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Agriculture



EMPOWERING AMERICA'S FARMERS AND RANCHERS

Key Takeaways:

- American farmers and ranchers are essential to putting safe, secure food on the table for families in the United States and around the world. Farmers are also on the front lines of climate change.
- A stronger agricultural economy and higher incomes for American farmers and ranchers can work in harmony with environmental progress.
- Public policy should protect private property rights, empower ranchers and farmers (not governments), and harness the power of incentives.
- Expanding opportunities for investment in new equipment, precision and regenerative agriculture, and removing barriers to tackling genetically modified plants and foods, invasive species, and agricultural trade will boost farm output and income while reducing emissions and building more natural climate resiliency.

American farmers and ranchers are essential to putting safe, secure food on the table for families in the United States and around the world. The people working in the domestic agricultural sector are also among some of the world's leading innovators. By investing in new technologies, inventing new techniques, and identifying cost savings, farmers and ranchers have dramatically improved their efficiency. They are producing more crops with fewer inputs. A 2018 study found that, "[i]nnovations in animal and crop genetics, chemicals, equipment, and farm organization have enabled continuing output growth while using much less labor and farmland. As a result, total agricultural output nearly tripled between 1948 and 2015—even as the amount of labor and land (two major inputs) used in farming declined by about 75 percent and 24 percent, respectively."¹

For the agricultural sector, climate change represents both a challenge and an opportunity. Farmers and ranchers are on the front lines as the climate changes. Warming affects crop seasons, soil nutrition, and erosion.² Extreme weather such as droughts, heat waves, and floods can ruin crops. Higher levels of carbon dioxide can help crop yields by boosting photosynthesis but can also create hotter, drier climates where crops suffer. Consequently, climate change's impacts on crop yields vary by crop and region.³

The global food system represents 21 to 37 percent of annual emissions (as measured by 100-year Global Warming Potential).⁴ Land-use changes, production, livestock management, fertilizer use, and transportation increase carbon dioxide, methane, and nitrous oxide emissions.⁵

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PRODUCING MORE FOOD WITH A SMALLER ENVIRONMENTAL FOOTPRINT

Continued innovation can drive efficiency, increase output, reduce emissions, and maintain American leadership in agriculture. Newer farm equipment and precision agriculture technologies improve fuel efficiency and reduce input costs. Meanwhile, innovative companies are turning waste into valuable products. For instance, Sedron Technologies processes liquid and solid wastes into useful products for soil nutrition, fertilizer, and drinking water.⁶ Reducing food waste and developing alternative sources of protein will also save money, minimize environmental impacts, and provide consumers with more choices. Greater adoption of genetically engineered crops and animals will increase productivity with a smaller environmental and climate footprint.⁷ Entrepreneurial startups are producing supplements for cattle to reduce methane emissions while earning farmers income in voluntary offset markets.⁸



Furthermore, natural climate solutions such as regenerative and precision agriculture provide an opportunity for farmers to diversify income and reduce the risks of climate change by sequestering more carbon dioxide. Researchers from the Soil Health Institute examined soil health management practices in the midwestern U.S. and reported, “that you could increase net revenue to farmers by \$52/acre for corn and \$45/acre for soybeans. Additionally, combining silviculture into farming operations can provide greater income stability, which can improve the economic resilience of farms.”⁹ Similarly, data show that regenerative practices at corn farms in Iowa and almond farms in California have generated far more revenue.¹⁰ Increased animal grazing has improved soils, biodiversity and generated climate benefits.¹¹ Cover crops improve soil health and reduce erosion, water pollution, and emissions.¹² Farmers are also expanding the use of renewable power, for instance, by pairing solar panels with shade crops¹³ or leasing land for wind turbine developers.¹⁴

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POLICY RECOMMENDATIONS TO MEET OUR FOOD NEEDS AND ENVIRONMENTAL OBJECTIVES

The aforementioned cost-saving, innovative technologies and processes underscore one important fact: **Greater food supplies for American families and higher incomes for American farmers and ranchers can work in harmony with environmental progress.** As policymakers deliberate how to boost the agricultural economy and address climate change, they should adhere to three fundamental principles.

1. **Protect private property rights.** Property rights incentive stewardship because property owners benefit economically and environmentally from taking care of the asset they own. Conversely, when everyone owns something, no one does. Countries with well-defined and protected private property rights also have the strongest environmental records.¹⁵
2. **Empower farmers and ranchers.** When it comes to agricultural innovation, American farmers and ranchers are already global leaders. Prescriptive government policy that imposes mandates and burdensome regulations will take decisions away from farmers and ranchers. Instead, policymakers should eliminate government-imposed barriers to agricultural innovation and provide technical assistance and guidance when applicable.
3. **Harness the power of incentives.** Whether it is endangered species, invasive species or carbon offset markets, regulations and poor policy frameworks can disincentivize conservation and stewardship efforts and misallocate resources toward unproductive uses. Reforming regulations to provide incentives for farmers, ranchers, and property owners would increase agricultural output and deliver healthier natural ecosystems.

EXPAND OPPORTUNITIES FOR PRECISION FARMING AND SUSTAINABLE INTENSIFICATION

Precision agriculture and sustainable intensification will enable farmers and ranchers to produce more with less. With access to more data, better information, and newer equipment, producers can improve yields while reducing emissions and unwanted environmental byproducts. Automated technologies, GPS, and enhanced imagery allows for optimized seed planting while reducing inputs like fertilizers, pesticides, and fuel and water use.¹⁶ Studies have shown that precision agriculture adoption increased corn and soybean yields on existing lands and allowed farmers to avoid cultivating another 10.2 million acres of new cropland, the size of 4.5 Yellowstone National parks.¹⁷ Another case study examined the adoption of precision agriculture on a family farm in Illinois and found the family reduced its per acre costs by \$67 and reduced greenhouse gas emissions more than 15 percent.¹⁸

American farmers are already global leaders in precision agriculture practices.¹⁹ To magnify opportunities for precision agriculture, Congress and the administration should:

- **Make immediate expensing permanently available.** Immediate expensing would allow farmers and ranchers to deduct the cost of automated, more efficient equipment in the year the cost is incurred rather than following cumbersome depreciation schedules.



- **Leverage existing programs for farmers to purchase precision agriculture equipment.** The Producing Responsible Energy and Conservation Incentives and Solutions for the Environment Act (PRECISE Act) would expand USDA conservation loans and programs to include precision agriculture investments and provide technical assistance for farmers and ranchers who want to pursue soil health planning.²⁰

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EXPAND OPPORTUNITIES FOR REGENERATIVE AGRICULTURE

Regenerative agriculture can diversify farmers’ and ranchers’ income streams and produce many environmental and climate benefits, including improved soil health, better air and water quality, added carbon sequestration, and diversified wildlife habitats. Improved soil health also reduces soil erosion and makes areas more flood- and drought-resistant.²¹ Transitioning, however, can be a costly and time-consuming endeavor. Congress should repurpose funds to compensate farmers for lost revenue as they switch to a healthier soil cropping system. USDA should make funds available for technical assistance for farmers and ranchers as they consult with USDA’s conservation service experts, non-profits, and other farmers.²² The Naturally Offsetting Emissions by Managing and Implementing Tillage Strategies (NO EMITs Act) would achieve several of these goals.²³ The bill:

- Establishes a Soil Health Transition Incentive Program that provides payments and technical assistance to producers who are transitioning their farms to soil health cropping systems.
- Provides longer-term contracts (5-7 years) to help mitigate risk during transition to soil health cropping systems.
- Allows the producer to choose individualized technical assistance through USDA, TSPs, commercial entities, non-profits, or state or local governments.
- Doubles funding for the Conservation Innovation Trials from \$25 million to \$50 million.
- Establishes State Assistance for Soil Health Programs and provides \$100 million a year out of Conservation Stewardship Program (CSP) funding for matching grants to states or tribes for state soil health programs.
- Carves out 1 percent of the overall conservation title funding to provide technical assistance to producers to mitigate and adapt to the changing climate.²⁴

MAXIMIZE EFFICIENCY OF RURAL BROADBAND SPENDING

Reliable telecommunications are essential for farmers, not just for precision agriculture practices but also to aid in telehealth, sales, and employment. Billions of dollars have been allocated to rural communities for broadband with mixed results depending on the program and the region.²⁵ Further, outdated maps of internet coverage make it difficult to allocate resources efficiently. Mercatus Center research fellow Brent Skorup notes that, “Complex, conflicting subprograms are another problem. The FCC alone has 17 rural telecom subsidy subprograms. Each has unique formulas and eligibility requirements for providers.”²⁶ With tens of billions of dollars available for rural broadband expansion, Congress and the administration should:

- **Consider turning funding into voucher programs.** Vouchers for rural broadband users would empower broadband purchasers, force providers to compete for customers, prevent overbuilding, and be technology neutral.²⁷ Absent a voucher program, the Federal Communications Commission should distribute funds through a reverse auction and expand participation in the auction by eliminating the requirement that providers be eligible telecommunications carriers (ETCs).²⁸
- **Improve the process to receive federal rights-of-way.** Streamlining the process to receive federal rights-of-way would improve access to broadband services in rural and tribal communities. The bipartisan Accelerating Rural Broadband Deployment Act would require agencies to review and respond to federal right-of-way requests within 60 days of receiving the request and authorize agencies to approve the licensing for all broadband equipment on a federal right-of-way.²⁹
- **Leverage public-private partnerships to expand mapping.** The private sector is the primary deployer of broadband and has access to data that can improve the allocation of federal resources and better illustrate gaps in internet needs.³⁰ The federal government should leverage private sector expertise and practices as it improves country-wide broadband mapping.



- **Prioritize unserved and truly underserved areas and ensure technology neutrality.** According to the Federal Communications Commission, 96 percent of Americans had access to broadband in 2019.³¹ Spending on rural broadband expansion should focus on the truly unserved and underserved locations, ensure technology neutrality (whether it be cable, fiber, satellite or other) and not favor municipalities, cooperatives, etc. over private providers.³²

PROVIDE ACCURATE ACCOUNTING OF THE ENVIRONMENTAL AND CLIMATE EFFECTIVENESS OF CONSERVATION PROGRAMS

Voluntary USDA conservation programs provide important assistance to farmers and ranchers, protect the environment, and can reduce emissions through carbon sequestration in soil and trees. Conservation programs help protect drinking water, preserve wildlife habitat, prevent soil erosion, and protect and restore forests and wetlands.³³ Data collection, transparency, and evaluation will maximize the efficiency of these initiatives and safeguard taxpayers from waste, fraud, and abuse. The bipartisan, bicameral Farmer-Driven Conservation Outcomes Act of 2020 would authorize the USDA to identify goals, metrics, and assessment processes to measure the effectiveness of conservation programs.³⁴ Developing goals, evaluation metrics, and monitoring programs and modifying the programs as necessary would provide sound scientific data to maximize conservation efforts. Data collection, monitoring, and evaluation would also better inform efforts to capture and sequester carbon.

ADDRESS INVASIVE SPECIES

Invasive species are an economic and environmental menace for private property owners, communities, and public lands and waters. USDA explains that the widespread, “economic and social impacts of invasive species include both direct effects of a species on property values, agricultural productivity, public utility operations, native fisheries, tourism, and outdoor recreation, as well as costs associated with invasive species control efforts. A 2021 study estimated that invasive species have cost North America \$2 billion per year in the early 1960s to over \$26 billion per year since 2010.”³⁵ Climate change exacerbates invasive species problems and can also increase risks of wildfires and reduce the health of forestland and grassland, reducing the potential to sequester more CO₂. Private property owners have a direct incentive to eradicate invasive species, but those incentives are weaker if eradication requires active planning, coordination, and action from multiple landowners as well as state and local governments.³⁶ To address and help eradicate invasive species, Congress and the administration should:

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- **Reform permitting for invasive species plans to efficiently utilize the \$100 million invasive species prevention, early detection systems, and eradication.** The Infrastructure Investment and Jobs Act allocates \$100 million each to the Department of Interior and Department of Agriculture to address invasive species.³⁷ Prevention and early detection are by far the most cost-effective ways to deal with invasive species. Through public, private, and international data collection, the Fish and Wildlife Service provides Ecological Risk Screening Summaries that quickly assesses the invasiveness of a plant or animal. The federal government should continue to provide the resources necessary to constantly update risk assessment as information changes and expand its public outreach as much as possible. Funding for methods including molecular-based surveillance technologies and even sniffer dogs have been helpful in detecting invasive species early.³⁸ Congress should expedite permitting for any invasive species eradication projects,³⁹ and DOI and USDA should have the flexibility to use funds to experiment with different prevention and detection methods.
- **Expand the use of federal and state incentive programs. Federal and state governments should expand the use of incentives to reduce invasive species.** For instance, a nutria is a semi-aquatic rodent that adversely affects wetlands and vegetation in Louisiana (and several other states). Through a federal-state program, participants can trap and hunt nutria and will receive \$6 per nutria delivered to a collection center.⁴⁰ Another example is a resource incentive, where



Florida's Fish and Wildlife service allowed anglers to harvest an additional spiny lobster for every 25 lionfish (the invasive species) captured. The state also had a contest to see which diver could capture the most lionfish and awarded prizes to those who captured the most. In 2021, the participants collected more than 3,400 lionfish.⁴¹ Different types of incentive programs (bounty, contractor, community, recreation) are effective and can vary depending on the region and species.⁴² Using the \$200 million from the infrastructure bill, agencies should work with states to expand the use of federal-state incentive programs and follow DOI recommendations on considerations, implementations, avoiding unintended consequences, and public outreach.⁴³

- **Provide consistent funding for research, development, and deployment for invasive species treatment.** USDA's Agricultural Research Service has collaborated with private landowners and states to treat and eradicate invasive species. For example, Fish and Wildlife partnered with local landowners and conservation organizations in Wyoming to test the effectiveness of chemical and biological treatments for cheatgrass, an invasive species that exacerbates the size and scope of wildfires.⁴⁴ Expanding research within USDA, at universities, nonprofits, and the private sector can expand the availability of low-cost solutions. While the infrastructure bill provides a sizable allocation to address invasive species, authorization and appropriation for research projects such as experimental forests would also help study cross-cutting environmental issues, including invasive species.
- **Explore alternative funding pathways.** Increase user fees and charge international visitors higher fees. To address invasive species at federal and state parks or waters like the Great Lakes (where 25 invasive species of fish and numerous invasive plants have entered the lakes since 1880⁴⁵), parks should charge market rates for entrances.⁴⁶ That revenue could be used to address deferred maintenance at parks but also to address environmental concerns like invasive species. Charging international visitors to federal parks by increasing visa fees or charging out-of-state visitors to state parks (as many do) would generate additional revenue. To be clear, parks and public spaces should be available to all Americans. Higher fees should not price families out of visiting America's national treasures. Providing vouchers for low-income families would ensure all Americans have access to national and state parks.
- **Provide research, development, and demonstration for expanded biochar use.** The use of biochar, or biomass-based charcoal, has numerous documented health benefits for farm animals, soil health, water quality improvement, and improved forest health.⁴⁷ Biochar could be particularly effective at sequestering carbon, too, especially if the sources come from agriculture and forest feedstocks and residues like corn stalks and tree trimmings.⁴⁸ The BIOCHAR Act of 2021 would create a biochar demonstration project and use at least 50 percent of the feedstock from forest thinning projects.⁴⁹



EMBRACE SOUND SCIENCE ON GENETICALLY MODIFIED CROPS AND GENETICALLY ENGINEERED ANIMALS

Genetically modified (GMs) crops have been essential to feeding American households and enabling farmers to produce higher yields with fewer resources. Genetically modified crops such as golden rice have been instrumental in combating global hunger and malnutrition.⁵⁰ These crops are safe, tested, and approved by regulatory agencies in the U.S. (Food and Drug Administration) and around the world. By improving productivity on existing cropland and reducing the use of herbicides and insecticides, GMs have substantial environmental and climate benefits. The climate benefits include both emissions reductions and stronger natural climate resiliency. A June 2020 study from PG Economics Ltd found that, in 2018, GM crops raised farm income nearly \$19 billion after having raised farm income \$225 billion from 1996-2018. The same study found that in 2018 the



“combined GM crop-related carbon dioxide emission savings from reduced fuel use and additional soil carbon sequestration were equal to the removal from the roads of 15.3 million cars.”⁵¹ Similarly, genetically engineering animals has proven to make them healthier, more productive, and more environmentally friendly. For example, genetically engineered cows have more disease-resistant milk, which reduces the emissions per gallon of milk produced.⁵² Moreover, researchers have inserted a gene into cows to produce more male offspring, which weigh more but eat less.⁵³ Again, the result is greater output with a smaller environmental footprint.

Recognizing the economic and environmental benefits of GMs, policies and regulations should open access to genetically modified crops and animals rather than stigmatizing them. For instance, Emma Kovak at the Breakthrough Institute writes, “Unfortunately, policies in the European Union (EU) prevent most cultivation of genetically engineered crops, thereby foregoing the potential environmental benefits. And those are substantial. In the European Union alone, growing more genetically engineered crops could avoid a yearly 33 million tonnes CO₂ equivalents (Mt CO₂e/yr) in emissions, largely by increasing yields and reducing cropland expansion. That’s equivalent to 7.5% of total EU agricultural emissions from 2017.”⁵⁴

While consumers must have safe products, unnecessarily burdensome approval processes and timeframes delay adoption of safe GM crops in developed and developing nations. Daniel Nerero at the Alliance for Science at Cornell University writes, “Golden Rice is an example of how a technology for humanitarian purposes can be delayed for more than a decade, in part due to excessive regulation. In India alone, the cost of not commercializing Golden Rice was more than US\$199 million annually and the loss of 1.4 million lives in the last decade.”⁵⁵ Another example is the first genetically modified salmon, the first GM food approved in the United States. It took 20 years for the FDA to grant permission for genetically modified salmon to be sold in the U.S.⁵⁶ Encouragingly, the federal government has made improvements to expedite the regulatory process for GM crops and animals. The FDA has approved (deregulated) more than 130 crops and plants.⁵⁷ Moreover, the USDA is taking over the approval process for genetically engineered animals, which should improve approval and commercialization timeframes. Kovak at the Breakthrough Institute emphasizes that:



*In contrast to FDA's overly cautious regulatory approach, which includes the same intensive review for every [Genetically Engineered] animal, USDA's proposed rule has two levels of safety review for potential risks to human and animal health: an expedited one for GE animals with changes that mimic naturally-occurring ones, and a full safety review for all other GE animals. Using genetic engineering to mimic naturally-occurring animal traits may sound pointless; however, it is a quicker way to combine traits from two different breeds than conventional breeding and usually achieves indistinguishable results.*⁵⁸

Kovak makes two recommendations to further improve the process. The first is to regulate the product, not the process. Countries including Canada and Argentina take this approach and it is supported by biotechnology scientists as a more scientific approach.⁵⁹ The second is to eliminate pre-market regulatory safety checks as producers regularly breed plants and animals in a conventional manner without any safety regulation until the animal reaches the market.⁶⁰

In addition to improving the regulatory process in the U.S., Congress and the administration should:

- **Keep GM labeling voluntary and consider building a USDA campaign around the economic and environmental benefits of GM crops and animals.** Mandatory labeling could likely create a negative stigma about genetic engineering, which would undermine the evidence that GM crops and animals are scientifically safe and beneficial for farmers, consumers, and the environment. Evidence also suggests that non-GMO labels may reveal enough information to



consumers to deem mandatory labels unnecessary.⁶¹ Additionally, USDA should consider reinstating its GM checkoff program to convey the minimal risks and economic and environmental benefits of GM crops and animals. While the USDA should not be in the business of picking winners and losers, public perception and acceptance is key to legitimizing GMs where widespread skepticism still exists.⁶²

- **Codify product-based regulations and work with other countries to adopt an efficient international standard.** USDA should adopt product-based regulations and Congress should codify those changes to prevent regulatory swings that occur with changes in administration. Furthermore, the U.S. should lead in developing transparent, efficient international standards that push back on overly risk-averse actions (such as by the European Union) that do not comport with the actual risks of GM and fail to recognize the immense benefits. Leading on international standards would also help developing countries establish standards.

BOLSTER AMERICAN LEADERSHIP IN AGRICULTURAL TRADE

American farmers and ranchers are global leaders in supplying food to the world. U.S. agricultural exports shattered records in 2021. The \$177 billion in exports surpassed “the 2020 total by 18 percent and eclips[ed] the previous record, set in 2014, by 14.6 percent.”⁶³ While these figures are not adjusted for inflation, agricultural exports as a percentage of gross domestic product increased from 10.2 percent in 2020 to 10.8 percent in 2021.⁶⁴ Because U.S. farmers are leaders in production, efficiency, and stewardship, U.S. agricultural exports are also generating global environmental and climate benefits. Many countries have higher on average emissions intensities for crop and meat production. Ted Nordhaus and Dan Blaustein-Rejto of the Breakthrough Institute astutely underscored:

In the contemporary environmental imagination, highly productive, globally traded agriculture is a bad thing—poisoning the land at home and undermining food sovereignty abroad. But in reality, a pound of grain or beef exported from the United States almost always displaces a pound that would have been produced with more land and greenhouse gas emissions somewhere else.⁶⁵

Removing barriers to trade would be beneficial to importers, exports, and American consumers' well-being.⁶⁶ Policymakers should remove policy and regulatory barriers that inhibit the growth of U.S. agricultural exports (and imports). That includes expanding free trade agreements to lower tariffs and non-tariff barriers, eliminating mandates that misallocate resources away from productive uses, and fixing outdated regulatory policies that exacerbate supply chain constraints. Specifically, policymakers should:

- **Repeal the Foreign Dredge Act.** The Foreign Dredge Act prohibits any foreign-built or chartered ships from dredging in the U.S. Consequently, some of the world's best dredgers that could deepen and widen America's ports cannot bid on contracts. Deeper, wider port channels would improve transportation efficiency, reducing emissions from unwanted congestion and light-loading. Unable to accommodate two-way traffic or larger cargo ships, port channels across the U.S. have become congested. As a result, companies move more goods via truck or rail, increasing congestion and wear-and-tear on America's highways. Repealing the Act would also be beneficial to American farmers and ranchers (as well as other manufacturers and businesses). With just an inch of additional depth, a cargo ship could transport millions of dollars more in products per trip. The National Oceanic and Atmospheric Administration estimates that an additional inch of depth would allow ships to carry about “50 more tractors, 5,000 televisions, 30,000 laptops, or 770,000 bushels of wheat.”⁶⁷
- **Repeal the Jones Act.** The Jones Act requires that shipments between two domestic ports be on U.S.-built, owned, flagged, and crewed vessels. Rather than pay competitive prices for shipping, Americans pay more for a number of goods for no meaningful economic or national security benefits.⁶⁸ The Act has resulted in missed opportunities for farmers (corn, soybean, and potato for instance) to sell their product to other American consumers, who buy instead from foreign competitors because of high shipping costs.⁶⁹

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- **Repeal the Renewable Fuel Standard (RFS) and waive refinery blending requirements.** The Renewable Fuel Standard requires that biofuels (primarily corn-based ethanol) be blended into America’s fuel supply. The mandate has led to land use changes and crop switching, increasing food prices for households.⁷⁰ The RFS is a poor economic policy and a poor environmental policy. A 2019 Government Accountability Office study found the mandate was “associated with modest gas price increases in areas outside the Midwest” for “limited effect, if any, on greenhouse gas emissions.”⁷¹ The market, not government mandates, should determine ethanol’s value in the marketplace. There is ample evidence that biofuels would play some role, as ethanol is a cost-effective gasoline oxygenate, a gasoline additive that improves efficiency and helps to meet fuel emissions requirements.
- **Eliminate tariffs, tariff rate quotas, and countervailing duties on agricultural imports.** Tariffs and retaliatory tariffs have cut off export opportunities for U.S. farmers and ranchers. For instance, exports to China dropped from \$24 billion in 2014 to \$9.1 billion in 2018.⁷² The administration should zero out these tariffs and focus on more targeted enforcement of products made with forced labor and other blatant human rights violations. A good example is the Uyghur Forced Labor Prevention Act signed into law by President Biden with near unanimous bipartisan support.⁷³ Furthermore, President Biden should zero out tariffs and tariff rate quotas on agricultural imports such as feed, fertilizers, and meat and poultry preparation machinery.⁷⁴ Congress and the administration should also relieve economic burdens placed on American farmers by removing countervailing duties on imported fertilizers.⁷⁵

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VOLUNTARY CARBON OFFSET MARKETS

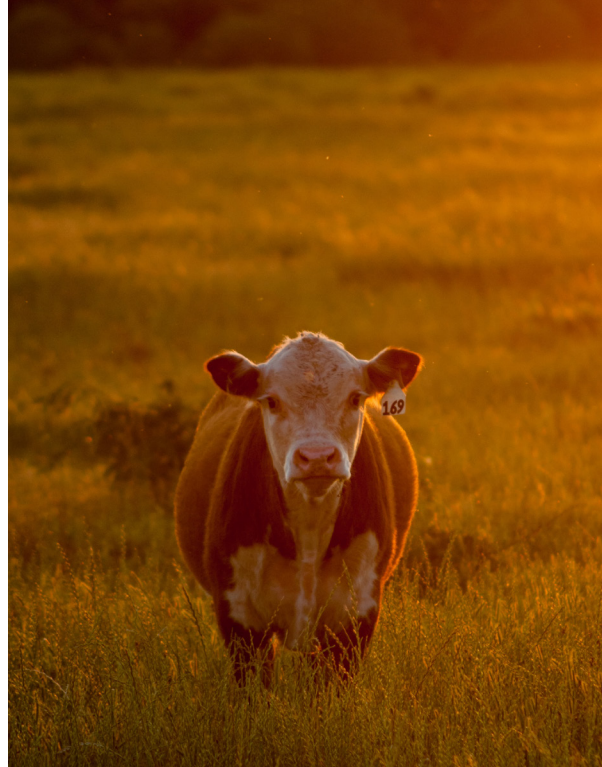
Voluntary carbon markets can be a cost-effective way for companies and individuals to reduce their climate footprint. In effect, landowners would receive compensation for preventing and reducing greenhouse gas emissions or for sequestering carbon. This could include planting trees or engaging in farming and ranching practices that increase carbon sequestration. For companies that have set their own net-zero targets, especially hard-to-decarbonize sectors, offsets provide a market-based mechanism to reduce or avoid emissions at lower costs. These markets are not without challenges. In some instances, offset projects did not materialize in the ways expected. For example, satellite imagery has shown that forest preservation or reforestation projects were only covering a fraction of the land they were intended to cover.⁷⁶

Another challenge is accurately measuring the emissions avoided or reduced. Soil samples taken to measure carbon stored can vary depending on which methods samplers use. Renewable power output can change from day-to-day. A reforestation project could be wiped out by a wildfire. The greatest challenge in verifying offsets is proving additionality. In other words, how can we be sure that farmers or businesses are not getting paid for something they were going to do anyway? For example, if a company makes an investment in a new energy-saving technology for financial reasons, but that technology also reduces emissions, those emissions reductions are not additional. For many reasons, proving or disproving that counterfactual is difficult.

These markets, however, have made dramatic improvements in collecting accurate data, improving carbon accounting methodologies, and having transparent, proper oversight. Third-party verifiers are improving methods to demonstrate the veracity of emissions reductions. For instance, one verifier tests soil at the beginning of an offset project, collects samples over the years, and then inputs the data “into an agricultural carbon model that estimates the sequestration that’s taken place.”⁷⁷ Other companies, like Nori, are using blockchain technology to create a voluntary, verifiable carbon removal market for buyers and sellers.⁷⁸ The Environmental Defense Fund, World Wildlife Fund, and Oeko-Institut (Germany) are setting up a carbon credit quality initiative.⁷⁹



Jonathan Wood, research fellow at the Property and Environment Research Center, writes that carbon markets will work best when they “incentivize compliance, rather than relying on enforcement.”⁸⁰ Wood writes, “If offsets are only purchased to comply with the regulation, neither the purchaser nor the seller necessarily has the incentive to ensure that the offsets provide results. Instead, those incentives depend on how closely the regulator scrutinizes transactions and monitors long-term compliance.”⁸¹ **With the right incentive structure and the weeding-out of fraudulent credits, voluntary carbon markets can make meaningful gains in reducing emissions and reducing risks of climate change.**⁸² The federal government could be a hub of information, provide technical assistance,⁸³ and provide any necessary verification for the inclusion of carbon markets in international agreements.⁸⁴



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²⁰ Representative Ashley Hinson, "Producing Responsible Energy and Conservation Incentives and Solutions for the Environment," U.S. House of Representatives Committee on Agriculture (Republicans) https://republicans-agriculture.house.gov/uploadedfiles/04.14.2021_preciseacthinsonsummary.pdf?utm_campaign=2760-396

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