

FUELING A LOW-CARBON FUTURE IN MINNESOTA

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TAKEAWAYS

Note: Takeaways represent statements made in the roundtable discussion and do not necessarily reflect C2ES positions or opinion.

Overall Takeaways

- While electrification is an economically and technologically feasible decarbonization solution for many segments of the transportation sector—particularly light-duty on-road transportation—low-carbon liquid fuels will still play a role as a drop-in solution for sectors such as aviation, shipping, rail, and heavy-duty trucking.
- Any policy supporting the reduced carbon intensity and expanded deployment of low-carbon fuels must be both comprehensive and specific enough to allow for the greatest compliance flexibility while addressing issues including climate pollution, air quality impacts, upstream environmental impacts, and equity.
- Equity must be central to the development of any state-level decarbonization policy. In the case of low-carbon fuels, state policy must intentionally prioritize accessibility and environmental benefits for disadvantaged communities. This can be accomplished either by supporting access to electrification options or fueling infrastructure or by prioritizing and targeting the accelerated uptake of low-carbon fuels by heavy-duty transportation modes to reduce air pollution in disadvantaged communities, including at ports, rail yards, and airports.
- In addition to established biofuel feedstocks such as corn and soy, investment and policy should support the utilization of wastes and residues as feedstocks for producing fuel. Fuels produced from agricultural and forestry residues or from municipal landfill wastes that otherwise hold no economic value have relatively low carbon intensities due to the lack of emissions associated with feedstock production and land use change—which are otherwise included for traditional biofuels.
- Aging infrastructure like storage tanks will need to be replaced or significantly upgraded to accommodate higher blends of ethanol in fuel. This creates a challenge for operators looking ahead to the mid- and long-term market, who must balance uncertainty on the long-term return on investments for traditional liquid fueling against the need to replace dated infrastructure.
- To incentivize farmers to produce low carbon-intensity feedstocks and use more sustainable farming practices, farmers must clearly and directly receive economic benefits for the adoption of these practices.
- The current limited supply of low-carbon fuels is being funneled to the market with the most favorable policy environment. Today, most low-carbon fuels like sustainable aviation fuel are used in California due to the incentives for their use under the state’s low-carbon fuel standard. In

Minnesota, a state-level policy like a clean transportation standard could support the development of a market to reward the use of these fuels within the state.

- In addition to policy drivers, public companies that take voluntary actions, such as reporting and disclosure of emissions, will lead to a demand boost from voluntary markets. The forthcoming rule from the Securities and Exchange Commission (SEC) on enhanced climate-related disclosures will also impact companies' actions: it could grow demand from voluntary markets for low-carbon fuels, but conversely could serve as a disincentive if its reporting requirements for emissions reductions plans are too stringent for companies to comply.
- A consistent regulatory and policy environment that includes long-term credits for low-carbon fuel production and use is crucial to supporting certainty among investors and reducing risk in capital investment for new, capital-intensive production facilities and distribution infrastructure. Updates to regulatory or policy measures that were in place at the time of final investment decision in new facilities should reasonably accommodate the conditions under which those investment decisions were made.
- Verification schemes and registries for market-based mechanisms underpinning credit markets for low-carbon fuels must be grounded by a neutral third party to build trust among market participants.

Environmental and climate impacts

- In addition to the climate benefits of reduced greenhouse gas emissions, low-carbon fuels can provide a wide range of environmental and health co-benefits, such as improved air quality, especially in low-income or racially marginalized communities. Agricultural practices that reduce greenhouse gas emissions may also produce improvements in soil health, water quality, and ecosystem services.
- Currently, exposure to air pollution and vulnerability to the harmful health impacts of air pollution are disproportionately concentrated among Black, Indigenous, and other communities of color. Policies to address air pollution must prioritize justice for these communities, including support for access to low- and zero-emission technologies.
- Policies and practices to address greenhouse gas emissions from agriculture must ensure that the goals of climate and environmental protection complement one another, rather than shifting impacts from one sector to the other.
- Innovation in feedstocks—e.g., winter annual intermediate crops such as winter camelina and pennycress, increased crop yield on existing farmland, and the use of clean hydrogen in fuel production can lead to large reductions in the carbon intensity of biofuels.
- Minnesota, as a major producer of biofuels and agricultural products, has a unique opportunity to be a leader in the integration of provisions incentivizing and measuring climate-smart agricultural practices into its state-level clean transportation standard.
- It can take as much as two decades to see the large-scale climate benefits of sustainable agricultural practices and technologies, whether that is the maturation of new practices or the market-wide accessibility of new technologies. Investment in these necessary changes must happen now to ensure their impacts are realized in time to meet midcentury decarbonization goals.
- Just as the production of biofuels and other low-carbon fuels have environmental impacts, vehicle electrification technology also produces upstream emissions and environmental impacts through the

mining of critical materials. These impacts should be accounted for in a consistent, transparent, comparable lifecycle emissions accounting scheme to ensure communities and ecosystems are protected as we decarbonize transportation.

- For farmers, new technologies like digital tools and zero-emission farm equipment often have high up-front cost barriers and steep learning curves. Policies and outreach supporting these innovations should include significant accommodations for farmers to meet their financial and training needs.
- To protect farmers from financial shocks, policies supporting sustainable agricultural practices should support risk management, such as broadened insurance coverage for double cropping and innovative feedstocks, and premium discounts for producers who implement climate-smart practices which bolster resilience to natural disasters.

Infrastructure needs and siting considerations

- The construction of new infrastructure, rather than simply retrofitting existing infrastructure, is needed to produce low-carbon fuels. This is due to both the emergence of new fuel production pathways that utilize different processes and the unique chemical properties of some low-carbon fuels (e.g., ethanol is significantly more corrosive than petroleum products).
- Conversely, electric utilities need more state and federal direction on employing grid enhancement technologies on existing infrastructure. This will expedite the inclusion of distributed energy resources to interconnect with the grid and supply clean electricity. Lower carbon intensity electricity can reduce the overall lifecycle greenhouse gas emissions for electric vehicles, as well as for liquid low-carbon fuels where electricity is an input for fuel production.
- More federal support is needed for pilot projects that can incorporate higher blends of biofuels, including updated infrastructure.
- Carbon capture and sequestration (CCS) can reduce emissions from refineries, making it a powerful tool for carbon intensity reductions in fuels. However, recent state and legal actions in the Midwest—like the rejection of carbon dioxide pipeline permit applications in South Dakota and Iowa—are inhibiting the development of associated infrastructure needed for CCS to become part of the solution. Developers, communities, and policymakers must work collaboratively to ensure the responsible and rapid build-out of supportive infrastructure if companies hope to utilize carbon capture to support carbon intensity reductions in fuel production.
- Pipelines and other linear infrastructure face significantly more limitations to siting than discrete projects like wind farms. One way to get ahead of court challenges or opposition from landowners is for developers to engage with communities early, transparently, and frequently in a decision-making capacity to create a positive and mutually beneficial pathway forward to infrastructure development.
- Companies shifting infrastructure from traditional fuel pathways to low-carbon pathways must make significant, time-intensive up-front investments to replace equipment and supporting infrastructure. Long-term policy certainty supports companies' ability and willingness to invest in new low-carbon fuels production capacity.
- As the transportation sector shifts toward lower carbon solutions, rural communities—especially tribal and low-income rural communities—must not be left behind in their access to charging or fueling stations. Policymakers must support continued and expanded access among rural communities to affordable fueling options.

- Relatively long permitting timelines in Minnesota inhibit the development of low-carbon fuels projects. Companies may choose to site development in other states where permitting timelines are shorter and regulatory processes are easier. Without comprehensive permitting reform, Minnesota may lose out on potential large-scale private sector investment in low-carbon fuel production.

Workforce considerations and community benefits

- The clean energy economy of the future presents significant opportunities for local workforces and communities that will host new energy projects. However, developers, labor groups, policymakers, workforce development professionals, and communities must collectively and intentionally develop transition plans to bridge existing and projected future gaps through coalitions, initiatives, and support career pathways for new and existing workers.
- Training for new energy workers can take many forms, including an intentional focus on re-deploying existing skillsets in service of clean energy projects; accessible education programs that match skills development in the classroom with skills needed on the job; registered apprenticeship programs; and certifications.
- Developers should prioritize hiring local workers to improve project development results by building community buy-in, encouraging improved worker safety through increased accountability, and supporting positive economic outcomes for the communities that host projects.
- The state can support the responsible siting of new projects and guarantee greater benefits to local communities by investing in build-ready sites. Such investments can include remediating brownfields, supporting local workforce development, expanding human services, streamlining the permitting process, and providing access to renewable energy. New low-carbon technologies and supporting projects often have electricity needs that can be orders of magnitude higher than the average for established technologies, necessitating access to ample land and renewable energy generation capacity.
- An aging workforce in Minnesota, particularly in the agricultural sector, inhibits the transition to new technologies as farmers nearing retirement may not receive an adequate return on the significant up-front capital investments the transition will require.
- Communities are the best positioned to elevate the issues and solutions that are most important to them. In the case of fuels development, communities raise infrastructure safety and air quality as their top concern. Companies should invest more time and resources in listening to communities' concerns and needs early in their planning processes and address them transparently and comprehensively.
- Many low-carbon fuels projects in Minnesota will be developed in rural areas. Developers must work with state and municipal government to ensure any influx of jobs and workers will be accompanied by supporting physical and social infrastructure capacity, such as wastewater infrastructure, school capacity, housing availability, childcare and transportation accessibility, and health services. Interdisciplinary organizations can mediate these needs; developers and policymakers must work closely with them.
- As the number of projects in rural communities increases, companies and economic development organizations must find ways to geographically balance workforce demand in rural areas against workforce supply in the Twin Cities.

- New fuel technologies and the large-scale build-out of new infrastructure to support the clean energy economy present an opportunity to explore new models of structuring community benefits from projects. This can include efforts to leverage investment to create career opportunities for community members, as well as models for community ownership of or equity in projects.

Sustainable aviation fuel

- Growing numbers of voluntary corporate commitments to emissions reductions are a source of demand for low-carbon fuels. These commitments often rely on the guidance provided by corporate accounting and target-setting standards such as the Science Based Targets initiative (SBTi), which provide guidance on how sustainable aviation fuel may be used to reduce airlines' emissions within their frameworks.
- Current production tax credits for sustainable aviation fuel are set to expire in between 2–5 years. Many existing and potential producers view this period as too narrow to justify investment in the new production capacity needed to match supply to the current high levels of unmet demand.
- Policies incentivizing and directing the utilization of the limited global supply of low-carbon fuels should prioritize supporting their use in the sectors of greatest impact. In particular, these policies should support utilization in hard-to-decarbonize sectors like chemicals and aviation.
- Market-based mechanisms like a high-integrity book and claim system can be effective in the near term to bridge gaps between demand for and supply of sustainable aviation fuel while shifting costs toward those who are more willing to pay them. As an example, 'book and claim' unlocks the sustainable aviation fuel market for Scope 3 offtakers such as companies with corporate travel footprints, freight forwarders, and manufacturers of goods. The establishment, implementation, and recognition of robust book and claim mechanisms within voluntary and regulatory frameworks will be a critical pathway to unlocking scale.
- Supply and demand for low-carbon fuels are heavily sensitive to price. Producers and consumers will prioritize markets with the greatest financial incentives that provide near price parity with conventional fuels.