) before its rebranding on February 23, 2018. The Great Plains Institute also acts as a convener for the Carbon Action Alliance and the Regional Carbon Capture Deployment Initiative, among others.

C. ADDITIONAL CONSIDERATIONS FOR A MINNESOTA LCFS

We also highlight concerns and considerations raised in a December 11, 2023 letter sent by Minnesota Environmental Partnership, CURE, Health Professionals for a Healthy Climate, Minnesota Center for Environmental Advocacy, and Friends of the Mississippi River, which can be found in this document.

1. Lack of an assessment of the impact of an LCFS

As noted in the summary, the CTS Work Group assumed that an LCFS was the right tool without considering alternatives or comprehensively assessing the impacts of an LCFS.

The scope and urgency of the climate crisis requires careful consideration and evaluation of all alternatives. Per the Intergovernmental Panel on Climate Change (IPCC), "The continued installation of unabated fossil fuel infrastructure will 'lock-in' GHG emissions."[43] Fossil-fuel-caused air pollution is responsible for 350,000 premature deaths in the U.S. each year.[44] But our collective actions to keep us to a 2°C pathway would prevent 4.5 million premature deaths, 1.4 million hospitalizations and ER visits, 1.7 million instances of dementia and 440 million tons of crop losses.[45] Accelerated reductions in carbon emissions could prevent 150 million deaths globally by 2100. On the other hand, reliance on market-based strategies like carbon capture and storage (CCS) prevents only 2.4 million deaths by 2100.[46] More lives are saved by swifter reductions in greenhouse gasses (GHGs) and some solutions are more effective than others.

Minnesota must adopt climate solutions that meet the scale of the climate crisis we face. Yet, the CTS work group report failed to include the wider perspective that several group members mentioned and that legislators need: a description of how an LCFS fits into the big picture and

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[43] IPCC, 2022.

[44] Harvard T.H. Chan School of Public Health, *Fossil Fuel Air Pollution Responsible for 1 in 5 Deaths Worldwide*, Feb. 9, 2021, https://www.hsph.harvard.edu/c-change/news/fossil-fuel-air-pollution-responsible-for-1-in-5-deaths-worldwide/.

[45] Shindell et al., *Temporal and Spatial Distribution of Health, Labor, & Crop Benefits of Climate Change Mitigation in the United States,* Earth Atmospheric & Planetary Science. 2021;118(46), https://www.pnas.org/doi/10.1073/pnas.2104061118.

[46] Shindell et al., *Quantified, Localized Health Benefits of Accelerated Carbon Dioxide Emissions Reductions*, Nature Climate Change. 2028;8(4):291-295, https://www.nature.com/articles/s41558-018-0108-y.

how it compares with other climate solutions. While the mandate of the CTS work group was limited, it is still critical that we examine how an LCFS fits into our climate action plan and its effectiveness in helping us reach our goal of 80% carbon reduction in the transportation sector by 2040. We know that an LCFS alone cannot get us to this goal. Even the report acknowledges that an LCFS is only one tool in the toolbox. But we're not persuaded that an LCFS would be an effective tool in that toolbox and is likely to be counterproductive for achieving Minnesota's greenhouse gas (GHG) reduction goals. While an LCFS promises to increase investment in EV charging infrastructure, the report fails to describe how/if the LCFS will result in investments in EVs and why this tool is better than alternatives, such as direct investments in EVs.

We heard from multiple individuals, including the consultant hired by the administration, that an LCFS will not accelerate the rate of EV adoption in our state, based on the experience of LCFS in other states.

Missing in the work group process was a robust assessment of the merits of an LCFS as a policy solution at all. This has been left to the legislative and rulemaking process. It is unfortunate that a Regulatory Impact Assessment (RIA) was not included in the charge for the workgroup. An RIA would have allowed the work group to compare an LCFS with other strategies to achieve our climate goals and analyze the costs and benefits of each. NASEM's Current Methods for Life Cycle Analyses of Low-Carbon Transportation Fuels in the United States (2022) highlights the importance of RIAs that incorporate Consequential Life Cycle Assessment (CLCA) to estimate the impacts of a particular policy to avoid unintended consequences. It is critical to understand that GREET is based on an attributional life cycle analysis (ALCA) which estimates emissions directly from the fuel, whereas CLCA examines the net effect on emissions resulting from the policy. A thorough RIA would estimate how GHG emissions would change under the policy, relative to business as usual.

An RIA is needed to assess the effectiveness of an LCFS in reducing aggregate GHG emissions within the timeline we need to meet our climate goals. Per NASEM 2022, Chapter 9 Biofuels, p 177: "Since an LCFS is a CI [carbon intensity] standard, full compliance with it may achieve a reduction in CI (carbon emissions per unit fuel), but there is no guarantee that it will reduce the aggregate GHG emissions from the transportation sector." Reducing carbon intensity (CI) within the context of the program doesn't mean that GHGs will be lower in aggregate, due to potential market rebound effects. The lower value of liquid fuels could lower fuel prices, which would result in higher consumption, therefore increasing overall GHG emissions. Though market rebound effects are not unique to liquid fuels, they are applicable to a proposed LCFS in Minnesota that relies on lowering the CI of ethanol.

Considering the science as articulated by the IPCC, it is imperative that we reach zero carbon by 2050 (and likely sooner) to prevent the worst impacts of climate change and save more lives. Therefore, it is the responsibility of Minnesota policymakers to critically examine potential

climate solutions - including an LCFS - to assess their effectiveness and any co-harms they may create. Given the scope of the climate crisis, we must invest in tools and programs that reduce the greatest amount of greenhouse gas emissions at the lowest cost, build out zero-carbon infrastructure, and maximize human and ecosystem health co-benefits. A critical question is: How does investing time, money, and political capital in an LCFS compare with investing in other transportation strategies? The IPCC has data to show that transportation strategies such as reduced VMT, public transit and vehicle electrification reduce GHGs faster and at lower cost and have significant health co-benefits, compared with market-based solutions.[47] The numerous issues described in this report lead us to conclude that a proposed CTS has the significant potential to harm human and ecosystem health and is not a timely and effective solution for meeting Minnesota's greenhouse gas reduction goals.

2. Credits for Renewable Hydrogen Used at Refineries

Renewable hydrogen was not discussed enough in the work group to draw any conclusions about this controversial source of energy. Whether or not hydrogen is helping or hurting the climate depends on both how it is produced and what it is used for.

On the production side, current hydrogen supply is overwhelmingly produced from fossil fuels and is incredibly energy intensive. Even hydrogen produced from renewable electricity could be problematic if the new hydrogen is produced using existing renewable electricity from the grid and that lost clean electricity needs to be backfilled by electricity produced from fossil fuels.

On the consumption side, hydrogen should be focused on uses where no clean electric alternative exists or is likely to exist. It is counterproductive to suggest using hydrogen for heating homes or for moving cars or light duty trucks where superior electric alternatives already exist. But hydrogen, if produced cleanly, could be an important tool in the future to help decarbonize heavy industry.

The National Resources Defense Council (NRDC) identified "Three Pillars," (additionality, deliverability, temporal matching) which are guardrails government agencies should use to ensure production of hydrogen is cleaned up.[48] Many organizations support these three pillars and any Minnesota policies that support or incentivize hydrogen should consider incorporating these pillars. To their credit, the Biden Administration largely adopted the three pillars in December of 2023.

III. RECOMMENDATIONS

The Legislature should not pursue an LCFS for all the reasons stated in the summary at the top of this Minority Report. We would also make the following additional recommendations:

[47] IPCC, 2022.

[48] Rachel Fakhry, *Success of IRA Hydrogen Tax Credit Hinges on IRS and DOE*, NRDC, Dec. 8, 2022, https://www.nrdc.org/bio/rachel-fakhry/success-ira-hydrogen-tax-credit-hinges-irs-and-doe.

1. The Legislature should explore multiple alternatives which were not considered by the CTS work group to repower vehicles as part of a larger suite of tools to address climate emissions from transportation. As recommended by the IPCC, these tools should include policies and programs to incentivize electrification directly and do so without incentivizing more ethanol.
2. The Legislature should reject the recommendations of the Governor's Council on Biofuels and should not support spending millions of dollars to "upgrade" gas stations or other expenditures that extend the economic lifespan of polluting industries.
3. The Legislature should prohibit construction of proposed carbon pipelines to North Dakota because the pipelines would be dangerous to Minnesotans, perpetuate polluting systems, and the piped carbon dioxide would inevitably be used for enhanced oil recovery as intended by its promoters.
4. The Legislature should hold hearings on state agencies' unwillingness to use their authority to enforce existing laws to reduce air pollution, water pollution, and excessive water consumption from conventional row crop agriculture.
5. The Legislature should develop a transition strategy to support corn farmers as they face a likely long-term decrease in corn ethanol demand, instead of furthering economic dependence on corn ethanol. An LCFS program sets market conditions for farmers to grow corn, locking them into an agricultural system that harms human and ecosystem health. Farmers in rural Minnesota should be rewarded for preserving rich soil and clean water and producing nutritious food instead of an inefficient fuel source. As our changing climate is impacting food security, it is more important than ever to preserve healthy lands for growing food and natural carbon sequestration.

Signed,

Sarah Mooradian, Government Relations & Policy Director, CURE

Carolina Ortiz, Associate Executive Director, COPAL

Kathleen Schuler, MPH, Policy Director, Health Professionals for a Healthy Climate

Peter Wagenius, Legislative Director, Sierra Club North Star Chapter

Above individuals are members of the CTS Work Group