



Primer for Counties:

Renewable Energy in Farm Country

About the National Association of Counties

The National Association of Counties (NACo) strengthens America's counties, serving nearly 40,000 county elected officials and 3.6million county employees. Founded in 1935, NACo unites county officials to:

- Advocate county priorities in federal policymaking
- Promote exemplary county policies and practice
- Nurture leadership skills and expand knowledge network
- Optimize county and taxpayer resources and cost savings, and
- Enrich the public understanding of county government.

NACo's Mission

Strengthen America's Counties.

NACo's Vision

Healthy, safe and vibrant counties across America.

Acknowledgments

This report draws on research and analysis from members of NACo's government affairs team. This report was written and compiled by Owen Hart, Charlotte Mitchell Duyshart, Joe Jackson and Rachel Yeung.

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Executive Summary

Over 75 million acres of U.S. farmland have been lost since 1997. Accelerating urbanization, increasing housing demands, and changing agricultural economics contribute to this troubling trend. Increasingly, county officials are now facing a new crossroads: how to navigate the growth of renewable energy development without sacrificing prime agricultural lands. This primer explores how county officials are approaching this complex landscape.

Key Findings

- 1. Rapid Growth in Renewable Energy:** The U.S. renewable energy sector is expanding rapidly, driven by technological advancements, public investment and surging electricity demand, particularly from high-intensity industrial uses like data centers. Solar energy is projected to account for nearly three-quarters of renewable electricity generation growth by the end of 2025.
- 2. Farmland at Risk:** The U.S. has lost nearly one-tenth of the nation's total farmland since 1997, equivalent to the farmland in Iowa and Indiana combined. Utility-scale renewable energy development, particularly solar, represents a growing contributor to farmland conversion.
- 3. Counties at a Crossroads:** County officials face unique challenges in balancing renewable energy projects with farmland preservation, including competing land uses, rights of property owners, broader community economic benefits (including local tax revenues), environmental impacts and complex regulatory landscapes.

Policy Recommendations

- 1. Empower Local Renewable Energy Siting:** Allow county governments to guide renewable energy development toward preferred locations, such as on existing structures, brownfield sites and marginal agricultural land, while incentivizing practices that protect prime farmland, maintain agricultural productivity and safeguard soil health.
- 2. Protect Local Authority and Consultation:** Preserve the ability of counties to shape renewable energy siting and permitting in ways that reflect local values and decision making, without federal and state preemption. Encourage project leads to consult with county governments throughout the lifecycle of renewable energy projects to ensure alignment with local priorities and greater opportunities for success.
- 3. Invest in Research and Best Practices:** Advance research into innovative renewable energy siting approaches and compatible land uses, such as agrivoltaics, to optimize both energy production and agricultural benefits.
- 4. Establish Environmental Safeguards:** Ensure project developers adhere to standards that protect soil health, preserve water rights and minimize long-term environmental impacts beyond the lifecycle of renewable energy projects.

Introduction

American farmland is foundational to the nation's economy, food security, environmental stewardship and rural vitality. For county officials, farmland loss is a growing national concern, with implications that stretch beyond the farm gate. Since 1997, the U.S. has lost more than 75 million acres of farmland to development, a trend driven by a surge of competing land use demands, including housing development, energy, and commercial and industrial growth, most recently from data centers.

As our use and reliance on new technologies – and subsequently energy demand – has grown, large-scale renewable energy development has emerged as a rapidly growing driver of farmland loss. While these technologies hold promise for local economic development, community resilience and producers looking to diversify their income, it also raises urgent questions about the future of agricultural communities.

With authority over zoning, permitting and land use in many states, county leaders are charged with balancing long-term

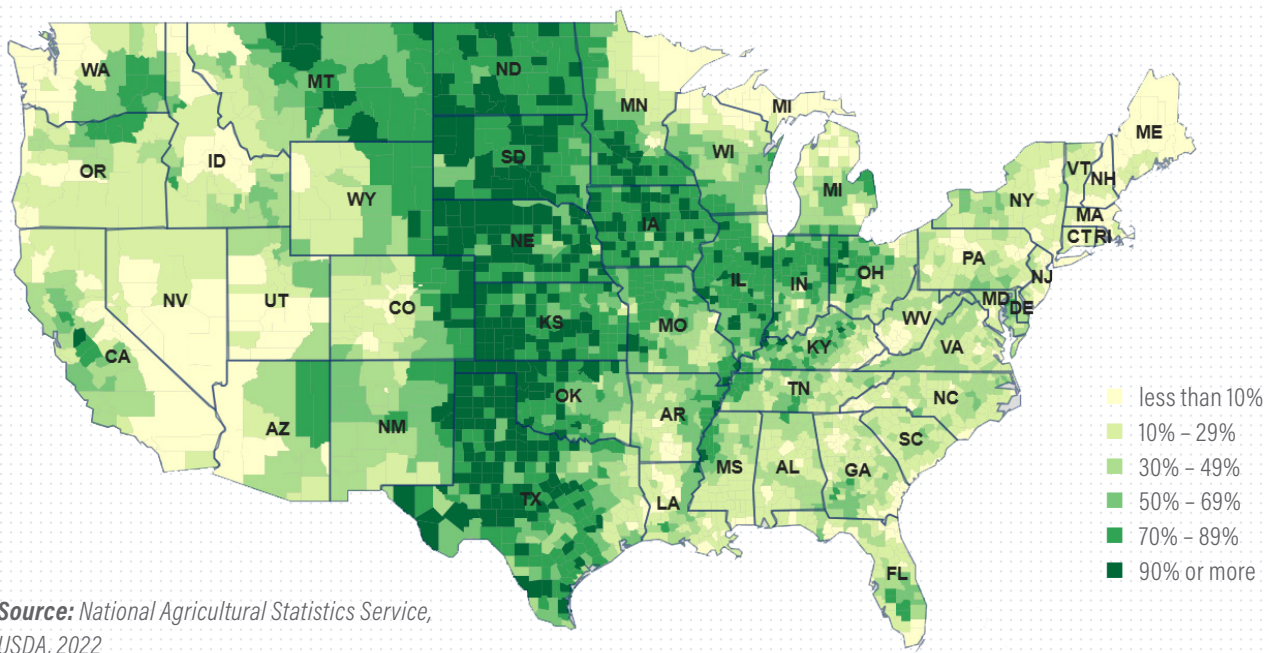
community needs with individual property rights. These decisions unfold within a complex web of federal, state, local and tribal policies, making land use one of the most layered and contentious policy arenas in county government.

The recent shift in federal focus toward securing U.S. energy dominance through expanded domestic energy production has further underscored the urgency for counties to develop balanced, locally driven strategies for energy development. Counties believe that local, state and federal policy must guide energy development in ways that support economic opportunity and energy resilience while protecting agricultural viability.

As frontline decision-makers, county governments are facing the challenge of shaping how energy and agriculture can coexist. With thoughtful planning, comprehensive engagement and adaptive policy tools, county officials can ensure renewable energy development strengthens, rather than supplants, the agricultural foundation of America.

FIGURE 1: PERCENT OF COUNTY LAND USED FOR FARMING, 2022

Data does not include information for Alaska and Hawaii.



Source: National Agricultural Statistics Service, USDA, 2022

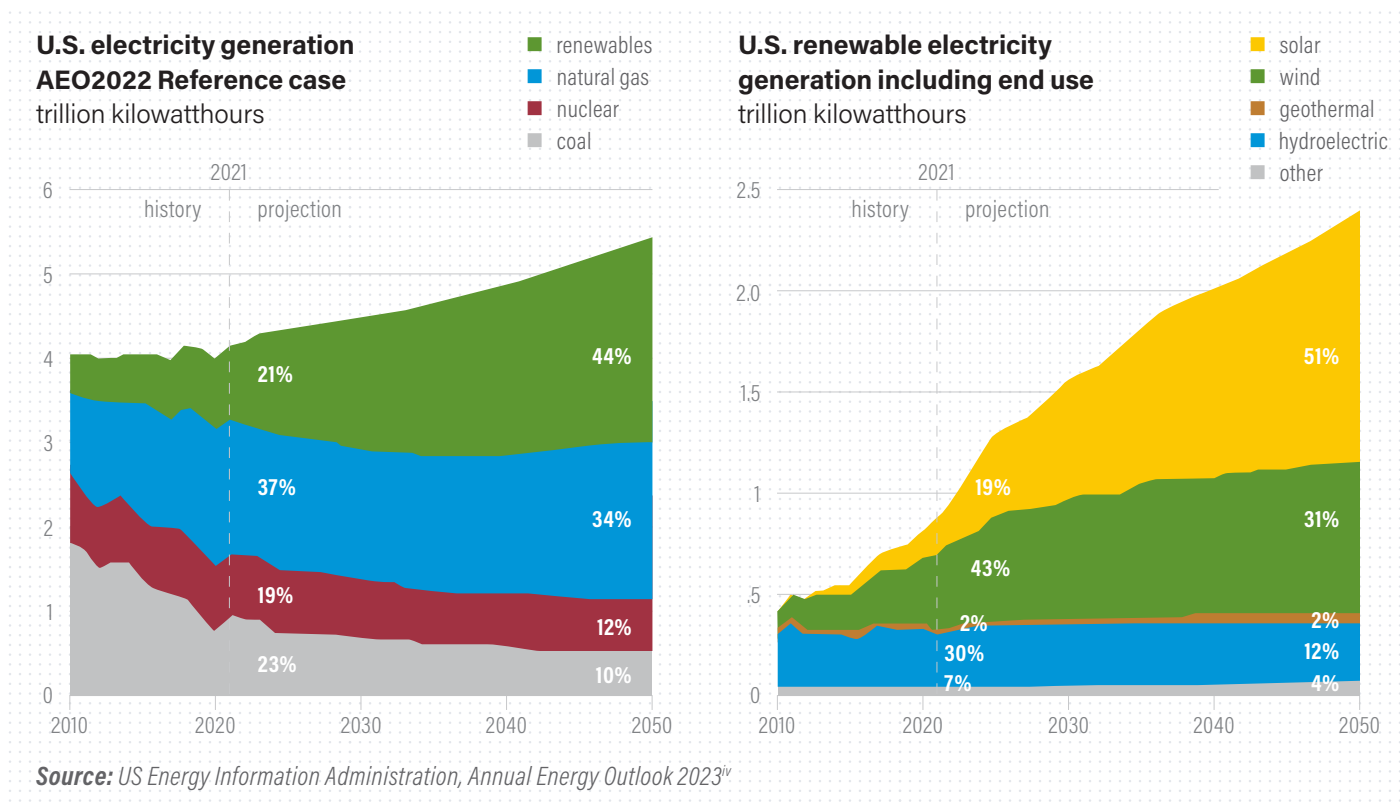
Background

Renewable Energy Trends

The U.S. renewable energy sector is expanding rapidly with 8 percent annual growth in 2024 and a projected 9 percent annual growth in 2025.ⁱ This surge is driven by historic federal investments exceeding \$100 billion in 2024, largely through the Bipartisan Infrastructure Law, which has funded over 66,000 projects since 2021. Solar and wind power production continues to increase,

generating enough electricity in 2023 to power more than 61 million homes.ⁱⁱ Private investment has also bolstered the sector, reflecting the growing market power of renewable energy. As coal consumption in the U.S. fell by 20 percent in 2023, the renewable energy sector added 149,000 jobs, a growth rate more than twice the rate of the broader economy.ⁱⁱⁱ

FIGURE 2: PROJECTED U.S. ELECTRICITY GENERATION BY SOURCE



Wind power has been a historically dominant force in renewable energy, contributing 10 percent of U.S. electricity generation in 2023 compared to 5.6 percent from solar.^{iv} However, recent advancements in solar energy technology and supply chains have accelerated growth in solar production, with most utility installations occurring after 2016. This rapid expansion positions solar energy as the fastest-growing segment of the renewable

energy sector, projected to account for nearly three-quarters of the growth in renewable electricity generation by 2025.^v These trends underscore the importance of ensuring that renewable energy development complements and supports other vital sectors, such as agriculture, which remain integral to rural communities and national resilience.

Spotlight on Solar Energy

Solar energy has traditionally flourished in the sunny Southwest, with states like Arizona, California, Nevada and Texas leading in deployment due to abundant solar resources and supportive policies.

In recent years, however, solar projects have expanded into new regions, including farmland in the Midwest and Mid-Atlantic states. Declining costs, federal incentives and investments, advancements in photovoltaic technology and improvements in domestic supply chains have made solar installations more viable even in areas with less intense sunlight. For many farmers, leasing land for solar projects offers a stable income source amid fluctuating agricultural markets.

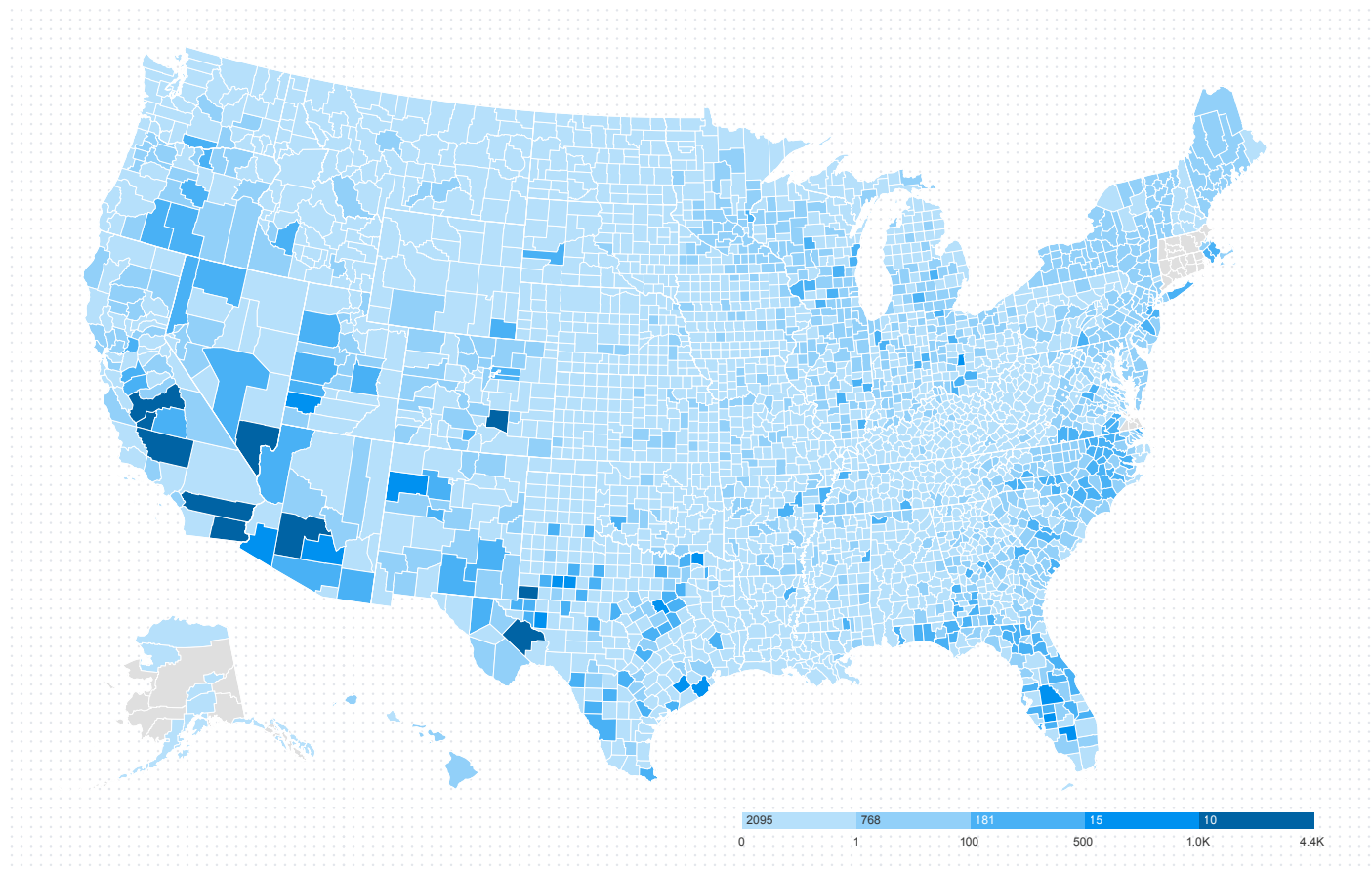
A significant driver of this expansion is the surging energy demand from data centers and other high-energy-consuming industries. Virginia, for instance, hosts the world's largest concentration of data centers, with Northern Virginia's "Data Center Alley" handling a substantial portion of global internet traffic. This concentration has led to a sharp increase in electricity demand, prompting utilities and developers to invest in solar energy projects in adjacent rural areas to meet the growing need for affordable energy.

*Scan to find
solar energy
data for your
county*



SOLAR ENERGY PRODUCTION

2024 Installed Capacity in MW



Source: U.S. Energy Information Administration (EIA), U.S. Energy Atlas – All Energy Infrastructure and Resources.^{vi}



Spotlight on Wind Energy

Wind energy production in the United States has consistently thrived in regions with strong and steady wind resources. The Plains, Midwest and West have emerged as key areas for wind development, with California, Iowa, Kansas, Oklahoma and Texas standing out as top producers. These states have combined natural wind potential with supportive state policies to spur robust growth.^{vii}

The sector’s expansion has been further supported by technological advancements, particularly in turbine efficiency. New turbines are larger and more productive, and older wind farms are being repowered with these

more efficient models. Supply chain improvements have also played a role, enabling more cost-effective and reliable deployment.^{viii}

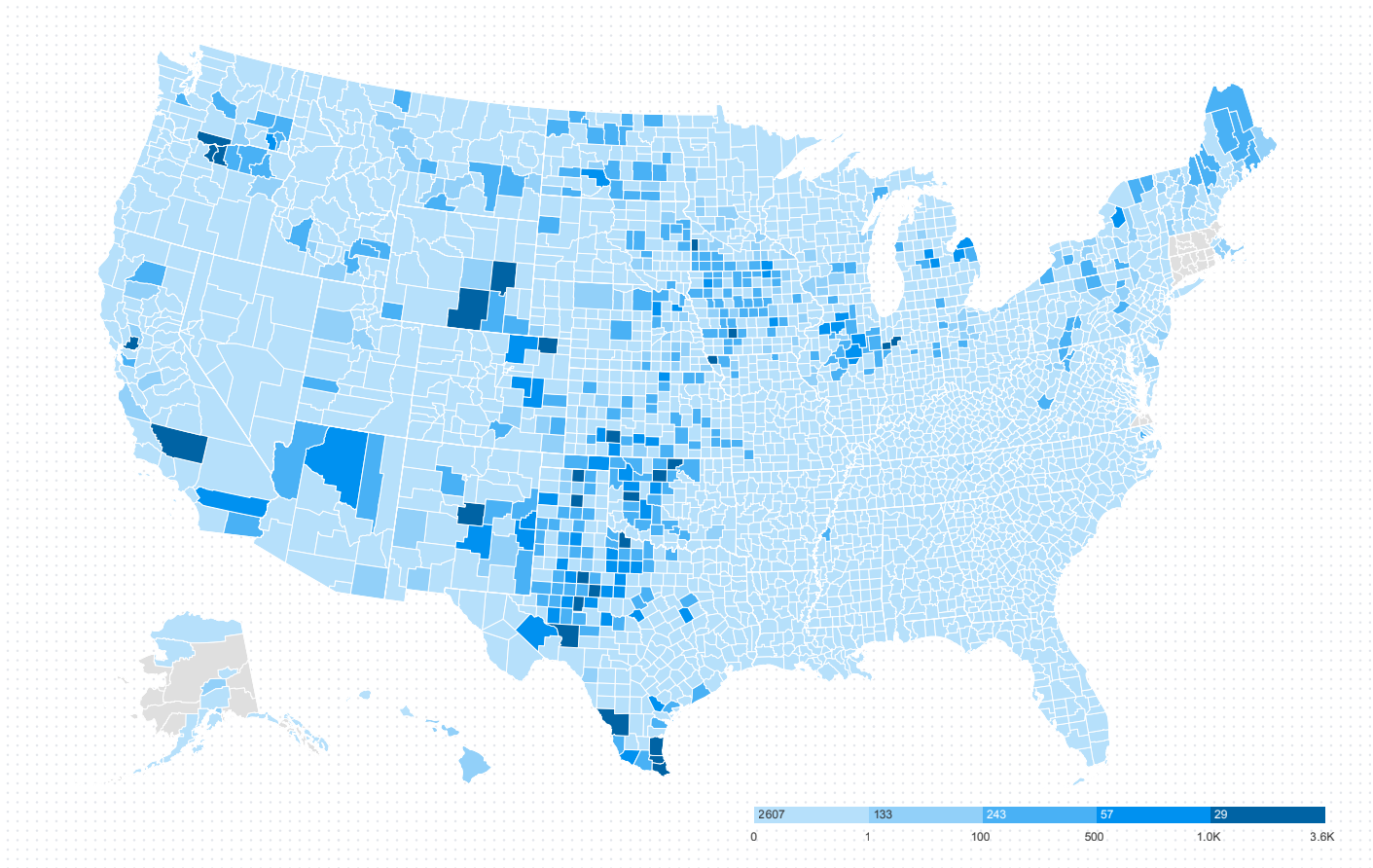
As interest in renewable energy grows, developers and utilities are increasingly turning to hybrid energy systems, such as combining wind with solar or battery storage on the same site, to enhance reliability and grid stability. These innovations, along with improved turbine technology, are enabling wind energy development to expand beyond its traditional strongholds and into new regions.^{ix}

Scan to find
wind energy
data for your
county



WIND ENERGY PRODUCTION

2024 Installed Capacity in MW



Source: U.S. Energy Information Administration (EIA), U.S. Energy Atlas – All Energy Infrastructure and Resources.

Surveying Farmland Loss

The United States has faced significant farmland loss over the past few decades due to competing land uses, including housing development, shifting agricultural policies, and renewable energy development. From 1997 to 2022, the U.S. lost over 75 million acres of farmland—a decline of 8 percent over that period.^{vi} Between 2001 and 2016 alone, the U.S. lost an average of 2,000 acres of working farmland a day to shifting land uses.^{vii} As population growth has led to increased housing and energy demand, experts project that farmland loss will further escalate.

While urbanization is the leading cause of farmland loss, renewable energy deployment represents a growing driver of agricultural land conversion. Many farmers are interested in siting renewable energy projects on their land as a way to diversify income streams, hedge against commodity price volatility and maintain ownership of agricultural property amid rising input costs and land values. From 2012 to 2020, more than 90 percent of utility-scale wind farms and 70 percent of utility-scale solar farms in rural areas were

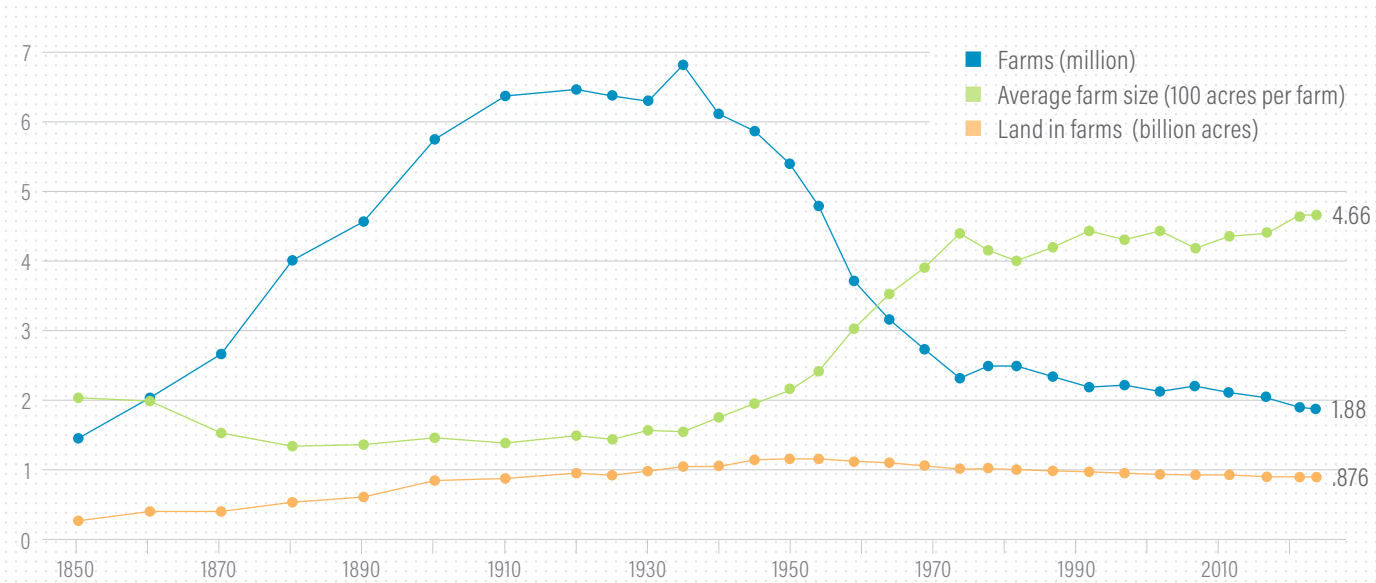
installed on agricultural land.^{viii} Although the total area impacted—424,000 acres—is relatively small, the localized impact on rural communities and agricultural production can be significant.^{ix}

Due to their substantial footprint and increasing rate of development, utility-scale solar projects in particular have sparked concerns about the risk posed by renewable energy development to farmland. Approximately 2.5 million acres across the contiguous United States are expected to be developed for utility-scale solar installations by 2040.^x Without intervention, an estimated 83 percent of these new solar projects are anticipated to be situated on working farmland, with nearly 50 percent on land classified as prime farmland.^{xi}

Thoughtful siting of solar projects is essential to avoid displacing high-quality farmland and exacerbating existing land use pressures. Innovative approaches, such as agrivoltaics, where solar installations coexist with agricultural activities, offer a promising pathway to balance renewable energy development with farmland preservation.

FIGURE 3: FARMS, LAND IN FARMS AND AVERAGE ACRES PER FARM, 1850 - 2024

Million farms, billion acres, or 100 acres per farm



Source: USDA, Economic Research Service using data from USDA, National Agricultural Statistics Service, *Censuses of Agriculture (through 2022)* and *Farms and Land in Farms: 2024 Summary (February 2025)*.

The Federal Role in Renewable Energy and Agricultural Preservation

The federal government plays a critical role in developing renewable energy while balancing agricultural preservation through funding, policy incentives and technical assistance. Several programs target rural areas and farmers to support the energy transition and sustainable land management.

Key federal renewable energy programs:

- **Empowering Rural America (New ERA)**
Program: Administered by the U.S. Department of Agriculture, this program offers loans and grants to rural electric cooperatives to develop renewable energy and carbon capture projects, supporting energy transition in rural areas.
- **Rural Energy for America Program (REAP):**
Administered by the U.S. Department of Agriculture, REAP provides grants and loans to help agricultural producers and rural small businesses install renewable energy systems and energy efficiency improvements. REAP helps farmers install solar panels, wind turbines and anaerobic digesters, reducing energy costs and environmental impacts.
- **Energy Efficiency and Renewable Energy (EERE) Grants:** The U.S. Department of Energy's EERE office offers funding to support innovative renewable energy technologies in rural and agricultural settings, including advanced biofuels, biomass and geothermal systems.
- **Inflation Reduction Act (IRA) Renewable Energy Incentives:** The IRA offers tax credits and grants for renewable energy projects, prioritizing rural and disadvantaged communities to lower costs for adopting solar, wind and battery storage systems for farmers and rural businesses.

Key federal agriculture preservation programs:

- **Conservation Reserve Program (CRP):** CRP incentivizes farmers to convert environmentally sensitive agricultural land to conservation-friendly use, including solar installations on marginal lands, while traditionally focusing on erosion control and habitat preservation.
- **Agricultural Conservation Easement Program (ACEP):** ACEP helps protect agricultural land from development pressures through easements that preserve working farms and critical habitat area, allowing some renewable energy projects, such as wind turbines, that do not compromise the agricultural value of the land.
- **Environmental Quality Incentives Program (EQIP):** EQIP provides financial and technical assistance to improve agricultural operations' sustainability, including funding for renewable energy initiatives like methane capture systems on livestock farms, aligning conservation practices with renewable energy generation.

Our solar farms are the largest taxpayers in Beaverhead County. While we appreciate the role of this new industry in promoting our natural resources, we also recognize that solar is heavily subsidized with state and federal dollars and we do not believe solar subsidies should be prioritized over other critical industries."

BEAVERHEAD COUNTY, MONTANA

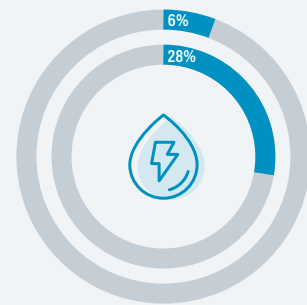
Renewable Energy and Public Lands

Many counties across the United States have federal land within their jurisdictions and are partially responsible for services such as law enforcement, waste management and search and rescue on these public lands. Federal land offers significant opportunities for renewable energy development, but this development poses unique challenges for affected counties. Federal lands are often leased for energy projects through a competitive bidding process, with the federal government then collecting royalties and monthly payments from bid winners. Key laws governing these activities include the Federal Land Policy Management Act (FLPMA), the National Environmental Policy Act (NEPA) and the Endangered Species Act (ESA).

Despite these energy developments being located within their jurisdictions, counties typically have limited influence over their development but must still manage their impacts. For example, energy leases—whether for oil, gas, geothermal or renewables—can disrupt tourism, reduce grazing land availability or alter other land uses. Renewable energy development on federal lands can displace or fragment grazing allotments, directly affecting ranchers who depend on predictable access to public rangeland to sustain their operations and maintain economic viability. Federal lands serve multiple purposes, including tourism, forestry, watershed management, grazing and energy production, making land-use decisions complex and multifaceted.

DID YOU KNOW?

In 2022, hydropower accounted for **over 6 percent** of total utility-scale electricity generated in the U.S., and **over 28 percent** of total electricity generated by renewable resources.^{xvi}



Currently, counties receive 25 percent of revenue from oil, gas, coal and other traditional forms of energy production on federal lands. However, no comparable revenue-sharing framework exists for renewable energy projects, leaving counties without a critical source of funding to address the impacts of these developments. Legislative efforts like the *Public Lands Renewable Energy Development Act of 2023* (H.R. 178) seek to address this gap by establishing a 25 percent revenue-sharing structure for counties hosting renewable energy projects on federal lands. Such measures would ensure that counties benefit equitably from energy development while managing its local impacts. Counties support similar revenue sharing provisions put forward in reconciliation packages in the 119th Congress.

A 2025 study conducted by the Departments of Energy, Interior, Agriculture and Defense found that between 51 and 84 gigawatts of renewable energy could be sited on federal lands while balancing the multiple use mandate.^{xvii} Furthermore, 4 percent of renewable energy facilities currently in operation are located on federal lands. The study also finds that 12.5 percent of projected 2035 renewable energy capacity could be sited on federal lands, a number in line with the 12 percent of oil production and 11 percent of natural gas production on federal lands.^{xviii} Data like this underscores the opportunity the utilization of federal lands provides and the need for balanced revenue sharing programs for renewable energy projects on federal land.



The County Role

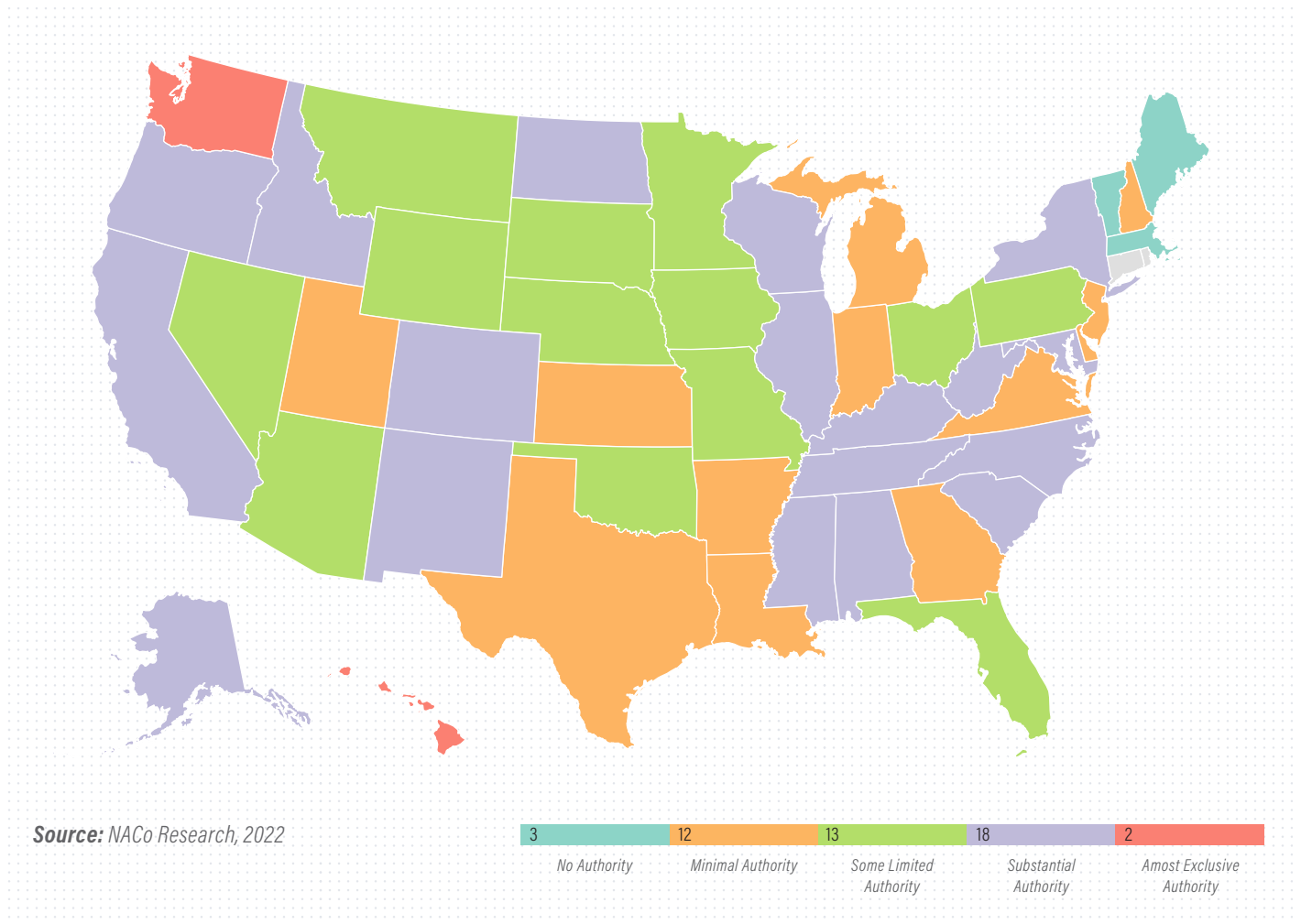
County Leadership in Land Use and Permitting

Land use planning is crucial for counties' social and economic stability, impacting development, resource protection, energy conservation, community services and overall quality of life. Counties must balance competing priorities when making land use planning decisions, including the need to increase economic development opportunities, generate tax revenue, protect private property rights, deliver essential public services and

ensure public safety, all while safeguarding natural resources and promoting agricultural vitality.

While land use decisions should be made locally, coordinating with state and federal governments ensures county perspectives are considered throughout the life of a project that requires a federal or state permit. Federal and state land use planning and management actions should be consistent with local land use policies.

FIGURE 4: COUNTY LAND USE AUTHORITY BY STATE



The County Role in Agricultural Preservation

Counties are on the front lines of local agricultural preservation efforts, using authority over land use planning, zoning and resource management to protect farmland for future generations. County policymaking plays a crucial role in balancing growth pressures with the need to maintain a strong agricultural base, support rural economies and preserve open space. Counties utilize a range of tools to safeguard agricultural land while accommodating renewable energy development:

- **Zoning and Agricultural Districts:** Zoning ordinances help establish agricultural districts that limit non-agricultural development and protect contiguous farmland.
- **Conservation Easements:** These voluntary agreements restrict non-agricultural development while allowing farming activities to continue.

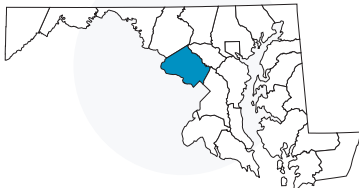
Counties can leverage funding from programs like the Agricultural Conservation Easement Program (ACEP) to support these efforts.

- **Incentive Programs:** Counties provide financial incentives, such as tax breaks and Transfer of Development Rights programs, to encourage landowners to maintain farmland and discourage conversion to other uses.

Counties also play an active role in promoting land use practices that allow for dual-use scenarios, such as agrivoltaics, where solar installations coexist with agricultural activities. By embracing innovative strategies and fostering collaboration among farmers, stakeholders and policymakers, counties can integrate renewable energy development into agricultural landscapes without compromising food security or farmland viability.

County Solutions Spotlight: Balancing Farmland Preservation with Renewable Energy

MONTGOMERY COUNTY, MARYLAND

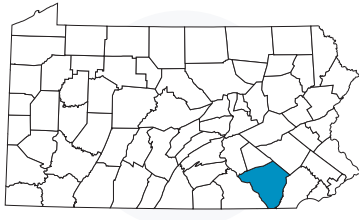


Montgomery County's Agricultural Reserve protects nearly 93,000 acres of farmland and open space in one of the nation's most urbanized regions. In 2021, the county amended its zoning ordinance to allow small-scale community solar projects within the Reserve, limiting each project to 2 MW and requiring dual-use practices that maintain agricultural production, such as grazing livestock under solar panels. Energy projects are strictly barred from prime soils, ensuring that solar development supports rather than supplants agricultural activity.

DANE COUNTY, WISCONSIN



Dane County integrated renewable energy development into its comprehensive Farmland Preservation Plan, updating zoning and land use policies to ensure solar and wind projects complement existing agricultural activity. County guidelines encourage dual-use approaches like agrivoltaics that combine energy generation with active farming. Decommissioning plans are mandated to restore sites to agricultural use after project lifespans end, reinforcing the county's commitment to maintaining long-term soil health and quality.



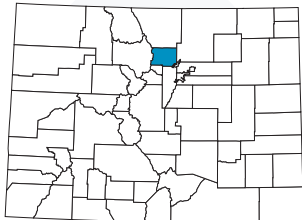
LANCASTER COUNTY, PENNSYLVANIA

Lancaster County, renowned for its longstanding farmland preservation program with over 100,000 acres protected, allows renewable energy installations as accessory uses on preserved agricultural land. The Agricultural Preserve Board's policies require that renewable energy facilities remain secondary to farming and occupy no more than 2 percent of a farm's total acreage on the preserve. Energy structures must be sited within existing farmstead areas to minimize disruption of farmland and maintain the county's agricultural landscape.



OGLE COUNTY, ILLINOIS

Ogle County applies a Land Evaluation and Site Assessment (LESA) system to prioritize farmland protection while permitting solar energy development on less productive soils. When a proposed 5 MW solar project in 2024 targeted land with an excellent LESA score, the county board required a revised plan that reduced the project's size and relocated it to more marginal land. The county also mandated native vegetation planting beneath panels to conserve soil and reduce erosion. Ogle's case exemplifies local zoning that permits renewables but only under conditions that uphold farmland integrity.



BOULDER COUNTY, COLORADO

Boulder County's zoning code allows small community solar projects in agricultural zones but imposes strict size and siting requirements to maintain agricultural uses. Solar installations may cover no more than 7 acres on small farms and 14 acres on larger farms, with developers required to submit detailed soil and agricultural management plans. These plans must show how projects will coexist with existing and future farming practices, including grazing or planting pollinator habitats, ensuring that solar development remains consistent with the county's agricultural preservation goals.



YOLO COUNTY, CALIFORNIA

Yolo County's Agricultural Conservation and Mitigation Program requires developers converting farmland to non-agricultural uses, like renewable energy projects, to permanently protect an equivalent area of farmland elsewhere through conservation easements. The program also steers large-scale solar projects to lower-quality or marginal lands, preserving prime farmland for agricultural production. The county's approach has become a model for integrating renewable energy development without sacrificing high-value agricultural resources.

Tracking Key Concerns with Renewable Energy Development in Rural Communities

While renewable energy projects offer significant opportunities for rural communities, they also may face local opposition. Addressing these concerns is essential to ensure renewable energy development benefits rural communities while minimizing negative impacts.^{xix xx} Local opposition to renewable energy projects among both residents and county leaders can be grouped into the following key areas:

- **Public Participation and Procedural**

Concerns: Opposition often arises from a perception that the siting and decision-making processes fail to adequately involve community stakeholders. A lack of early and meaningful engagement creates distrust and alienation, emphasizing the need for transparent and frequent communication between developers, county governments and local residents.

- **Equitable Economic Benefits:** Many communities express concerns that the economic benefits of renewable energy projects, such as jobs, tax revenues and energy cost savings, are not equitably distributed. This includes fears that local communities bear the costs while receiving minimal benefits from energy projects.

- **Property Rights and Aesthetic Concerns:** Residents often oppose projects due to fears about declines in property values, restrictions on land use and visual impacts on the landscape. These concerns are particularly strong in tourism-reliant communities. Transparent communication and fair compensation mechanisms are critical for addressing these issues effectively.

- **Safety and Emergency Preparedness:** County officials and residents have voiced concerns about safety risks tied to certain renewable energy technologies, especially battery storage systems and large-scale solar PV installations. Key issues include fire hazards, hazardous material leaks and limited emergency response capacity in rural areas. Addressing these

concerns requires clear safety standards, risk mitigation plans and coordination with local emergency services.

- **Environmental and Decommissioning**

Impacts: Opposition is frequently rooted in fears about harm to wildlife, soil health and water resources. Community members are also concerned with the long-term stewardship of project sites, underscoring the importance of robust decommissioning plans and funding mechanisms to ensure land is responsibly restored after project lifespans.

- **Infrastructure and Regulatory Challenges:**

Renewable energy projects can strain local infrastructure, such as roads and utilities, and require counties to navigate complex regulatory processes. Without clear guidelines and technical assistance, counties face significant challenges in managing these developments effectively.

In Arizona, if we deny a project, developers can sue for damages. If we approve a project, residents can sue for diminished property values. We're trying to figure out how to reduce our liability exposure while following zoning processes."

NAVAJO COUNTY, ARIZONA



The County Playbook

Counties are uniquely positioned to lead the way in harmonizing renewable energy growth with farmland preservation. To ensure that renewable energy development supports sustainable and equitable outcomes for all communities, counties support the following policy priorities:

Federal Priorities for Balancing Farmland Preservation and Responsible Renewable Energy Development

Empower Local Renewable Energy Siting



Allow county governments to guide renewable energy development toward preferred locations, such as on existing structures, brownfield sites and marginal agricultural land, while incentivizing practices that protect prime farmland, maintain agricultural productivity and safeguard soil health.

Protect Local Authority and Consultation



Preserve county authority over renewable energy siting and permitting by opposing state and federal preemption of local land use decisions. Encourage partners to consult with county governments throughout the lifecycle of renewable energy projects to ensure alignment with local priorities.

Invest in Research and Best Practices



Advance research into innovative renewable energy siting approaches and compatible land uses, such as agrivoltaics, to optimize both energy production and agricultural benefits.

Establish Environmental Safeguards



Require project developers to adhere to standards that protect soil health, preserve water rights and minimize long-term environmental impacts beyond the lifecycle of renewable energy projects.

Endnotes

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- ^{xiii} Ibid.
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