Economic Bulletin

Agricultural Economic Summit Highlights Growing Connection Between Agriculture and Energy

by: Nate Kauffman and Ty Kreitman

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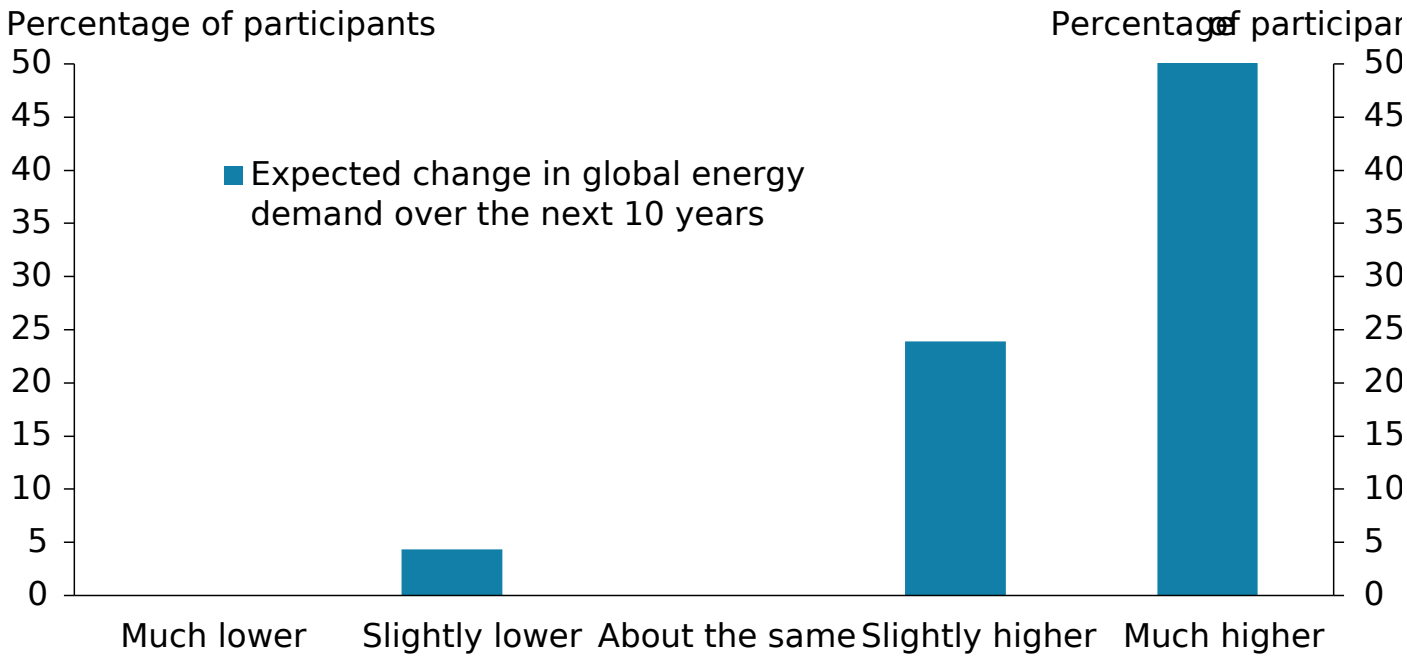
The agriculture and energy sectors have become more tightly connected as renewable energy increases demand for input crops and creates alternative income opportunities for farms. Industry experts underscored these links at the Kansas City Fed's Agricultural Economic Summit in May. Despite some longer-run uncertainties, Summit participants expect energy investments and developments to have a significant influence on the future structure of ag and commodity markets.

Although ethanol production has driven connections between the agriculture and energy sectors in past decades, new forms of renewable energy and movements to limit greenhouse gas emissions are likely to further tighten connections between the sectors. For example, production of sustainable aviation fuel (SAF) and biomass-based diesel have increased considerably in recent years, spurring heightened demand for soybean and other oils used to produce these fuels. In addition, agricultural land has been increasingly used to harvest energy through solar panels and wind turbines, among other means. These shifts toward renewable energy sources have been complemented by growing attention to carbon abatement, carbon sequestration, and carbon intensity scoring, which is likely to have significant implications for the agriculture sector.

The anticipation of increased demand for and growth in renewable energy markets has spurred large investments in renewable fuel and energy production, thereby expanding revenue opportunities for producers. According to recent estimates by the Energy Information Administration (EIA), U.S. production of SAF and other non-ethanol biofuels is forecast to be nearly three times larger in 2025 than it was in 2023, which will likely drive considerable demand for oilseed crops such as soybeans.[1] In addition, a modest but growing share of agricultural producers is pursuing solar electricity extraction as an additional revenue stream for farmland (French 2024). And while still relatively modest and subject to barriers, net-zero emissions commitments are expected to grow in the coming years, offering producers an opportunity to monetize carbon sequestration (USDA 2023). Reflecting these opportunities, Chart 1 shows that nearly two-thirds of participants in the Kansas City Fed's recent Agricultural Economic Summit (hosted by the Omaha branch on May 15, 2024) expect global demand for energy to be higher over the next 10 years.

Chart 1: Ag Summit participants expect global demand for energy to grow significantly in the next decade



Note: Chart shows responses to the question, "How will global demand for energy evolve over the next 10 years?" from about 50 executives and industry experts who participated in the Kansas City Fed's Agricultural Economic Summit in May 2024.
Source: Federal Reserve Bank of Kansas City.

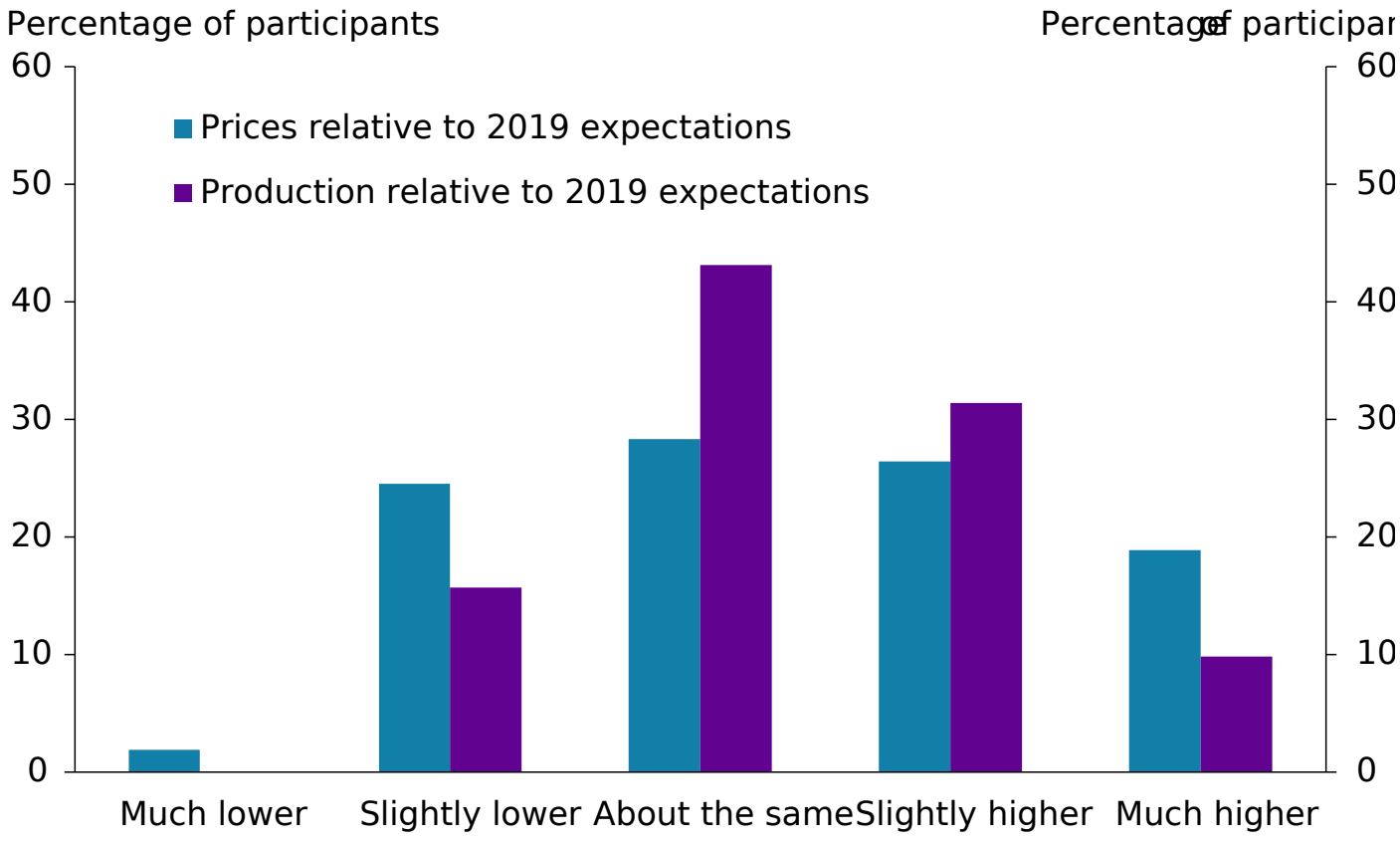
Transitions from conventional to renewable energy sources have been largely policy-driven; however, the degree to which existing policies will be sustained and new policies implemented in the future is uncertain. Thus far, the Inflation Reduction Act (IRA), the U.S. Environmental Protection Agency's Renewable Fuel Standard (RFS), and subsidies created by state and federal policies have initiated and supported the viability of biofuel and SAF production, while other environmental policy initiatives have promoted solar and wind energy and carbon measuring. Although some Summit participants noted that uncertainty may be holding back some private-sector investment in long-duration and capital-intensive projects, uncertainty could also create significant risks throughout the agricultural supply chain. For example, the continuation of key policy elements supporting the production of SAF, such as renewable fuel mandates and tax credit levels, remains unclear, and any substantial policy changes before completion of expanding infrastructure could create risks. Uncertainty about solar and wind lease contracts and the longer-term effects on land use are also risks. Finally, uncertainty in carbon markets has arisen due to differences in intensity scoring, the possible discontinuity of policies, and stringent requirements on agricultural practices to qualify for carbon credits.

Despite uncertainties surrounding policy, connections between the agriculture and energy sectors have already altered the structure of the agriculture sector—and growing renewable energy use is likely to continue to alter the sector in the years to come. Following the implementation of the RFS in 2006, ethanol use increased, boosting demand for and production of corn and likely contributing to higher but more volatile crop prices (Cowley 2024). The IRA is likely to similarly increase the use of

biofuels, boosting demand for soybeans and other oilseed crops. Although this tightening connection between the ag and energy sectors may boost farm income, as it did following the RFS, it could also lead to more income variation and uncertainty for crop producers (Cowley 2024).

As agriculture and energy become more connected, geopolitics and global economic developments are likely to play an even more important role in agricultural markets. Chart 2 shows that many participants in the Agricultural Economic Summit report that both prices and production of agricultural commodities are slightly higher than what they expected five years ago. Both global and domestic grain production have increased steadily over the past few decades, and production is likely to continue growing alongside steady improvements in yield. Brazil in particular is well positioned to expand production through infrastructure investments and improve its competitiveness in grain export markets. Despite higher production, increased demand has likely supported higher prices. However, recent geopolitical tensions involving key producers and buyers of crops have created uncertainty in global agricultural markets, making it difficult to assess how much biofuel demand has contributed to overall agricultural prices.

Chart 2: Both prices and the level of production in ag markets are higher than most Ag Summit participants expected in 2019



Note: Chart shows responses to the question, "How do prices and production in your respective agricultural markets compare to what was expected five years ago?" from about 50 participants in the Kansas City Fed's Agricultural Economic Summit.
Source: Federal Reserve Bank of Kansas City.

Technological developments and growing climate risks are likely to intensify the links between the agriculture and energy sectors. Artificial intelligence and machine learning could drive change across the agricultural supply chain, and advances in carbon measurement will inform developments in carbon sequestration, abatement, and credit programs. In addition, greater weather volatility has created concerns about water availability and growing conditions across the globe, presenting a major risk for both the energy and agriculture sectors in the medium to long term. As the climate changes, agricultural producers may need water in different amounts and at different times of the year. At the same time, electricity generation from traditional water-intensive sources could also compete with agricultural water needs.

As energy demand grows, so too will the links between the agriculture and energy sectors. When asked to highlight factors most likely to affect agricultural prices over the next 10 years, nearly all Summit participants cited energy demand and policies related to ag, energy, and the environment as major factors. Developments related to geopolitics and trade are also expected to affect agricultural prices, with climate, weather, technology, and productivity cited as important factors to a lesser extent. Despite some lingering uncertainties surrounding policy, participants believe developments related to energy will have a significant influence on the future structure of agriculture and commodity markets.

Endnotes

[1] See analysis published July 17, 2024.

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Nate Kauffman is Senior Vice President and Omaha Branch Executive at the Federal Reserve Bank of Kansas City. In his role as the Kansas City Fed's lead economist and representative in the state of Nebraska, Nate provides strategic direction and oversight for the Omaha Branch, regional research, and economic outreach throughout the state. He serves as a local connection to the nation's central bank and is responsible for briefing the Kansas City Fed's president – a member of the Federal Open Market Committee – on regional economic and business activity.In addition, Nate is the Kansas City Fed's principal expert in agricultural economics. He is a leading voice on the agricultural economy throughout the seven states of the Tenth Federal Reserve District and the broader Federal Reserve System. Nate oversees several Bank and Federal Reserve efforts to track agricultural economic and financial conditions. He also speaks regularly on the agricultural economy to industry audiences and the news media, including providing testimonies at both U.S. Senate and U.S. House Agriculture Committee hearings.Nate joined the Federal Reserve in 2012. He received his Ph.D. in economics from Iowa State University. Prior to receiving his Ph.D., Nate spent three years in Bosnia and Herzegovina coordinating agricultural economic development projects.Nate lives in Omaha with his wife and four children.

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