American Farmland Trust

Advancing Smart Solar in the Next Farm Bill

As the popularity of renewable energy sources grows, our nation's electric power sector will change dramatically to a more distributed and decarbonized energy network. Driving this change are markets, where solar and other forms of renewable energy are now cost-competitive, as well as ambitious local, state, and federal policy goals to address climate change by dramatically reducing greenhouse gas (GHG) emissions. Achieving these essential goals will require substantial increases in renewable energy and primarily solar, which, according to a 2021 U.S. Department of Energy (DOE) study, may rise from 4% of our nation's total energy production today to 45% by 2050. With dramatically increased funding for solar in the Inflation Reduction Act (IRA), this pace should accelerate quickly.

This energy transition is expected to have significant impacts on the rural landscape. According to the same DOE study, increasing solar generation to 45% could require nearly 7.4 million acres by 2040 and 10.4 million acres by 2050, with approximately 90% expected to occur in rural communities. Further studies reveal that without intervention most solar development will take place on farmland. **Modeling done by American Farmland Trust (AFT), through the *Farms Under Threat: 2040* analysis, projects that 83% of new solar built by 2040 could be sited on agricultural lands, with almost half located on our most productive land for producing food and crops**. This is corroborated by a 2021 Cornell University study which found 82 to 85% of land suitable for solar to meet New York's ambitious climate goals is farmland. The federal government, along with state and local governments, all have an important role to play in minimizing this conversion by incentivizing solar development on marginal land and the built environment as well as encouraging renewable energy infrastructure development away from productive agricultural land. Conversion of some agricultural land, however, is inevitable and already occurring, and must be accompanied by efforts to minimize the impact on farm viability and maximize the benefits to farm communities.

> Solar developers often select high-quality farmland since it is more likely to be flat, dry, clear, and close to existing infrastructure to interconnect to the grid—thus making it less costly to develop.

SOLAR OPPORTUNITIES AND THREATS IN FARM COMMUNITIES

> America needs both renewable energy and productive, resilient farms and ranches.

AFT supports decarbonization targets, agreeing with scientists that society must drastically reduce emissions to slow climate change and minimize impacts from droughts, floods, and extreme heat—which are already affecting farmers and ranchers.[1] But the growth of solar development will reshape many rural landscapes and farm economies. For example, displacing farming from productive land could put more marginal farmland in production, leading to decreased productivity, farm viability, and food security, as well as increased environmental impact. **Ultimately, whether this solar buildout is an opportunity or threat to farm viability and rural vitality depends on the choices we make today.**

[1] A recent AFT report entitled *"Building Climate Resilience with State and Federal Farm Policy"* shares stories of extreme weather impacts currently experienced by farmers and ranchers.

Solar energy leases can generate new streams of income for farmland owners, helping to keep the farm viable. According to research AFT conducted in 2021 (and much reporting since), developers are often willing to pay over 10 times the amount that landowners can make renting the land to farmers, with many offering the security of long-term leases lasting on average 25–40 years. This can be a financial opportunity for landowners, but a source of competition – and even displacement – for farmer-renters and farmers looking to expand their operations.

Large-scale solar development in particular can threaten the future viability of local economies dependent on agricultural production. AFT's modeling reveals that, although solar development will be widely distributed across the country, projects will be concentrated in communities with favorable siting and interconnection opportunities. This is already playing out in farm communities across the country where large-scale solar projects are proposed that will take hundreds or thousands of acres of a community's farmland out of production at once. **Without strong policies, this concentrated conversion will strain the viability of the farms that remain by decreasing land availability, increasing land prices, and reducing the viability of farm support services.**

These issues are threatening the timely and successful achievement of U.S. climate goals. In a recent study analyzing why proposed utility-scale renewable energy projects were delayed or stopped entirely between 2008 and 2021, land concerns were the most frequent culprit, with concerns over 'non-monetary' impacts including land use changes from agriculture to industrial use arising in 82% of cases. Many localities are passing moratoria to provide time to study the impacts of this new land use, and to devise and develop policies governing permitting and siting in ways that will work for their communities. In reaction, some states are preempting local control either to advance this buildout, or – in other cases – to slow it down. **America needs both—renewable energy and productive, resilient farms and ranches. AFT's smart solar principles can help lead to a solution.**

AFT'S SMART SOLAR PRINCIPLES SEEK TO MAXIMIZE OPPORTUNITIES AND MINIMIZE THREATS

In 2018, AFT began its efforts to help communities accelerate solar development in ways that minimize agricultural land loss and strengthen farm viability, developing four principles to find balance in solar buildout. Smart solar projects meet three main goals: they accelerate renewable energy development, strengthen farm viability, and safeguard land for farming and ranching. AFT developed the following principles to guide policymakers, developers, and decisionmakers on how to create a smart solar buildout:

- **Prioritize solar siting on the built environment and land not well-suited for farming**. Emphasize solar development on rooftops, carports, irrigation ditches, brownfields, and marginal lands to help minimize the impacts of solar energy on our nation's best agricultural land and farm businesses.
- **Safeguard the ability for land to be used for agriculture**. If solar energy is developed on farmland or ranchland, policies and practices should protect future soil health and productivity, especially during construction and decommissioning, to ensure opportunities for farming in the future.
- **Expand agrivoltaics for agricultural production and solar energy.** Agriculture and solar energy can coexist if appropriate planning is undertaken. Agrivoltaic projects sustain production underneath and/or between rows of solar panels throughout the life of the project.

- **Promote equity and farm viability**. Stakeholders, including farmers and underserved communities, should be inclusively engaged to ensure widespread benefits and avoid negative impacts from solar energy development.

In short, smart solar means directing solar development to where it has the least negative impact on land well-suited for farming while protecting soil health, maintaining opportunities for farming, and ensuring equitable community benefits. Smart solar elevates agricultural considerations and aims to accelerate renewable energy development by addressing community concerns over solar project impacts.

RECOMMENDATIONS TO ADVANCE SMART SOLAR IN THE NEXT FARM BILL

USDA's stated mission is to "provide leadership on food, agriculture, natural resources, rural development, nutrition, and related issues based on public policy, the best available science, and effective management" and its vision is to "provide economic opportunity through innovation, helping rural America to thrive." **Given the expected scale of solar development in rural communities, USDA's mission and vision cannot be achieved without active engagement on the solar buildout, not only through its own programs and services, but also by providing guidance, resources, and information to farmers, state and local governments, and other federal agencies**.

Even though state and local governments and private actors lead in proposing and permitting solar projects, the federal government – and specifically USDA – has a critical role to play in strengthening farm viability and minimizing displacement of farming from productive land as solar development accelerates across the U.S. This can be done primarily through thoughtful IRA implementation and transmission planning; creating and compiling resources and guidance for state and local governments; investing in research; continuing to protect our most productive, versatile, and resilient farmland; and modeling best practices to advance smart solar through its own programs. Such actions can remove conflict and provide clarity for productive paths forward and the Farm Bill can help advance this critical work. **AFT recommends Congress take the following actions in the next Farm Bill to ensure USDA is best positioned to support a smart solar buildout.**

COORDINATE WORK TO ADVANCE SMART SOLAR BUILDOUT WITHIN USDA

Many USDA agencies have an important role to play in establishing the Department's leadership on smart solar. All of these efforts would benefit from greater internal coordination as well as active engagement with other federal agencies (e.g., DOE, EPA, DOI), especially on critical topics like transmission planning and IRA renewable energy funding and tax credit rollout. To accomplish this, AFT recommends that Congress direct USDA to:

1. Create a new "smart solar coordinator" position to coordinate the work between NIFA, ARS, NRCS, and Rural Development. This coordinator would also liaise with other federal agencies and state departments of agriculture to advance all four smart solar principles.

SUPPORT AGRIVOLTAIC FARMERS WITH USDA PROGRAMS AND SERVICES

A smart solar buildout requires empowered and engaged landowners and communities, strong science-based standards for construction and decommissioning, and innovative solutions. One element of this is advancing the growth of agrivoltaics, or solar projects that pair solar energy generation and agricultural production in an integrated manner on the same piece of land. USDA has a critical role to play in advancing this solution in a way that prioritizes farmer needs and farm viability. AFT recommends that Congress direct USDA to:

1. Assess and study the viability and scalability of agrivoltaic operations and create a 5-year plan to incorporate agrivoltaics throughout USDA programs (e.g., conservation[2], renewable energy[3]).
2. Create a definition, in coordination with farm and conservation groups and in consultation with DOE, for what qualifies as agrivoltaic within USDA programs. This definition should take regional variation into account and ensure a viable farm operation continues through the full life of the solar project.

ENABLE NRCS TO ADVANCE SMART SOLAR AND KEEP LAND IN PRODUCTION

Another essential element of a smart solar buildout is ensuring land put into solar will be available for agricultural use after, and ideally also during, the life of the solar project. However, land being put into solar becomes a major construction site for a period of time, and current construction standards (e.g., stripping topsoil) do not protect soils. State and local governments often do not have the technical expertise to recommend practices that will reduce soil erosion and compaction caused by solar development. However, NRCS technical experts are in an excellent position to support producers and developers in protecting soils, keeping land in production, and maintaining the ability of the land to be farmed in the future as the U.S. transitions to renewable energy. AFT encourages Congress to:

1. Direct NRCS to develop recommended best practices and minimum standards to protect the ability for the land to be farmed in the future, based on USDA-NRCS soil health principles, during construction, operation, and decommissioning. This will enable Rural Development and the Rural Utilities Service, state and local governments, permitting authorities, and developers to tap into this essential resource that can inform project award and planning, and permitting processes. This could also help guide developers and reduce community resistance and permitting delays.
2. Clarify that those providing conservation technical assistance with federal dollars (e.g., NRCS agents, Technical Service Providers, conservation districts) are able to assist grazers, crop producers, and other farmers and ranchers developing and working on agrivoltaic projects, as defined by USDA.[4]

PROTECT OUR MOST PRODUCTIVE, VERSATILE, AND RESILIENT FARMLAND

NRCS is also in a critical position to support producers in protecting their most productive, versatile, and resilient farmland. The Farmland Protection Policy Act (FPPA) was enacted in 1981 to minimize the impact of federal programs on the unnecessary and irreversible conversion of farmland to nonagricultural uses. Administered by NRCS, the FPPA requires federal agencies to consider the impact of their programs on farmland conversion, and to rate and track the potential impact of any project supported by federal funds that the agency determines will result in the permanent conversion of agricultural land to a nonagricultural use. It also seeks to ensure that federal programs are administered to be compatible with state, local, and private policies to protect farmland.

While, in theory, solar development may not be permanent, many factors would need to be in place for a viable farm to begin on that land 35 years or more into the future.[5] Therefore, alongside investing in permanent farm and ranch land protection through programs like the Agricultural Conservation Easement Program (ACEP), AFT recommends that Congress direct NRCS to consider non-agrivoltaic

[2] See Recommendation #2 in the "Enable NRCS to Advance Smart Solar And Keep Land In Production" section.
[3] See "Direct Rural Development to Model a Smart Solar Buildout" recommendations later in document.
[4] See USDA recommendation #2 in the "Support Agrivoltaic Farmers with USDA Programs and Services" section.
[5] For example, farmers with the knowledge and desire to farm it, initial protection of topsoil during construction and intentional restoration during decommissioning, continued market infrastructure, and farm support services.

(defined by USDA as recommended above) solar development permanent conversion as it concerns the FPPA, specifically:

1. Amend FPPA to define utility-scale ground-mounted solar arrays as conversion of agricultural land subject to the FPPA.
2. Require that federal agencies track *actual* conversion of agricultural land as a result of solar projects subject to the FPPA, as opposed to its present practice of tracking only *proposed* conversion.
3. Require that projects subject to the FPPA minimize their development footprint on the country's most productive, versatile, and resilient agricultural land to the maximum extent practicable.

These changes to the FPPA would not preclude solar development on agricultural land. Rather, they would result in a better understanding of the actual impact of federally-funded activities on agricultural land conversion, including conversion to solar development. They would also help to minimize the conversion of the country's most productive and irreplaceable agricultural land from all federally-funded activities, including solar development, where feasible to do so.

DIRECT RURAL DEVELOPMENT TO MODEL A SMART SOLAR BUILDOUT

The Rural Energy for American Program (REAP)[6] helps farmers, ranchers, and rural businesses increase energy efficiency and renewable energy generation by providing cost share and loan guarantees for these purposes. REAP is popular and widely supported and it has a strong track record of success. Since its inception, the program has helped over 22,000 farmers, ranchers, and rural small businesses to adopt clean energy, cut energy costs, and boost rural economic development.

A significant amount of REAP funding has supported solar projects (69%), including both cost share for rooftop solar as well as cost-share and loan guarantees for ground-mounted solar projects, which can be quite sizeable. For example, in 2022, REAP loan guarantees supported one project that was potentially over 800 acres in size. Historically, applications have greatly exceeded available funds, but recent IRA funding has significantly increased the amount of financial support available for the program. AFT recommends maintaining the IRA funding for REAP to increase support for farmers, ranchers, and rural businesses in reducing their costs and GHG emissions. Through its evaluation of REAP applications, USDA-Rural Development has a critical opportunity to model ways to support smart solar projects to state and local governments and permitting authorities (e.g., those that are proposed on a low percentage of prime farmland, prevent displacement of farmer-renters, have a plan in place to protect soil health, are agrivoltaic[7]). AFT encourages Congress to direct USDA to:

1. Require that NRCS-developed minimum standards, or the best available best practices to protect soils during construction/operation, are followed as a condition for receiving REAP funding for projects developed primarily to generate energy for off-farm use *or* for ground-mounted solar projects over 50 acres in size.
2. Gather information from REAP applicants, especially for projects developed primarily to generate energy for off-farm use and for ground-mounted solar projects over 50 acres in size, regarding:

[6] USDA also supports solar development through the Rural Utilities Services (RUS). Funding for these programs was significantly increased in the Inflation Reduction Act. The recommendations made here also apply to RUS.

[7] If a government agency offers an incentive for agrivoltaic projects, AFT recommends that agency be able to establish that the project can meet certain standards including that the farming activity continues throughout the full life of the project, and the farmer has been incorporated into the facility design and planning process.

- The percentage of soils in the facility area that are designated as USDA prime,
- Whether a farmer previously rented the land,[8]
- Whether the land was actively farmed at any point in the last 5-10 years,
- Whether the applicant has a plan in place to protect soil productivity and do soil health baseline testing, and
- Whether an agrivoltaic system, using the USDA-created definition, is planned.

AFT recommends that this information be used to incentivize or prioritize REAP awards for projects generating energy for off-farm use that are 'smart solar projects.'

3. Provide a financial incentive for agrivoltaic projects in applications for REAP funding.

INVEST IN RESEARCH TO ANSWER KEY QUESTIONS SLOWING ADVANCEMENT OF SMART SOLAR

Solar development is moving quickly, yet many questions remain about the impacts of solar on farm communities and soil health as well as how to optimize solar array design for a wider range of agrivoltaic applications. Investing in research to answer these questions, and reporting results back to Congress, is urgent to keep pace with developments in the field and achieve a smart solar buildout. AFT sees five major priority areas for federal research:

- Potential impact of solar on our most productive, versatile, and resilient farmland and ranchland;
- Best management practices for solar construction, operation, and decommissioning to protect and build soil health on farmland;
- Agrivoltaic applications that increase land use efficiency and sustain viable agricultural enterprises;
- Processes to ensure that solar development equitably builds farm viability; and
- Potential impact of solar development on farmland access and intergenerational transition—particularly for historically underserved producers.

AFT recommends that Congress direct the USDA Under Secretary for Research, Education, and Economics to coordinate and invest in research on the following topics, and report key findings to Congress and other stakeholders:

1. Which production systems in different climates will viably pair with solar generation for agrivoltaic projects. This research should address market access, supply chain, and economic proof of concept questions for different array designs and different farm products.
2. Impacts of large-scale solar on farmland conversion, farm viability, and land availability (especially for historically underserved producers) and how to mitigate them. This research could assist in informing policies like mitigation fees or conversion caps currently being discussed at the local and state level.
3. Costs, benefits, and potential for siting solar projects on marginal land and land designated for repurposing (e.g., PFAS contaminated land, water constrained land to be fallowed, CRP land).
4. Modeling solar development impacts on farmland for alternative future scenarios of solar buildout based upon DOE's Solar Futures Study, including projected acreage needed to meet 2050 decarbonization goals.
5. Analyzing the impact of energy infrastructure buildout (e.g., transmission, substations, storage) on future conversion of farmland, done in cooperation with other federal agencies.

[8] AFT recommends tracking this information to better understand the impact of solar on farmer-renters and inform future policy, rather than use it to reject projects or as a criteria for evaluation.

DIRECT USDA TO DEVELOP AND DISSEMINATE SMART SOLAR RESOURCES

Questions from landowners, state and local governments, and solar developers about how to decarbonize while strengthening farm viability and protecting soils and productivity are arising with little time to arrive at solutions. As a result, the solar buildout is accelerating without widespread buy-in and a shared understanding of how to ensure that it will contribute to, and not harm, farm viability and rural vitality. All of this is creating permitting slowdowns. USDA is in a strong position to be a trusted voice in answering these questions. To meet this potential, AFT recommends that Congress direct USDA to develop and disseminate information to the public based on research, and:

1. Create, aggregate, and/or provide resources to support smart solar projects like maps (e.g., USDA Soil Survey Geographic Database), guidance (e.g., model laws for smart solar on farmland), and funding to aid state and local governments and other Federal agencies in engaging in farmland protection planning and least-conflict processes to identify priority areas for both renewable energy development and protection.
2. Produce, or fund and aggregate, regionally and culturally appropriate educational materials and guides for landowners about what to look for in evaluating solar leases that meet their needs. This information should be made available at USDA county offices and online.

American Farmland Trust (AFT) is the only national organization that takes a holistic approach to agriculture, focusing on the land itself, the agricultural practices used on that land, and the farmers and ranchers who do the work. This document focused on Farm Bill solar policy represents but one part of AFT's broader Farm Bill agenda which can be found here. For more information about these solar recommendations, contact AFT Conservation and Climate Policy Manager Samantha Levy at slevy@farmland.org. For more information on AFT's full Farm Bill platform, contact AFT Policy Director Tim Fink at tfink@farmland.org.