ACCELERATING SUSTAINABLE LAND USE PRACTICES IN THE U.S.

EXECUTIVE SUMMARY

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The Challenge

Land use covers all activities and inputs used for production, alteration, or maintenance of land. Policymakers face many structural and behavioral challenges to achieving more sustainable land use, including the significant political power of several actors in this sector, the practical difficulties of implementing policies across tens of millions of hectares, and the deep-seated cultural and economic factors that motivate farmer-decision making. Nevertheless, decarbonization policies will need to address agriculture, which takes up over half of total land use[1], and is responsible for 10 percent of total U.S. greenhouse gas (GHG) emissions.[2] There are also challenges to addressing underlying drivers of land use, such as reducing food loss and waste, managing forests and soils to capture more carbon, and carefully deploying renewable energy infrastructure and long distance transmission while managing environmental impacts. Federal and state governments lack a needed long-term strategy and coordinated pathways to achieve sustainable, decarbonized land use.

The Solution

Achieving net-zero GHG emissions for the United States by 2050 will require a concerted set of actions on land use. Infrastructure for renewable energy production and transmission will need to be sited, displacing some other productive uses. Energy sector modeling shows that biofuels will be an important part of the energy mix by 2050, making R&D efforts and sustainability guardrails especially important. Meanwhile, decarbonization will require reducing GHG emissions from agriculture and livestock, and managing soils to increase carbon storage. Reforestation and afforestation, together with best practices in forest management, can increase the carbon sink in U.S. forests significantly. Pressures on land use can be reduced if the population moves towards healthy, low-carbon diets, and if food loss and waste is reduced. These solutions can be achieved through sets of policies, management strategies, and programs, as well as new governance systems equipped to understand complex synergies around a wide range of issues to achieve decarbonization objectives.

Policy Recommendations

Specific recommendations include:

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- integrated spatial planning, transparent processes and financing mechanisms for renewable energy project development, and transmission infrastructure;
- financial incentives for agrivoltaics and distributed generation, as well as renewables development, on existing structures on agricultural land and contaminated and underutilized sites;
- regulations to address jurisdictional overlaps among states, federal government, regional transmission operators, and the ability of one or a few states to veto an interstate expansion to balance regional and local interests;
- policies to assess impacts on host communities and engage impacted communities in the siting process and decisions on compensation;
- development of a national reforestation goal by 2050, supported by various incentive policies and federal acquisition of private lands for reforestation where feasible and effective;
- policies to increase the storage of carbon in agricultural soils built around incentives, conditional subsidies, monitoring, and reporting;
- transformation to next-generation biofuels through increased research, design, development and deployment funding, a new low-carbon fuel standard, and new federal procurement standards;
- promoting dietary shifts to foster healthier diets produced by a food system with lower GHG emissions; and
- policies to reduce food loss and waste.

In addition to the specific recommendations detailed above, there are three overarching policy recommendations that span the many issues that arise with respect to decarbonization of the U.S. economy and the role of U.S. lands.

1. *ARPA-Land:* The Advanced Research Projects Agency (ARPA) labs have proven to be invaluable assets to U.S. leadership in scientific discovery and the development of cutting-edge technologies. Given the range of technical challenges the U.S. faces with regard to the role of its land in economy-wide decarbonization, the U.S. government should create an ARPA lab with a singular focus on land-based activities. Specifically, ARPA-Land should have the following funding priorities:

    a. Monitoring technologies and tools to measure soil carbon sequestration from short- (days) to long-term (decades) over small- (fields) to large-scale (continents) areas. Given the importance of soil carbon sequestration in the overall carbon budget, improvements in measurement and monitoring technologies will be critical.

    b. Next-generation biofuels that can achieve the low-carbon fuel goals outlined in this report, particularly biofuels made from non-food (cellulosic and algae-based) resources.

    c. Next-generation, low carbon intensity animal protein substitutes that can be made widespread at low-cost.

    d. Technologies for reducing food loss and waste, including innovations in food packaging, storage, and transport.

    e. Renewable energy technologies that minimally impact agricultural production when integrated with agricultural lands

2. *New inter-agency task force on land:* Inter-agency task forces have been established to address a variety of issues throughout U.S. history that require coordination of activities

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and regulatory approaches of multiple departments and agencies, ranging from human trafficking to climate change. At the start of the next presidential term, the administration should create a new inter-agency task force on land to coordinate the multiple issues relevant to U.S. lands in the context of deep decarbonization. Renewable infrastructure siting, increased soil carbon sequestration, biofuel production, reforestation, and shifting away from animal agriculture all have positive and negative (and likely competing) implications for land use change and land-based activities, and authority over each of these activities is spread across several areas of the U.S. government, including the Department of Defense, Department of Energy, Department of the Interior, Department of Agriculture, and the Environmental Protection Agency. To minimize competition for land, whether it be for food, fiber, or energy, it is critical that federal departments and agencies coordinate and align their priorities to manage trade-offs and maximize synergies in land use decisions. Moreover, such a task force should coordinate with relevant states, as state governments also have significant authority over land use decisions.

3. *Integrated Spatial Planning:* The U.S. needs to invest in developing targets and long-term pathways towards sustainable land use and food systems that consider agronomy, nutrition, ecology, hydrology, climatology, economics, infrastructure engineering, the social sciences, and of course local politics. To our knowledge, the federal and state governments lack both long-term targets to achieve sustainable food and land use systems as well as pathways (i.e., sets of policies, management strategies, and programs) to achieve those targets. An important first step is to support the development of analytical tools to understand the complex synergies and trade-offs across these areas and to determine which short-term measures must be undertaken in order to achieve long-term objectives. Just as it is impossible to design and implement economic policies without sound macroeconomic models, the U.S. will not be able to make its land use and food systems sustainable without robust tools to model the integrated impacts of policies.

Outcomes

Taken together, these policy recommendations would mark a transformative step forward in ensuring a meaningful, positive contribution of the land use sector—in all its forms—to deep decarbonization in the U.S. Moreover, the many links between land use and other environmental crises—from air and water pollution to biodiversity loss—means that ambitious action in this sector will enable the U.S. and the world to improve multiple elements of human and ecosystem wellbeing.

References

1. "A Primer on Land Use in the United States". 2017. USDA ERS. https://www.ers.usda.gov/amber-waves/2017/december/a-primer-on-land-use-in-the-united-states/#:~:text=The%20U.S.%20land%20area%20totals,forestland%20has%20decreased%20more%20rapidly.

2. Sources Of Greenhouse Gas Emissions | US EPA". 2020. US EPA. https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions.

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