American Farmland Trust
SAVING THE LAND THAT SUSTAINS US

Recommendations for State and Local Governments to Advance Smart Solar Policy

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About American Farmland Trust

Founded in 1980, American Farmland Trust's (AFT) mission is to save the land that sustains us by protecting farmland, promoting sound farming practices, and keeping farmers on the land. AFT recognizes that fulfilling this mission depends on America's farmers and ranchers, and their ability to operate viable farm businesses. In addition to being a leader in federal agricultural policy, AFT works across the nation at the state and local level to advance policies to achieve its mission.

About this Document

While a diversity of stakeholders will need to take action to achieve a Smart Solar buildout—including developers, clean energy buyers, utilities, researchers, non-governmental organizations (NGOs), farmers, the federal government, and the general public—this document is geared towards local and state policymakers and advocates where most land use decisions rest. AFT recommends that communities proactively implement policies from the menu of options presented in this document that are the most relevant to the unique economic and conservation needs, and permitting and policy conditions, of their states and municipalities. This document is organized into sections describing, and providing recommendations for, each of AFT's four Smart Solar principles, with footnotes containing examples of how some state and local governments have already implemented the recommendations. Recommendations for local governments are bolded in **gold**, while actions state governments can take are in **orange**. All of the recommendations, including for the **federal** government (in blue), are in Appendix A.

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Photo of Jack's Solar Garden, Colorado

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Introduction

Our Nation's Farmers and Farmland are Critical to Addressing Climate Change

Farmland[1], and the food, feed, fiber, and other benefits it provides, is an irreplaceable resource. Despite this, farmland loss is still occurring at an alarming rate. Between 2001 and 2016, over 11 million acres of agricultural land were developed, paved over, or otherwise converted to uses that threaten agriculture.[i, 2] When farmland is lost to any type of development, the food production, economic activity, and ecosystem services[3] that that farmland provided are also lost—straining food security and reducing rural vitality. Losing our most productive farmland will also push farming to fewer acres and onto more marginal land, both requiring greater inputs to sustain comparable production and resulting in higher greenhouse gas (GHG) emissions and other environmental impacts. To address all of this, AFT works "from kitchen table to Congress" to help farmers voluntarily protect their land from development, adopt sound farming practices, improve farm viability, and increase farmland access for a diverse new generation of farmers.

> The goals of AFT's solar policy work are to maximize benefits to farmers, farmland, farm communities, and the climate, and to minimize both the displacement of farming from farmland and the negative impacts to farmland productivity, farmer-renters, and farm communities, all while accelerating renewable energy development across the nation.

Climate change, which is occurring as a result of human activities, is already impacting farmers, farm viability, food security, water availability, and more. As extreme weather events increase in frequency and scale, farmers are beginning to adopt what USDA's Natural Resources Conservation Service (NRCS) has termed "climate-smart practices", like cover cropping, rotational grazing, and nutrient management, that reduce emissions, sequester carbon, and build resilience to climate impacts. Greater long-term adoption of these practices will contribute to farm viability and the nation's long-term food security and rural vitality.

Scientists continue to assert that to avoid even greater climate impacts, unpredictability, and extreme weather, the nation must dramatically reduce GHG emissions and achieve carbon neutrality by mid-century.[ii] In recognition of this, an increasing portion of AFT's policy, research, and field work is focused on addressing climate change, including helping farmers become a greater part of the climate solution by (1) reducing GHG emissions (particularly methane and nitrous oxide) from their operations, with an emphasis on changes that increase efficiency and reduce costs,[4] (2) adopting farming practices that sequester carbon in soils and build resilience to extreme weather, (3) permanently protecting more farmland and supporting smart growth to avoid potential future increases in emissions

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[1] The term "farmland" in this document refers to all agricultural land, including farmland and ranchland. Likewise, the terms "farm" and "farmers" includes ranches and ranchers.

[2] This amount translates into the loss of 2,000 acres every day and is equivalent to the total U.S. acreage used in 2017 to grow vegetables, fruits, and nuts.

[3] This term refers to the environmental benefits farms can provide to society, such as improved water quality, flood mitigation, carbon sequestration, and wildlife habitat.

[4] For more information, see AFT's Soil Health Economic Case Studies.

due to electricity and vehicle use, and (4) enabling farmers to host well-sited renewable energy facilities to power their farms and/or generate carbon-free energy for the grid.

Farmers and Farmland Will Play a Central Role in Decarbonizing the Electric Grid

Electricity generation accounts for 25% of our nation's total GHG emissions, second only to transportation.[iii] Achieving carbon neutrality in the U.S. will necessitate substantial near-term increases in renewable energy infrastructure construction, especially solar.[5] According to the 2021 Department of Energy Solar Futures study, decarbonizing our electric sector will likely demand a rise in solar energy generation from 4% of our nation's current energy production, to 45% by 2050. **This is projected to require 10.4 million acres of land to host solar arrays of various sizes,[6] with 90% of this solar development expected to take place in rural settings** where municipalities primarily govern land use decisions.[iv] Growth will occur in forms of solar development that communities are more accustomed to permitting, like distributed rooftop or community solar arrays of 40 acres or less. But, in order to affordably decarbonize the grid, communities are also being faced with newer forms of solar development, namely large- or utility-scale arrays impacting hundreds or thousands of acres at once, which they have little to no experience addressing.

Further research reveals that the vast majority of future solar development is expected to take place on farmland. **Modeling done by AFT through its *Farms Under Threat: 2040* analysis projected that, under current policies, 83% of new solar built by 2040 will be sited on agricultural lands, with almost half of this development on our most productive farmland for producing food and other crops.** This is corroborated by a 2021 Cornell University study which concluded that, even after removing the most productive farmland from New York solar development projection models, 82-85% of the remaining land most suitable for solar to achieve the state's ambitious climate goals is farmland.[v] Farmland, especially our most productive farmland (e.g., USDA-classified prime farmland, AFT-designated nationally significant farmland[7]), is often the first-choice site for solar developers in the U.S. This is because the very characteristics that make land productive and suitable for farming—sunny, flat, dry, cleared, temperate, low-wind, and close to existing energy infrastructure and population centers—are the same characteristics that make land attractive for solar development, especially utility-scale solar. **Without deliberate changes in policy, the expansion of solar development could result in the conversion of millions of acres from farming, rapidly reshaping rural landscapes and farm economies.**

Solar deployment across the country—particularly utility-scale—is currently being slowed or halted by communities raising questions about its impacts on their farmland and farm economies. In a recent study analyzing why proposed utility-scale renewable energy projects were delayed or stopped between 2008 and 2021, land concerns were the most frequently cited reason, with concerns over "non-monetary"

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[5] The demand for wind and solar energy is growing rapidly due to (1) market forces decreasing the cost to generate renewable energy; (2) policies (e.g., Renewable Portfolio Standards), incentives, and initiatives that promote renewable energy; (3) the decommissioning of fossil fuel power plants; and (4) increased energy demand, including from electrification.

[6] This also raises important questions about where new transmission will be sited to bring this power to market.

[7] For more information on the "nationally significant" designation of the most productive, versatile, and resilient farmland in the U.S., see AFT's *Farms Under Threat: The State of the States* report.

impacts, including land use changes from agriculture to industrial use, arising in 82% of cases.[vi] Many states and localities are passing moratoria[8] to provide time to study the impacts of this new land use, and/or to develop policies governing permitting and siting in ways that will work for their communities.[vii] This slowdown is threatening the timely and successful achievement of U.S. and state-level climate goals, and, in many cases, is preventing proposed projects. Reactively, some states are passing legislation to pre-empt local decision making and speed up renewable development efforts by granting a state agency permitting authority, especially for utility-scale solar. **Enacting local and state policies to ensure that the U.S. solar buildout strengthens farm economies will be critical to reducing land use and siting tensions and getting renewable energy projects built, thereby enabling us to reach carbon emissions reduction targets.**

Understanding how to achieve these goals is nuanced work. To decrease this conversion pressure, policies and programs are needed to reduce electricity demand (e.g., energy efficiency) *as well as* the amount of land-based solar needed to decarbonize the grid (e.g., by accelerating development of wind[9]). But land-based solar arrays at any scale can provide critical economic benefits to farmer-landowners. In particular, distributed, smaller-scale solar arrays (e.g., on-farm use, community solar) can reduce on-farm energy costs, improve infrastructure, and provide lease payments to farmers that support the viability of their operation and keep land in farming while providing clean energy to the grid. This is especially important when considering the challenges of running a viable farming operation, the aging of the U.S. farmer population, and rapidly rising land costs, all of which make the permanent conversion of land out of farming more likely. Furthermore, developing agrivoltaic arrays, which pair solar energy generation with viable agricultural production on the same parcel of land for the full life of the array, may offer a way to keep land in production and provide new opportunities for farmers.

Utility-scale arrays can provide some of these same economic benefits to farmer-landowners, but without significant policy and industry changes, such solar arrays will convert hundreds or even thousands of acres of farmland in a community out of production at once. This large-scale loss of land in a community can increase farmland prices and rental rates, displacing farmer-renters who cannot compete with the prices offered by developers, and reducing the viability of the remaining farms and other local supporting businesses, like large animal veterinarians and seed dealers. And although agrivoltaic arrays may offer a means to keep land in farming *and* produce solar energy for the grid, for this practice to gain wider use and support a diversity of viable farm operations at scale, economic and workforce challenges would need to be addressed.[10] While all of these aforementioned concerns apply to smaller-scale arrays, as the scale of solar arrays increases, the impacts are magnified. These increased impacts amplify the need to have sensible policy frameworks in place.

Ultimately, America needs thriving rural economies, robust food production, *and* reliable, affordable renewable energy. **The goals of AFT's solar policy work are to maximize benefits to farmland,**

[8] A recent Columbia University study found that in nearly every state, local governments have enacted policies to restrict or block renewable energy development.

[9] Land-based wind projects are often compatible with continued agricultural activity due to the smaller project footprint and more limited shading. So long as they are designed to allow for continued farming around turbines and best practices are followed to limit damage to soil during construction, farmers can farm up to the base of the turbines.

[10] AFT's support for agrivoltaics is conditioned on continued proof of concept. Currently, there is limited application of agrivoltaics in large-scale solar, with the exception of sheep grazing.

farmers, farm communities, and the climate, and to minimize both the displacement of farming from the land and the negative impacts to farmland productivity, farmer-renters, and farm communities, all while accelerating renewable energy development across the nation. AFT has been working since 2018 to determine how to ensure this solar buildout achieves all these goals. Building on principles AFT helped to develop in the Smart Growth movement, AFT calls this work "Smart Solar."

What is Smart Solar, and How Can Policymakers Achieve a Smart Solar Buildout?

Just like "reduce, reuse, recycle" contains within it a hierarchy for reducing waste, many have asserted the hierarchy for the impact of solar development should be "avoid, minimize, and mitigate."[11] While helpful, this hierarchy does not capture the full complexity of this topic as it relates to farmers, farmland, and rural communities. To address this, AFT has developed four non-hierarchical principles that, when followed, will help lead to what AFT has termed a "Smart Solar buildout":

- **Siting: Prioritize solar siting on the built environment, contaminated land, and other land not well-suited for farming** to help minimize the impacts of solar energy on our nation's best agricultural land and farm businesses**.**
- **Soil and Water: Safeguard the ability for land to be used for agricultural production** when siting solar on farmland by following best practices during construction, operation, and decommissioning that promote soil health and productivity and preserve future water rights and access.
- **Agrivoltaics: Expand the use of agrivoltaics for agricultural production and solar energy on the same land** to minimize displacement of farming from farmland and to improve farm viability.
- **Shared Benefits: Promote equity and farm viability in siting and permitting decisions** with inclusive processes to accelerate project siting, maximize benefits, and minimize negative community impacts.

These principles recognize the importance and complexity of supporting farm viability and rural vitality, and that achieving decarbonization goals will require siting some solar on farmland—but that this must be done in ways that strengthen agriculture. Below is more information about each of these principles and recommendations for how state and local policymakers can put them into action.

[11] The hierarchy of "reduce, reuse, recycle" means that one should first reduce what they consume and then reuse what they have. Failing the first two, one would recycle. In the context of avoid, minimize, mitigate—one would first avoid siting on land well-suited for farming before seeking to minimize impacts. Failing that—one would mitigate those impacts.

Siting: Prioritizing Solar Siting on the Built Environment, Contaminated Lands, and Land Not Well-Suited for Farming

The pressure to develop solar on land well-suited for farming can be reduced by advancing policies and programs that decrease energy demand and promote efficiency as well as those that encourage other forms of renewable energy, like wind. Additionally, it is important that governing bodies inclusively engage constituents and stakeholders to define both preferred sites for solar and priority areas to avoid converting, and then that they implement policies that will make it easier and less costly for developers to site solar in preferred places. Communities should coordinate at a regional or state level to identify these preferred solar sites that maximize local benefits and minimize negative impacts.[12]

For example, many communities would prefer that solar be developed on contaminated land (e.g., brownfields, landfills, abandoned mines) and the built environment (e.g., rooftops, irrigation ditches, parking lots, carports, along roads and highways) rather than on farmland, forests, and other greenfields. Though solar on contaminated land and within the built environment can be more costly to develop, arrays on these sites have the added benefits of revitalizing underused public and private land and offering co-benefits like shade for cars in parking lots or reduced water evaporation from irrigation canals on sunny days. And there is great opportunity: DOE's Solar Futures Study found that disturbed lands[13] could support 10 million acres of solar.[viii] The EPA has also prescreened more than 80,000 brownfields through Re-Powering America's Land Initiative, and the National Renewable Energy Laboratory (NREL) estimates that landfills and other contaminated sites cover 15 million acres,[ix] with another recent study asserting that landfills could host 60 GW of solar capacity across the country.[14, x] However, because these sites carry extra financial and transaction costs to develop, state and local governments will need to create incentives to make them more attractive and feasible for solar development.

There are also ways to develop solar on farms that will keep land well-suited for farming in production, including by siting solar on farm infrastructure (e.g., barn roofs, parking lots, farmyards, buildings, silage bunkers, fences, reservoirs) and on marginal farmland (see box below).

Farmland used to raise crops and livestock varies greatly across the nation. Some farming is done on land well-suited for agriculture (e.g., USDA-classified prime farmland, AFT-defined nationally significant farmland) and can be managed for greater productivity and less impact on the

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[12] For example, if smaller-scale, decentralized, locally-owned developments are favored by the community, this may necessitate re-assessing or creating net-metering policies that pay customers for excess energy produced by behind-the-meter arrays they install, increasing size caps on renewable projects considered "on-farm buildings", or passing policies and programs that support the growth of community-scale and/or community-owned solar.

[13] "Developed" areas identified in the 2016 LANDFIRE program include invasive species-impacted lands and other types of non-vegetated lands such as quarries or gravel pits. It does not include agricultural lands.

[14] The actual potential of some of these opportunities may be less.

[15] AFT will provide PVR maps and guidance to assist these efforts upon request. Please reach out to maps@farmland.org for more information.

[16] **Definition of PFAS and Example Legislation:** PFAS—which stands for polyfluoroalkyl substances—are widely used, long-lasting chemicals believed to have negative health effects that have been found in some agricultural soils. Maine bill number LD 1591 establishes a procurement process for lands contaminated by PFAS.

environment. On the other hand, some farming occurs on land not particularly well-suited for that purpose. This marginal land can have lower productivity, often requiring more costly external inputs that can have negative impacts on the environment to achieve the same yields. Changes in water availability are also affecting these land use classifications. The ever-increasing periods of drought, coupled with unsustainable water use in portions of the country, suggests that significant retirement of agricultural land will take place in the future.[17] Strategic deployment of solar arrays may offer a way to repurpose fallowed land while replacing lost farm income in affected areas.

Defining Marginal Farmland. There is no widely accepted definition of marginal farmland. Climate, production history, soils, and infrastructure are amongst the factors that can categorize farmland as either marginal or well-suited for agriculture. As part of a process to determine land preferred for solar, AFT recommends that farmers and communities define and include marginal farmland, taking the following factors into account:

- **Soil Quality:** Land that scores lower on AFT's soil productivity, versatility, and resilience (PVR) index[15] and land not classified as USDA prime, statewide or locally important, unique, and/or priority for agriculture by state or local stakeholders;
- **Size and Shape:** Parcels that are oddly shaped or too small to support a viable farm operation in the region;
- **Infrastructure:** Land that lacks critical agricultural infrastructure (e.g., for storage, transportation);
- **Access to water**: Land which has been or might be fallowed due to limited access to water, and which is not suitable for dry farming;
- **Contamination**: Land unable to be cultivated due to contamination (e.g., PFAS,[16] heavy metals) where viable strategies for reclamation do not exist;
- **Prior Land Use:** Land that has not been farmed in many years and would require significant investment to bring it back into production.

While soil productivity and access to water are major factors determining the suitability of land for farming, these factors have little bearing on the land's ability to host solar arrays and produce solar energy; the sun shines equally bright on marginal farmland and highly productive land. **Guiding solar deployment to marginal farmland,[18] land without sufficient water resources, and/or incorporating agricultural production into arrays (agrivoltaics) will help keep the finite and precious resource of productive farmland available to feed a rapidly growing population.[19]**

Recommendations for State and Local Governments

State and local governments and other permitting authorities have unique and important roles to play in identifying local goals and values, and developing and implementing policies that will guide where solar development and farming occur in their communities. This includes defining preferred sites for solar that will meet goals for climate, conservation, and economic development. AFT recommends that state and local governments:

1. **Invest in Research to Identify and Increase Development of Preferred Sites.** State governments should support, engage in, and/or fund research to determine costs, barriers, opportunities, and needs to advance solar on the built environment, contaminated land, and

[17] California's San Joaquin Valley alone is projected to retire between 500,000 and 1,000,000 acres of current cropland.

[18] Communities should concurrently work to minimize impacts on wildlife when siting solar on marginal farmland.

[19] New and beginning, under-resourced, and BIPOC farmers often can only afford to start out on marginal farmland. This is a factor communities should take into account when defining preferred areas for solar.

marginal land. **State** governments should also dedicate funding to support Smart Solar modeling and mapping as decision support tools to help communities identify preferred sites for solar and priority areas to avoid converting[20] (see also Recommendations 3 and 4 in this section).

2. **Reduce Farmland Conversion Pressure and Accelerate Development on Preferred Sites.** **State** and **local** governments should implement programs and policies that reduce energy demand, advance other forms of clean energy beyond land-based solar, and accelerate solar energy development on the built environment and contaminated land. Policy options include streamlining permitting processes and providing financial support for solar proposed on these preferred sites,[21] updating building codes to ensure new construction is energy efficient and solar ready (without overburdening low- or moderate-income communities or farm businesses),[22] advancing wind development, investing in programs that provide cost share for energy efficiency improvements, etc.

3. **Engage in Proactive Planning for Agriculture and Renewable Development.** **State** and **local** governments should fund, convene, and participate in inclusive regional "least conflict processes"[23] to empower stakeholders to define preferred, or "least-conflict," sites for solar[24] as well as priority areas to avoid converting.[25] This process would ideally begin before solar arrays are proposed in a community or region (also see Shared Benefits section Recommendation 4). This should be coupled with implementation policies (see Siting Recommendation 4 below) to maximize the impact of these processes. **State** governments should help fund these activities, convene these regional processes, and provide maps and other resources to enable their success. **Local** governments should organize, participate in, and help fund these processes, and advocate for resources from state and federal sources to enable them. AFT also recommends that **local** governments update their comprehensive plans, farmland protection plans, zoning, and other land use laws to guide development to preferred, or least conflict, sites for solar.[26]

[20] **Examples:** AFT's Farms Under Threat 2040: Solar Modeling reports and The Nature Conservancy's *Power of Place* report.

[21] **Examples**: New Jersey incentivizes community solar on carports, contaminated land, rooftops, and landfills. In New York's Build Ready program, the state acts as the primary developer of preferred sites, then auctions the site to a developer once red tape is cleared. Though it has yet to be funded, Virginia has the Brownfield and Coal Mine Renewable Energy Grant Fund and Program to fund development of brownfields and abandoned coal mines.

[22] **Examples:** The New York City building code, as of 2019, requires new construction to have a green roof or solar PV system. In California, Title 24, part 6 requires all post-2020 construction to be energy efficient and all low-slope roofs to be solar ready.

[23] **Definition of Least Conflict Processes**: Least conflict processes bring different stakeholders (e.g., agricultural groups, transmission groups, conservation organizations, developers, environmental justice groups, Tribes) together to inclusively and proactively determine priority areas to avoid converting, and preferred, or least-conflict, areas for development. These processes empower communities to engage in decision making before projects are even proposed by clarifying community priorities and values, thereby reducing conflict and project delays and accelerating solar development in the long run. **Examples** include the Columbia Plateau in Washington State and San Joaquin Valley in California.

[24] **Example:** In Washington state law, preferred sites include "rooftops, structures, existing impervious surfaces, landfills, brownfields, previously developed sites, irrigation canals and ponds, stormwater collection ponds, industrial areas, dual-use solar arrays that ensure ongoing agricultural operations, and other sites that do not displace critical habitat or productive farmland as defined by state and county planning processes."

[25] AFT can provide guidance, data, and maps to assist local efforts to identify preferred areas for siting solar and priority areas to avoid converting upon request. Please reach out to maps@farmland.org for more information.

[26] **Example:** Talbot County, Maryland has a mitigation fee program in place, and has recently amended it to further identify the priority land to avoid converting.

4. **Implement Incentives and Disincentives to Steer Developer Decision Making.** **State** and **local** governments should implement policies that:
   - *Incentivize* developing solar arrays proposed on preferred sites by reducing the costs, including "soft costs" (e.g., the time it takes to secure a permit), of developing these projects. Effective incentives include:
     - Streamlined permitting processes,
     - Added points in competitive energy procurement and public funding opportunities,
     - Financial adders for the price paid for electricity generated at these facilities.
   - *Disincentivize* development of arrays that convert land out of agricultural production (i.e., not agrivoltaic, as defined in the Agrivoltaic section below) and those proposed in priority areas communities want to avoid converting. Effective disincentives include:
     - Additional standards for identifying and addressing the agricultural impacts of solar (e.g., additional economic, social, or environmental impact studies),
     - Subtracted points from competitive energy procurement and public funding opportunities,
     - Compensatory mitigation fees (see box below).[27, 28]

5. **Collect Information During Procurement and Permitting to Inform Policymaking.** AFT recommends collecting data on soil type, prior land use, whether a solar array will incorporate agricultural production, and water rights/availability (where applicable), as part of permitting and/or funding application processes to track aggregate impacts on farmland and farm viability, and advance Smart Solar policymaking. This data should be made available at public hearings and periodically reported to the public in aggregate to protect landowner privacy. This recommendation can apply to **state** and utility-led procurement processes that fund and support utility- or community-scale solar energy development for off-farm use (e.g., Power Purchase Agreements, Competitive Bid Preference[29]); and **state** and **local** permitting authorities, state energy offices, and other related agencies that regulate, permit, or financially support the development of solar.

[27] Fees levied on solar development should also be applied to any real estate development that converts farmland.

[28] **Examples:** New York Mitigation Fees (see Appendix B for more information). At of the time of publication, both Virginia and Maine are undergoing processes to develop mitigation fees. (Note: New York's fees are likely too low to change developer behavior and should not be taken as a direct model. See AFT recommendations to improve New York mitigation policy here).

[29] **Example**: New York Solar Scorecard asks applicants questions about best practices and planned uses up front, awarding points based on the responses to these questions.

6. **Minimize Permanent Conversion.** **State** and **local** governments should ensure that their development review processes also properly account for and minimize permanent conversion of farmland out of production. For example, the federal Farmland Protection Policy Act (FPPA) requires federal agencies 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. However, because solar conversion is, in theory, considered non-permanent, utility-scale ground-mounted solar arrays are not always subject to the FPPA. AFT recommends that similar **state** and **local** permitting and review processes incorporate policies to minimize the permanent conversion of farmland out of production, and that they only consider solar arrays that follow the minimum standards recommended in the Soil and Water section below as temporary conversion.[30]

AFT recommends that state or local governments consider assessing per-acre compensatory mitigation fees to offset the impacts on farm communities from permanent development, utility-scale solar, and transmission development on land well-suited for agriculture. Mitigation fees can be an effective strategy to disincentivize conversion of land well-suited for agriculture out of production. But where conversion is unavoidable, mitigation policies enable communities to collect funds to offset the impact and keep other farms in business and land in production, including by investing in farmland protection, farm viability, and/or farmland affordability. To be effective, such policies should be designed to include the following considerations (refer to Appendix B for more detail):

- Determine the type of land on which proposed development would trigger a fee and assess *meaningful* per-acre mitigation fees from developers that will effectively minimize conversion of land well-suited for agriculture out of production.
- Escalate per-acre mitigation fees as more land within a community (e.g., county) is developed and converted both to deter too much land from being taken out of production and to increase the likelihood that the host community can continue to support viable farm operations and keep land in farming.
- Invest mitigation fees in permanent farmland protection within the community (e.g., NY's mitigation fees are invested in the state Farmland Protection Program). Should the farmland protection project take place outside of the host community, fees charged should increase to incentivize protecting farmland proximate to the conversion. Fees could also be invested in programs, infrastructure, or other projects that will improve equitable access to farmland and long-term farm viability in the community, especially if protecting farmland within the host community is not possible.

[30] AFT supports agrivoltaics arrays that integrate farming and solar energy generation and does not view this as a form of permanent conversion. However, agencies responsible for overseeing permitting processes often do not have the ability to oversee whether agricultural production occurs or continues throughout the life of the solar array. AFT does not recommend using policy processes that have no recourse or authority to claw back benefits developers may have received if the proposed farming activity does not come to fruition or continue throughout the life of the array to incentivize such arrays. See Agrivoltaic section below for more details on how AFT recommends effectively incentivizing agrivoltaic arrays.

Soil and Water: Safeguarding the Ability for Land to be Farmed

Franklin DeLano Roosevelt, in his 1937 letter to all State Governors, presciently stated, "*I… emphasize to you the seriousness of the problem and the desirability of our taking effective action… to conserve the soil as our basic asset. The nation that destroys its soil destroys itself*." Helping farmers and ranchers across the nation voluntarily adopt practices that build soil health to increase resilience and farm viability has been a long-standing priority for AFT. It is also critical to the future of farming and food security—especially as extreme and unpredictable weather events increase. Healthy soil does more than support sustainable food and other crop production, it improves water quality, sequesters carbon, and helps farmers adapt to extreme weather fueled by climate change by increasing water infiltration and water holding capacity in times of flood and drought.[31]

Most current approaches to constructing solar were not designed to factor in soil health, soil productivity, or future access to water rights. As a result, solar arrays sited on farmland can have tremendous physical impacts on the land which can significantly impede returning it to agriculture, resulting in permanent conversion.[32] **Incorporating these soil and water considerations into current construction, operation, and decommissioning practices is critical to protecting or building long-term soil health, carbon stocks, and agricultural productivity, and helping to ensure that the conversion of farmland out of production due to solar is temporary.** Below are considerations for each phase of an array's lifecycle:

> **Construction:** Land involved in a solar project will be a major construction site for a period of time. During the construction phase, the site experiences disturbances: heavy equipment is used to grade access roads, build laydown yards, deliver equipment components to construct the arrays, and drive posts to set racking. Some developers design solar arrays to remove existing vegetation and even topsoil during construction and discourage or actively prevent new vegetation during operation. **Heavy equipment use, disturbance, and lack of ground cover are likely to cause soil erosion, compaction, and overall soil degradation[33].** Installation of solar modules and trenches could also disrupt surface and subsurface drainage systems, including tiles, on farmland beneath the development site that could then be inaccessible for future use or repairs.[xi] These impacts would require both knowledge and enforcement to counteract them and protect soil health.
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> **Operation:** Ongoing operations and maintenance activities also occur within solar facility areas to keep panels functioning efficiently. These activities include panel cleaning, maintenance, inspections, and spraying or mowing to control vegetation and shading. The choices developers make during operation, which can last 30 years or more, will also have impacts on the site's future soil health and fertility. Even if vegetation is planted under panels, it must be actively managed for

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[31] AFT research shows that widespread adoption of just two regenerative practices—cover crops and no till—would sequester the carbon equivalent of removing up to 260 million automobiles from American roadways each year.

[32] States should also ensure best practices and standards are in place to minimize the impact to soils from construction of other forms of renewable energy, such as wind.

[33] **Definition of Soil Degradation:** Soil degradation is defined by the UN-FAO as a change in the soil health status resulting in a diminished capacity of the ecosystem to provide goods and services for its beneficiaries.

soil health to improve and to prevent invasives, disease, and pests. It is not a foregone conclusion that the land will simply "rest and improve."

Decommissioning: Since few arrays have reached the end of their useful life as of 2023, **it is not yet clear how solar will impact long-term soil productivity, nor how—or even if—farmland will be converted back to farming at the end of an array's lifespan.** Further, as renewable energy generation demand grows and technology shifts, whether solar arrays will be decommissioned remains a question, especially since many developers include options to extend solar leases and repower arrays. Nevertheless, plans must be made up front for who will complete project removal, how it will be funded, and at what point restoration will be considered complete (some landowners may want to keep access roads, materials, or infrastructure for the farm). Such planning is essential to guarantee that neither the landowner nor the locality is liable for costly infrastructure removal and restoration so the land can be farmed again, and to ensure the benefits accrued by following best practices throughout the life of the project are not negated during decommissioning when the array's owners have the least financial interest in the project. Finally, if the land carries water rights, proper authorities will need to ensure that those rights are retained or banked, as allowing them to go unused may otherwise extinguish them, making future farming unlikely to be viable.

Beyond stormwater considerations,[34] these best practices to protect soils and water for farming are not widely established or promoted. More work must be done by researchers and policymakers to develop them[35] and to require their implementation. These best practices should be based on the USDA Natural Resource Conservation Service's (NRCS) soil health principles,[36] and should:

- Ensure that existing topsoil remains in place (or if not, determine where and how it should be spread or stored) to retain, or ideally improve, soil productivity over time. This includes guidance on when construction activities should and should not take place, and other best practices to reduce compaction.
- Minimize soil disturbance and erosion, and ensure adequate drainage during the array's life, including standards around vegetation planting and establishment.
- Include soil testing[37] before any construction commences to establish a baseline for restoration after decommissioning, and periodically during operation to monitor progress.
- Guide placement of access roads, fencing, electric conduits, conductors, overhead collection lines, and other infrastructure to ensure farming can continue outside the facility area (and within the facility area in the case of agrivoltaics) during and after the life of the array.
- Protect drainage tile and other farm infrastructure from damage during construction and decommissioning.

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[34] Resources and examples for stormwater management best practices are available here and here.

[35] AFT will soon be publishing guidelines based on NRCS soil health principles. Check www.farmland.org/solar for updates.

[36] NRCS' soil health principles include: minimize disturbance, maximize living roots, maximize soil cover, and maximize biodiversity. Click here for more information.

[37] Tests should, at a minimum, include pH, percent soil organic matter, cation exchange capacity, compaction, carbon, nitrogen, phosphorous/phosphate, and potassium/potash.

- Ensure water rights for farming are retained after decommissioning, where applicable.
- Include other considerations that will ensure the ability to farm the land after, and ideally during, the life of the array, especially for arrays proposed on land well-suited for farming.

Recommendations for State and Local Governments

Establishing and requiring developers to follow minimum standards and other best practices to protect soil productivity and preserve water rights will help to ensure that farmland used for solar will not be permanently converted out of farming. State and local policymakers and permitting authorities have a critical role to play in ensuring this is the case. AFT recommends state and local governments:

1. **Develop Guidance.** **State departments of agriculture**[38] should, ideally in collaboration with NRCS and energy agencies, develop and disseminate guidance and best practices based on NRCS soil health principles for protecting soil productivity during construction, operation, and decommissioning, and to ensure future access to water. Such guidance and standards should be periodically updated to reflect the latest research (Recommendation 2).

2. **Invest in Research on Best Management Practices (BMPs).** **State** governments should concurrently support, engage in, and/or fund both near-term and long-term research to determine the impacts of current common construction, operation, and decommissioning practices on soil health and productivity and water resources to inform existing standards, or create evidence-based best practices that will achieve the goals laid out above where they do not already exist.

3. **Provide Training and Outreach.** **State** governments should conduct outreach to installers, developers, landowners, and local governments to share these best practices, and ideally—where able—provide trainings and/or certifications to identify installers that are equipped to follow best practices.

4. **Require Minimum Standards.** **Local** and **state** permitting authorities should:
    - Choose which best practices will serve as minimum standards that developers must follow as a condition for receiving a permit (while incentivizing other beneficial BMPs).
    - Require developers to fund the hiring of qualified, independent monitors that will enforce implementation of these minimum standards and agreed upon BMPs during construction and oversee decommissioning and restoration for several years following the array's removal to ensure restoration has been completed to the point where farming can resume. Hiring should, ideally, be done by a separate entity, like a state or local government.
    - Require comprehensive soil health assessments during three phases of the solar array: 1) prior to construction to establish a baseline for post-decommissioning restoration; 2) periodically (e.g., every five or ten years) during operation to check on soil health and inform any management adjustments needed to maintain or improve on the baseline; and 3) for several years following decommissioning to ensure restoration is completed.[39]

[38] **Example:** The State of New York has developed wind and solar mitigation guidelines which are used by state and local governments in permitting processes. In addition, InSPIRE has guidelines for low-impact solar.

[39] This should not add significant costs to a project. AFT estimates this to be ~$2,500 per assessment.

- Ensure water rights associated with lands proposed for solar development are banked for future use, where applicable. Where such banks do not yet exist, governments should support the development and funding of water rights banks or trusts for this purpose.
- Ensure that no financial responsibility for removal and restoration falls on the landowner or municipality by requiring financial surety (e.g., decommissioning bonds) at the solar array's outset that will cover the full expected costs of infrastructure removal and restoration at the end of the useful life of the array.

Agrivoltaics: Expanding the Development of Solar Arrays that Integrate Farming

One way to reduce the perceived trade-off between using land for agriculture and using land for solar energy generation is to combine solar energy production with sustained agricultural activity through agrivoltaic solar installations.[40] **Agrivoltaic arrays integrate *active agricultural production* with modified solar arrays on the same piece of land throughout the full life of the project.** These projects exist on a spectrum, ranging from more inexpensive applications to those that require more design modifications. Projects designed to support long-term sheep grazing are the least expensive, and therefore the most common agrivoltaic application employed by U.S. developers. Though in the U.S., crop-based agrivoltaic projects are mostly limited to a research context, agrivoltaic applications focused on crop production are emerging. Learning from countries like Germany and Japan where these commercial projects are more common, state policy, like the SMART program in Massachusetts, is starting to drive the establishment of demonstration projects and smaller-scale crop-based agrivoltaic projects in specific markets with incentives. Greater knowledge and incentives will be needed to increase the scale of agrivoltaic arrays and to expand this practice to more production systems.

No matter the scale or production type, successful agrivoltaic arrays need to be farm-centered, or designed specifically to retain farming activities for the life of the array below or between rows of panels (e.g., increased panel height and row spacing, digging wells for irrigation). They must also allow flexibility for changes in production to ensure the farm remains viable, such as growing a different crop or raising different livestock to respond to potential future market shifts. But as agrivoltaics is a relatively new application in the U.S., AFT's policy recommendations on this topic will be periodically reevaluated as more arrays are developed and analyzed for (1) their viability for farmers and developers for different climates, scales, and production systems; (2) their impact on the amount of land needed for solar; and (3) to ensure power remains affordable, especially for low- and middle-income families.[41]

[40] **Definitions of Dual-use and Agrivoltaics:** Dual-use (sometimes also referred to as co-location), generally involves traditional ground-mounted solar installations that provide other social benefits or host non-agricultural plantings with additional environmental benefits (e.g., flash grazing of sheep as part of planned vegetation management, planting pollinator habitat). While such projects are beneficial, they are not considered agrivoltaic solar. Agrivoltaics specifically describes the production of a farm product, undertaken in an integrated way with a solar array throughout the life of the array. For AFT, all agrivoltaics are dual-use, but not all dual-use is agrivoltaic.

[41] Agrivoltaic applications can be more costly to develop than traditional arrays and may require more land to produce the same amount of power, especially if they incorporate design changes to share sunlight with crops or allow space for farm machinery.

At their best, agrivoltaic solar arrays fully integrate solar and farming in ways that create synergies and co-optimize for both energy and agricultural production. For example, pairing sheep grazing and solar provides forage and shade for animals while offering low-cost vegetation management to solar developers without changes to the array that reduce the amount of electricity generated—a win-win. Research also indicates that pairing shade-tolerant crops with solar panels in arid climates can reduce water demand and heat stress for crops and may improve panel function.[xii] In areas where the limiting factor for production is water, as opposed to sunlight, this may both improve production and climate resilience. However, agrivoltaics that require design changes or increased spacing can be more costly to develop in terms of materials and labor as well as potential reductions in energy output per acre.[42] Therefore, to achieve commercial development of these projects, financial incentives for developers will be necessary.

Recommendations for State and Local Governments

There is growing interest in agrivoltaic arrays as a means of reducing the conversion of farmland out of production as the solar buildout advances. However, maximizing this opportunity will require deliberate public policy at all levels of governments to advance research, incentives, and support. AFT recommends the following to state and local policymakers:

1. **Invest in Research and Demonstration.** **State** governments should increase engagement and investment in agrivoltaic research and demonstration projects to determine farmer interest in, and compatibility and feasibility of, agrivoltaic arrays in different production systems and climates as well as how to apply conservation practices in this context. Research should also be done to determine how the development of agrivoltaic arrays may impact land access—especially for historically marginalized[43] and limited-resource producers—and to assess what is needed to scale up agrivoltaic arrays for various production systems in terms of workforce development, market access, supply chain investments, and other factors. State governments should also encourage and/or incentivize developers to collect, aggregate, and share data (e.g., yield, soil health, economic) from current agrivoltaic arrays with state and federal agencies, AFT, the AgriSolar Clearinghouse, land grant universities and researchers, and other NGO stakeholders working to understand and advance agrivoltaic project viability. To maximize the utility of this data, national standards should be established for what data should be collected (e.g., water and light use efficiency, yield per acre, quality, productivity) and how it should be shared.
2. **Incentivize Agrivoltaic Arrays.** **State** and **local** governments should incentivize the development of agrivoltaic solar arrays.[44] **In order to offer effective financial incentives, government agencies and/or permitting authorities administering them need to have the authority and ability to ensure (with periodic verification) that farming continues throughout the life of the array. Up-front program details should include, at a minimum:**

[42] The National Renewable Energy Laboratory estimates a cost premium of $0.07/Wdc-$0.80/Wdc for different dual-use applications compared to conventional ground-mounted solar over bare ground. For more information, refer to this report.

[43] **Definition of Historically Marginalized Producers:** This is an imperfect, but common term. Used here, it means those that have been marginalized in society and from government support based on race and ethnicity, namely Black, Indigenous, and other people of color (BIPOC). AFT uses this term to recognize that, though there are other producers marginalized in the U.S., racism in this country has perpetuated disadvantages for BIPOC producers and landowners in particular because of their race and ethnicity, and that important systemic work and changes are needed to address these inequities.

[44] **Examples** of incentives include pilot projects (New Jersey), price adders (Massachusettes), reduction or removal of per-acre compensatory mitigation fees (New York), and retention of current use taxation.

- A clear statewide definition[45, 46] for what qualifies as an agrivoltaic array eligible for financial incentive (see box below), including the percentage of the array that needs to be in continued production if the financial benefit is not calculated on a per-acre basis,

Defining Agrivoltaics. State governments, led by the state agency responsible for supporting agriculture (e.g., the department of agriculture), need to set clear standards for what constitutes active agricultural production in a solar array that make a developer eligible to qualify for financial incentives. Farm and conservation groups should contribute directly to this process, which should be done in consultation with state energy offices and developers wherever possible and appropriate. **AFT suggests that the following non-exhaustive list of criteria and standards be incorporated**:

1. Over the lifetime of the solar array, the farm operation must continue to produce (outside of any planned fallow seasons) marketable and measurable *agricultural* products, not just beneficial habitat or other important ecosystem services. Land loss, light penetration, and yield thresholds should be considered in writing qualification definitions and regulations.
2. The qualification definition should take into account the type and value of agricultural products currently or recently grown on the site or in the state. Incentive amounts should be directly related to the added costs developers take on for each production system. Higher financial incentives may be needed to support development of agrivoltaic arrays with crop production systems that align with local historic production.
3. Developers need to demonstrate that they have been actively engaging with a farmer who has a viable agrivoltaic farm business plan that, among other factors, considers soils, infrastructure, support services, water access, succession, and market access/customer segments for the farm product(s) that will be produced following installation.
4. Developers need to demonstrate they are adjusting solar array designs to meet the farmers' needs in supporting a viable farm operation for the life of the array (e.g., light availability, water wells for grazing animals, adequate water supply and infrastructure for irrigated crops, panel height and spacing changes to allow for farm machinery to pass through). Critically, array designs should be optimized to enable the producer to respond to changes in market demand over the life of the project, and to meet other farm goals so as not to lock farmers into only one production system for 30+ years.
5. Developers need to demonstrate they will be working with a contractor who can implement these designs properly, including all minimum standards recommended in the above section on Soils and Water.

- When and how spot checks will occur to ensure farming activities continue (e.g., annual location checks early in the life of the array followed by more periodic verification),
- Conditions under which financial penalties will be applied or incentives clawed back if farming discontinues, and who will be liable to pay for related noncompliance,
- How to prioritize arrays that increase the viability of, or provide new or enhanced farming opportunities for, operations owned by historically marginalized farmers, and

[45] **Example:** In Germany, developers must follow specifications that allow for a certain amount of light to penetrate below panels, and that maintain at least 66% percent of reference yield. For more, refer to DIN SPEC 91434, here.

[46] "Current Use" laws may help inform state agrivoltaic definitions, but AFT recommends these laws be used *only* as a starting point. Additional considerations for agrivoltaic definitions can be found in the box on this, and the next, page to ensure agrivoltaic incentives result in farm-centered solar projects.

- A plan to periodically report publicly on project awards, efforts, and activities in order to increase public data and knowledge of agrivoltaic arrays. The **state agency** should also develop partnerships with research entities to collect, analyze, and share data collected from agrivoltaic arrays to help increase understanding of agrivoltaic viability and scalability.

3. **Support Agrivoltaic Farmers.** **State programs** that support farm viability, training, conservation practice adoption, farmer-to-farmer networking, risk management, and more should be adapted to provide services and support to producers farming within solar arrays.

Shared Benefits: Promoting Equity and Farm Viability

Farming is a tough business with numerous risks and narrow margins. Many farmers and ranchers struggle to maintain viable operations, especially as climate change accelerates. Advancing policies and programs that increase renewable projects for on-farm energy use and improve the energy efficiency of farm operations (like USDA's Rural Energy for America Program, or REAP) will help support farm viability while reducing GHG emissions. Solar arrays on farmland can also provide steady, diversified revenue to landowners when integrated into a farming business. **Programs that advance community-scale solar arrays, typically 5 megawatts (~40 acres) or less, can provide the ideal opportunity for farmer-landowners to put a portion of the farm into solar, and arrays of this size can also work well for diverse applications of agrivoltaics.**

But farms do more than provide food and ecosystem services. Farms are often described as "anchor businesses" within rural communities because they support a network of other businesses and services like feed and seed dealers, veterinarians, and processors. Large-scale solar development, of the kind that is now growing across the U.S., will be an important part of an affordable energy transition, achieving economies of scale to provide renewable energy at lower costs. But they do so by taking up hundreds or thousands of acres in host communities at once.[47] This type of concentrated land conversion within local farm communities can strain the farms that remain by decreasing land availability, increasing land prices, and reducing the viability of farm support services.

There are also important concerns about land access and equity in the advancement of solar. The solar buildout is occurring at a time of record prices for agricultural land. Since 2019, the average farm real estate value has gone up nearly 30%. This is even more drastic in some parts of the country—in the Northern Plains, for example, land values have shot up nearly 50% in just four years.[xiii] Solar adds another source of competition for finite agricultural land, driving up prices and placing farmland ownership further out of reach for many aspiring young, beginning, and limited-resource farmers.

Solar can similarly have significant impacts on the farmland rental market. Nationwide, 39% of farmland

[47] AFT's Farms Under Threat 2040 modeling revealed that, though solar development will utilize only a small overall percentage of farmland across the country, projects will be concentrated in communities with good siting characteristics and interconnection opportunities.

is rented with even higher percentages in some states (Illinois is 60%).[xiv] Additionally, many farmers of color, women, limited-resource, veteran, and young and beginning farmers are more likely to begin their careers by renting land, and often at much higher rates than the general producer population. Solar developers are often willing and able to pay over 10 times what landowners can make renting land to a farmer, all while offering the security of long-term leases lasting on average of 30 years or more.[xv] As a result, farmer-renters are often outcompeted, and there may be less land available for rental, thereby increasing rental rates. Minimizing the impact of solar development on farmland prices and rental rates is a critical part of keeping farm businesses strong and supporting a more diverse generation of producers.

Complicating this picture is the advancing age of America's farmers. Today's average farmer is 57 years old, with 34% of farmers over the age of 65.[xvi] AFT estimates, based on the best available data, that over 40% of farmland, or 371 million acres, is likely to change hands in the near term. For aging producers without a successor, renewable energy leases can be an attractive option, enabling them to retire and keep the land in the family with the hope of passing it to a willing generation to farm it in the future. However, many factors would need to be in place for a viable farm to begin after the solar array's lifetime 30 years or more in the future, including but not limited to producers with the knowledge and desire to farm it, healthy soil, market infrastructure, and farm support services. Implementing policies that support the continuation of these elements will help to ensure that conversion of farmland to solar is temporary, rather than permanent, and that it does not spread to other farms in the community.

Finally, AFT recognizes that there are off-farm implications to energy policy decisions, especially for low-income households and communities. It is crucial that these groups are engaged as part of community decision-making processes, are protected from increases in electricity rates, have full access to support for energy efficiency improvements, and benefit from the ownership and production of renewable energy.

RECOMMENDATIONS FOR STATE AND LOCAL GOVERNMENTS

Designing policies that achieve a solar buildout that supports individual and community farm viability while providing affordable power across the country is critical given the scale and speed at which solar is expected to develop. AFT recommends that state and local governments take the following actions:

1. **Invest in Research.** **State** governments should support, engage in, and/or fund research to determine the potential impacts of solar development on farm economies, land access and tenure, Indigenous foods and land rights, food supply chains, and communities that have been disproportionately impacted by energy generation and environmental degradation. Research should explore how to maximize community benefits from, and ownership of, solar and how to minimize farmland conversion and impacts to farmer-renters and farm viability.
2. **Incentivize Community and Distributed Solar.** AFT recommends that **state** governments create, protect, and strengthen policies advancing distributed generation (e.g., net metering, community solar)[48] that are accessible to all residents and businesses, including households unable to host their own solar panels. States should fully fund programs that will advance residential, behind-the-meter solar and energy storage, including for farm businesses, and create

[48] According to the Solar Energy Industry Association, net-metering is a policy that allows residential and commercial customers who generate their own electricity to sell the electricity they are not using back into the grid.

programs and incentives for community solar that adhere to AFT's Smart Solar principles by incentivizing both agrivoltaic arrays (as defined above) and siting on contaminated lands and the built environment; requiring developers to follow minimum standards to protect soil health and future access to water; achieving well-distributed projects with county-by-county incentives; and designing programs to ensure they benefit small- and mid-sized farms and historically marginalized farmers.

3. **Ensure an Adequate Amount of Working Farmland is Protected from Development.** **Local** or **state** governments should implement policies that keep enough land in production to ensure that farming remains viable in the community by spreading the hosting opportunities and benefits across the state. This can be achieved by developing statewide and/or county level farmland conversion caps[49] or escalating mitigation fees as more farmland is developed (see Appendix B). **Local** and **state** permitting authorities should also require economic and other studies examining the impacts (including impact to farm viability) that may result from constructing arrays that would take a significant percentage of a community's farmland out of production.

4. **Engage in Inclusive and Proactive Community Planning.** **State** and **local** governments should fund and participate in local/regional planning and community engagement with broad stakeholder involvement (e.g., least conflict processes) that includes farmers and historically marginalized producers, renewable energy developers, state and regional transmission authorities and organizations, low- and middle-income communities, and communities that have historically borne disproportionate health and economic burdens from energy generation (see Siting section). **Local** and **state** governments and permitting authorities should also incentivize developers to conduct up-front community engagement when seeking permits. Federal- and state-recognized Tribes should be consulted on a government-to-government basis where solar arrays have the potential to impact traditional Tribal lands and/or indigenous food sovereignty and other rights.

5. **Support Landowner Empowerment and Decision-Making**: **State** and **local** governments should support development and dissemination of information, including in languages other than English, that empowers farmers and landowners to navigate the negotiation process with developers and best represent their interests and needs.

6. **Reduce Energy Burden and Energy Poverty:** To ensure the policies described throughout this document are not regressive, AFT recommends **state** and **local** governments develop, implement, and support policies and programs that lower energy bills and increase energy efficiency for low- and moderate-income ratepayers, and communities that have historically borne disproportionate health and economic burdens from energy generation.[50]

[49] **Example**: New Jersey set a 5% cap for developing unpreserved prime and statewide important farmland in county agricultural development areas, and a 2.5% statewide cap, for solar arrays 5 megawatts and up, per its 2020 solar law (see Appendix B).

[50] **Example:** At the federal level, the Low Income Home Energy Assistance Program (LIHEAP) provides a model, offering block grants to states that flow to local agencies.

Conclusion

Local and state policymakers and their constituents will have an outsized role in shaping the solar buildout, as most land use decisions rest with them. Given that farmland is a preferred site for solar arrays, especially utility-scale solar, this newer land use presents both opportunities and challenges for people and businesses in rural areas. Navigating these concerns over the next few years to maximize benefits and minimize impact will be essential to achieving renewable energy goals. Communities should choose, develop, tailor, and implement policies from the menu of recommendations included throughout this document that are the most relevant to achieving a Smart Solar buildout within their local contexts. With such proactive action, communities will be best poised to preserve agriculture while advancing a form of energy essential to slowing climate change across the world.

Appendix A: AFT's Federal, State, and Local Policy Recommendations to Advance Smart Solar

The goals of AFT's solar policy recommendations for local, state, and federal policymakers are to maximize benefits from the solar buildout to producers, farm communities, farmland, and the climate and to minimize both displacement of farming from the land and potential negative impacts to farmland, farmer-renters, and community farm viability by accelerating Smart Solar development across the nation. Addressing community concerns around these topics, which are causing pushback to proposed solar projects on the ground across the country, will be critical to achieving climate goals. Policymakers at different levels of government have unique and critical roles to play. The federal government can invest in research and provide trusted, technical information to support community decision-making, while state and local governments are primarily responsible for the permitting and land-use decisions that will shape the future of their communities. To help shape a solar buildout that will achieve all of the above goals, AFT developed four Smart Solar principles (represented by the four headings below) and the following policy recommendations to advance each principle. Policymakers should choose and implement the recommendations from this agenda that will best help them advance a Smart Solar buildout while supporting farm viability and keeping land in farming.

SITING: Recommendations for Prioritizing the Built Environment and Marginal Farmland

Solar arrays are often sited on high-quality farmland because it is flat, sunny, clear, and near existing infrastructure. AFT recommends communities take the following actions to guide solar development to preferred areas and away from priority areas to avoid converting, including land well-suited for farming:

1. **Invest in Research to Identify and Increase Development of Preferred Areas.** **Federal** and **state** governments should invest, engage in, and promote research to determine costs, barriers, opportunities, and other needs to advance solar on the built environment, contaminated land, and marginal land. **Federal** and **state** governments should also dedicate funding to support Smart Solar modeling and mapping as decision support tools to help communities identify preferred sites for solar and priority areas to avoid converting.

2. **Reduce Farmland Conversion Pressure and Accelerate Development on Preferred Areas.** **Federal**, **state**, and **local** governments should implement programs and policies that promote energy efficiency, support other forms of clean energy (e.g., wind), and accelerate solar energy development on the built environment (e.g., rooftops, irrigation ditches, parking lots, carports, transportation rights of way) and contaminated land (e.g., brownfields, landfills, abandoned mines) to reduce conversion pressure on our nation's best agricultural land. Policy options include advancing wind development, streamlining permitting and/or providing financial support for siting in preferred areas, updating building codes to ensure new construction is energy efficient/solar ready.

3. **Engage in Proactive Planning for Agriculture and Renewable Development. Federal**, **state**, and **local** governments should fund, convene, and participate in inclusive regional "least conflict processes" to empower communities to proactively define preferred, or least conflict, areas for siting solar as well as priority areas to avoid converting. This work would ideally be done even before solar arrays are proposed in their communities. This should be coupled with effective implementation policies (Recommendation 4) to maximize their impact.

4. **Implement Incentives and Disincentives to Steer Siting Towards Preferred Areas. State** and **local** governments should update comprehensive plans, zoning, and other land use laws, and implement other policies below to:
   - *Incentivize* developing solar arrays proposed in preferred areas by reducing the costs, including "soft costs" (e.g., the time it takes to secure a permit), of developing these projects. Effective incentives include:
     - Streamlined permitting processes,
     - Extra points in competitive energy procurement and public funding awards,
     - Financial adders for the cost of electricity generated at these facilities.
   - *Disincentivize* development of arrays that convert land out of agricultural production (i.e., not agrivoltaic, as defined in the Agrivoltaic section below) and those proposed in priority areas communities want to avoid converting. Effective disincentives include:
     - Additional standards for identifying and addressing the agricultural impacts of solar (e.g., additional economic, social, or environmental impact studies),
     - Subtracted points in competitive energy procurement and public funding awards,
     - Compensatory mitigation fees (see box below)

AFT recommends that state or local governments consider assessing compensatory mitigation fees to mitigate impacts on farm communities from permanent development, utility-scale solar, and transmission development. Effective design and implementation of these policies should involve the following considerations:

- Determining the type of land on which proposed development would trigger a fee and assessing *meaningful* per-acre mitigation fees from developers to minimize conversion of land well-suited for farming out of production.
- Escalating per-acre mitigation fees as more land within a community (e.g., county) is converted both to deter too much land from being taken out of production, and to increase the ability for the host community to keep land in farming with viable farm operations and support services.
- Investing mitigation fees in permanent farmland protection within the community. Should the farmland protection project take place outside of the host community, fees charged should increase to incentivize protecting farmland proximate to the conversion. Fees could also be invested in programs, infrastructure, or other projects that will improve equitable access to farmland and long-term farm viability in the community, especially if protecting farmland within the host community is not possible.

5. **Collect Information. Federal**, **state**, and **local** governments should collect, and publicly share (at public hearings and in aggregate), data on soil type, prior land use, whether a solar array will

incorporate agricultural production, and water rights/availability (where applicable), as part of permitting and/or funding application processes to track aggregate impacts and advance Smart Solar policymaking.

6. **Minimize Permanent Conversion.** **Federal**, **state**, and **local** governments should ensure that their development review processes properly account for, and minimize, conversion of farmland out of production. AFT also recommends that **state** and **local** permitting review processes incorporate policies to minimize the permanent conversion of farmland out of production by only considering solar arrays that follow minimum standards in the Soil and Water section temporary conversion.

SOIL AND WATER: Recommendations to Safeguard the Ability to Use Land Put into Solar for Farming

Most current approaches to solar construction, operation, and decommissioning are not designed to ensure that land put into solar can again be used for farming. Given the outsized role farmland is expected to play in hosting solar, it is imperative that soil health and productivity are protected or improved, especially during the high-disturbance times of construction and decommissioning, and water rights are preserved for future use when solar is sited on farmland. AFT recommends:

1. **Develop Guidance.** **USDA-NRCS** and/or **state departments of agriculture** should develop and disseminate guidance and best practices based on NRCS soil health principles to protect soil health and productivity during construction, operation, and decommissioning, and to ensure future access to water so land may be able to be farmed after the life of the solar array. This guidance should be periodically updated as more research is completed (Recommendation 2).

2. **Invest in Research on Best Management Practices (BMPs).** **Federal** and **state** governments should concurrently invest in both near- and long-term research to determine the impacts of current solar construction, operation, and decommissioning standards and practices on soil health and productivity and water resources. This research should inform existing standards, or create evidence-based best practices where they do not already exist to achieve the following goals:
    - After panels are removed, land used for solar can go back into agricultural production,
    - Soil compaction and erosion is minimized and soil health is maintained or improved,
    - Stormwater and runoff is properly considered in array design and construction,
    - Other impacts to soil or circumstances that would ensure solar arrays do not permanently convert land out of farming (e.g., access to water) are addressed.

5. **Provide Training and Outreach.** **Federal** and **state** governments should conduct outreach to installers, developers, landowners, and local governments to share these best practices, and ideally–where able–provide trainings and/or certifications to identify installers that are equipped to follow best practices.

3. **Require Minimum Standards.** **Local** and **state** permitting authorities should:
    - Choose which best practices will serve as minimum standards that developers must follow as a condition for receiving a permit (while incentivizing other beneficial BMPs).

- Require developers to fund the hiring of qualified, independent monitors to enforce implementation of these minimum standards and agreed upon BMPs during construction and oversee and guide decommissioning and restoration for several years following the array's removal to ensure restoration has been completed.
- Require comprehensive soil health assessments during three phases of the solar array: 1) prior to construction to establish a baseline for post-decommissioning restoration; 2) periodically (e.g., every five or ten years) during operation to check on soil health and inform any management adjustments needed to maintain or improve on the baseline; and 3) for several years following decommissioning to ensure restoration is completed.[51]
- Ensure water rights associated with lands proposed for solar development are banked for future use, where applicable. Where such banks do not yet exist, governments should support the development and funding of water rights banks or trusts for this purpose.
- Ensure that no financial responsibility for removal and restoration falls on the landowner or municipality by requiring financial surety (e.g., decommissioning bonds) at the solar array's outset that will cover the full expected costs of infrastructure removal and restoration at the end of the useful life of the array.

AGRIVOLTAICS: Recommendations to Expand the Development of Solar Arrays that Integrate Farming

AFT defines agrivoltaics as the integration of agricultural production and solar energy generation on the same piece of land throughout the life of the solar array. Agrivoltaics could represent an innovative way to keep land in farming as solar deployment accelerates, but advancements in research and policy are needed to expand this practice to other production systems beyond the current most economically viable option, sheep grazing. AFT recommends the following:

1. **Invest in Research and Demonstration.** **Federal** and **state** governments should increase investment into research and demonstration projects to determine the economic viability of agrivoltaics for different crop and livestock systems (and associated conservation management) in different climates with varying scales of arrays as well as farmer interest in agrivoltaics. Research should also explore how agrivoltaic projects can improve water usage, soil health, and land access—especially for historically marginalized and limited-resource producers. In addition, research should assess what is needed to scale up agrivoltaic arrays in different communities and for various production systems (e.g., workforce development, market access, supply chain investments). **Federal** and **state** governments should encourage and/or incentivize developers to collect, aggregate, and share data (e.g., yield, soil health, economic) from current agrivoltaic arrays with state and federal agencies, researchers, NGOs, and other stakeholders to inform and advance the viability of future agrivoltaic projects.

2. **Incentivize Agrivoltaic Projects.** **State** and **local** Governments should incentivize the development of agrivoltaic solar arrays. **In order to offer effective financial incentives, government agencies and/or permitting authorities administering them need the authority**

[51] AFT estimates this to be ~$2,500 per assessment.

and ability to ensure with periodic verification that farming continues throughout the life of the array. Up-front program details should include, at a minimum:

- A definition for what qualifies for the incentive (see box below), including the percentage of the array that needs to be in continuous production if the financial benefit is not calculated per-acre,

Defining Agrivoltaics. State governments, led by the state agency responsible for supporting agriculture (e.g., the department of agriculture), need to set clear standards for what constitutes continuous agricultural production in a solar array that make a developer eligible to qualify for financial incentives. Farm and conservation groups should contribute to this process, in consultation with state energy offices and developers wherever possible and appropriate. **AFT suggests that the following non-exhaustive list of criteria and standards be incorporated**:

1. Over the lifetime of the solar array, the farm operation must continue to produce (outside of any planned fallow seasons) marketable and measurable *agricultural* products, not just beneficial habitat or other important ecosystem services. Land loss, light penetration, and yield thresholds should be considered in writing qualification definitions and regulations.
2. The qualification definition should take into account the type and value of agricultural products currently or recently grown on the site or in the state. Incentive amounts should be directly related to the added costs developers take on for each production system. Higher financial incentives may be needed to support the development of agrivoltaic arrays with crop production systems that align with local historic production.
3. Developers need to demonstrate that they have been actively engaging with a farmer who has a viable agrivoltaic farm business plan that, among other factors, considers soils, infrastructure, support services, water access, succession, and market access/customer segments for the farm product(s) that will be produced following installation.
4. Developers need to demonstrate they are adjusting solar array designs to meet the farmers' needs in supporting a viable farm operation for the life of the array (e.g., light availability, water wells for grazing animals, adequate water supply and infrastructure for irrigated crops, panel height and spacing changes to allow for farm machinery to pass through). Critically, array designs should be optimized to enable the producer to respond to changes in market demand over the life of the project and to meet other farm goals so as not to lock farmers into only one production system for 30+ years.
5. Developers need to demonstrate they will be working with a contractor who can implement these designs properly, including following all minimum standards recommended in the above section on Soils and Water.

- When and how spot checks will occur to ensure farming activities continue (e.g., annual location checks early in the life of the array, followed by more periodic verification),
- Conditions under which financial penalties will be applied or incentives clawed back if farming discontinues as well as who will be liable to pay for related noncompliance,
- How to prioritize arrays that increase the viability of, or provide new or enhanced farming opportunities for, operations owned by historically marginalized farmers, and
- A plan to periodically report publicly on project awards, efforts, and activities to increase public data and knowledge of agrivoltaic arrays. The **state agency** should also develop partnerships with research entities to collect, analyze, and share data collected from arrays they support to help increase understanding of agrivoltaic viability and scalability.

3. **Support Agrivoltaic Farmers.** **USDA** and **state programs** that support farm viability, training, conservation practice adoption, farmer-to-farmer networking, risk management, and more should be adapted to provide services and support to producers farming within solar arrays.

SHARED BENEFITS: Recommendations to Promote Farm Viability and Equity

Farming is a tough business with numerous risks and narrow margins. Solar arrays on farmland can reduce costs and provide steady, diversified revenue to landowners when integrated into a farming business. But as solar arrays increase in size, impacts are amplified. Farms are often described as "anchor businesses" because of the network of other businesses and services they support. Large, non-agrivoltaic, utility-scale arrays on hundreds or thousands of acres, of the kind that are increasingly being proposed in farm communities, will be an important part of an affordable energy transition, but they can strain the viability of farms that remain by decreasing land availability, increasing land prices, and reducing business for farm support services. Also, any off-farm implications to energy policy decisions that could raise rates for low-income households must be addressed. AFT recommends the following actions:

1. **Invest in Research:** **Federal** and **state** governments should invest in research to determine the potential impacts of solar development on farm economies, land access and tenure, Indigenous foods and land rights, food supply chains, and communities that have historically borne disproportionate health and economic burdens from energy generation.

2. **Incentivize Community and Distributed Solar.** AFT recommends that **state** governments implement net-metering policies, and that **federal** and **state** governments fully fund programs that will advance residential and behind the meter solar and storage development, including for farm businesses. Programs supporting community solar (40 acres or less) should also be created, and such programs should advance Smart Solar by: incentivizing both agrivoltaic arrays (as defined above) and siting on contaminated lands and the built environment; requiring developers to follow minimum standards to protect soil health and future access to water; achieving well-distributed projects with county-by-county incentives; and designing programs to ensure they benefit small- and mid-sized farms and historically marginalized farmers.

3. **Ensure an Adequate Amount of Working Farmland is Protected from any Development.** **Local** or **state** governments should implement policies that keep enough land in production to ensure that farming will remain viable in the community and spread the hosting opportunities and benefits across the state—for example, by developing statewide and/or county level farmland conversion caps or escalating mitigation fees as more farmland is developed (see Appendix B). **Local** and **state** permitting authorities should also require economic and other impact studies that may result from constructing arrays that would take an appreciable percentage of a community's farmland out of production.

4. **Engage in Inclusive and Proactive Community Planning:** **Federal**, **state**, and **local** governments should fund and participate in local/regional planning and community engagement with broad stakeholder involvement (See Siting Section Recommendation 3 and 4). **Local** and **State** governments and permitting authorities should incentivize up-front community engagement when developers seek permits. Federal- and state-recognized Tribes should be consulted on a

government-to-government basis where solar arrays have the potential to impact traditional tribal lands, Indigenous food sovereignty, and other rights.

5. **Support Landowner Empowerment and Decision-Making**: **Federal**, **state**, and **local** governments should support development and promulgation of information, including in languages other than English, that empowers farmers and landowners to navigate the negotiation process with developers and best represent their interests and needs.

6. **Reduce Energy Burden and Energy Poverty:** To ensure the policies described throughout this document are not regressive, **federal**, **state**, and **local** governments should develop, implement, and support policies and programs that lower energy bills and increase energy efficiency for low- and moderate-income ratepayers, and communities that have historically borne disproportionate health and economic burdens from energy generation.

Appendix B: Developing Mitigation Policies

Despite being an ardent advocate for farmland protection, AFT has never been opposed to development *per se*, recognizing its need and value. Rather, AFT has worked to channel growth away from our most critical farmland resources. In fact, AFT was a driving force behind the smart growth movement—and one of the founders of Smart Growth America. AFT continues to advocate for smart growth, including in AFT's recent *FUT 2040: Choosing an Abundant Future* report. As such, the mitigation recommendations below do not just apply to solar development, but also to development at large to keep land in farming and keep farmers on the land.

Solar is a newer form of development, but AFT similarly does not propose that communities prohibit (or *effectively* prohibit through overly-restrictive land use laws) arrays on farmland. Rather, as with smart growth, we support "Smart Solar" which aims to advance solar development in ways that keep land in farming. Our goals are to maximize positive benefits to producers and farm communities while minimizing negative impact on farmland productivity and farm viability. While we know converting farmland to housing is permanent (it is often said to be "the last crop"), converting farmland to solar may be temporary, especially if the steps outlined in the Soil and Water and Shared Benefits sections within this document are followed.[52] This means that, in theory, land developed for solar could be kept or put back into production—but many elements would need to be in place for that to be the case, including farmers and adequate processing and supply chain infrastructure to bring products to market.

Large or utility-scale solar will prove an important part of providing affordable clean energy through economies of scale. But these arrays, which comprise hundreds or thousands of acres, may take a significant percentage of a community's farmland out of production at once, and last for 30 years or more. As a result, without good policies to support the farms in the community that remain in production, large-scale solar has the potential to reduce farmland availability and farm viability and to increase farmland prices for those that remain—significantly reshaping that community for decades.

Well-crafted mitigation policies can offer communities a means of offsetting these impacts by ensuring farmland remains available and farm businesses remain viable in communities hosting projects that convert large portions of their farmland. In the absence of state action, local communities can enact mitigation policies that act either as a meaningful disincentive to guide development (renewable and otherwise) away from priority areas to avoid converting, or as a means of raising funds that offset the impacts of converting land out of production to keep farm communities strong. When coupled with incentives for preferred areas for siting solar, these kinds of policies can provide powerful market signals to developers that result in a Smart Solar buildout.

Designing Effective Mitigation Policies

[52] Though they often last two generations or more and give companies the ability to 're-power' projects for another length of time, solar leases are time-bound and could be decommissioned at some point in the future. However, as the U.S. population continues to grow and electrifies heating and transportation, it will likely need to produce more electricity. While improvements in panel efficiency and storage already have, and may continue to, reduce the amount of land needed to produce renewable energy in the future, whether land put into solar will be decommissioned is uncertain.

To develop effective mitigation policies, a state, region, or community must first determine its goals through inclusive, stakeholder processes to inform the design and adoption of mitigation policies. For example, achieving a decentralized and distributed energy grid will necessitate different mitigation policies than just disincentivizing conversion of prime farmland. Communities should also consider whether mitigation policies should cover solar conversion in a similar way to housing or other permanent forms of conversion, and whether distributed solar should be held to the same standards as utility-scale solar. In addition to the suggestions below, AFT recommends that any public entity that converts, or provides funding for the conversion of, prime farmland to energy infrastructure (including transmission) also consider mitigating this conversion. Below are several mitigation policy options to help guide communities in achieving their goals.

Per-Acre Conversion Fees. Per-Acre conversion fees are one of the most commonly considered mitigation policies because they send market signals to developers while respecting private property rights and private decision-making. Imposing per-acre fees increases the cost of land conversion. This disincentivizes development on priority areas to avoid converting, or—if conversion does occur—raises funds the community can use to invest in offsetting or minimizing the broader impact of farmland conversion. To implement such policies, communities must answer the following questions:

1. **What type(s) of development are more or less favorable in our community**? Communities should consider imposing conversion fees that will signal the kinds of development they want to incentivize and disincentivize. For example, if the community prefers smaller-scale, distributed solar arrays, they can impose fees only on larger projects.
2. **What type of land conversion should trigger the fee**?[53] For instance, if the community's goal is to protect prime or actively farmed land from development, then the fee should be assessed on the conversion of these land types out of production.
3. **What fee amount will act as an actual disincentive rather than just a "cost of doing business"?** Fees should be set at a meaningful level that will achieve the community's goals. Then, if an unavoidable conversion must take place, it will also provide enough funding to enable the community to more fully offset or minimize the impacts. To be effective, communities should consider tying fee amounts to land prices, or the per-acre cost of purchasing development rights.
4. **Will the fees be the same per acre, or are there qualities that would increase[54] or decrease[55] fees? For instance, will permanent forms of development, like housing, be treated the same as development that is potentially temporary, like solar**? To disincentivize excessive development of farmland, communities should consider escalating per-acre fees as the percentage of converted land in the community increases. Though this may create a rush to be the first

[53] **Examples:** New York requires mitigation fees for solar projects on 30 acres or more of prime farmland that was actively farmed. The Commonwealth of Virginia is exploring a mitigation fee structure for solar projects proposed on over 10% prime soils, and Maine is exploring creating a mitigation structure. Washington state is proposing a mitigation policy for farmland lost as a result of government action.

[54] **Example**: In Kings County, Washington, mitigation fees are used for permanent farmland protection. These fees are assessed by acre at 1:1 if farmland adjacent to the site is protected, and 3:1 if farmland is protected elsewhere in the community. The reasoning behind this approach is that mitigation is more effective in greater proximity to the conversion.

[55] **Example:** In the State of New York, solar developers can avoid or reduce their per acre mitigation fee by incorporating agrivoltaics or adjusting project design to avoid prime farmland.

developer, it would give the community more influence over how much land it is willing to tolerate being converted out of agricultural use before farm viability declines. This would also spread the hosting benefits across the state. Fee decreases and adders can be applied if arrays are designed to be sited in least-conflict areas or are agrivoltaic (thus not converting land out of farming). Agrivoltaic arrays can be incentivized by offering exemptions from mitigation fees—but should only be done if the fees can later be re-levied if farming ceases during the array's lifetime.

5. **How will the funds collected be used**? If the goal of the community is to mitigate the loss of farmland, AFT recommends that the collected funds be invested in permanent farmland protection elsewhere in the same community. However, if there is no local land trust or municipal ability to place an agricultural conservation easement on land—or there is no farmland left elsewhere in the community to protect—funds can be invested into farm viability, farmland affordability, market infrastructure, or other priorities that help improve the viability of remaining farms and farmland.

The State of New York offers an interesting case study for solar mitigation fees. As part of the New York State Energy Research and Development Authority's (NYSERDA) large-scale solar solicitation, arrays on actively farmed land greater than 30 acres are assessed a fee for each acre of prime soils converted. But solar developers can reduce or avoid that fee (with approval from the New York State Department of Agriculture and Markets) if they redesign arrays to avoid prime farmland or incorporate agrivoltaics.[56] In 2022, the New York legislature passed a law to invest all mitigation fees collected in the state's farmland protection program.

DESIGNING EFFECTIVE CONVERSION CAPS

Conversion caps can be put in place to ensure that only land within the community up to a chosen percentage is converted out of farming to development. Like conversion fees, this policy does not restrict individual private landowner rights or development opportunities. Instead, it sets a cap on the amount of land conversion the community can "tolerate" before it sets off a domino effect that irreversibly reduces the viability of farming in that area. This type of mitigation policy could be particularly useful for spreading the benefits of hosting projects amongst communities while reducing burdens on any one community. When adopting this policy, communities should consider:

1. **What is the appropriate percentage of conversion the community can tolerate?** How much land does the community think can be converted out of production before a) land becomes too scarce and/or expensive for farming and b) businesses supporting farms no longer have enough demand to be viable?

2. **Will the conversion cap be focused on all farmland or only specific kinds of farmland (e.g., prime farmland, actively farmed prime farmland)**? New Jersey's conversion cap only applies

[56] **Note**: AFT does not consider the current New York fee a "meaningful" disincentive. AFT recommended improvements in a 2022 report to the mitigation fee program, including increasing the per-acre fee and incorporating more incentives for farm viability, as well as more costly forms of agrivoltaics. The state also does not have the authority to ensure farming continues or to re-levy fees if farming stops during the array's life, a policy design AFT does not recommend. Additionally, AFT recommended that the state consider providing no discounts on mitigation fees for arrays that displace farmer-renters.

to prime farmland, but each community should use data and maps to determine their own answer to this question. AFT can assist in this effort by providing maps, guidance, consultation, and more.

3. **What geographic boundaries will the conversion cap(s) apply to (e.g., state, county, agricultural district**[57])? New Jersey has two different caps—one which applies to the state, and another which applies at the county level. This is done to ensure that solar development is spread out and that it does not go above a statewide percentage.

4. **Will the conversion cap cover only permanent conversion, or both permanent and temporary conversion? How is each defined**? AFT recommends that such conversion caps apply to all conversion of farmland out of production, and that solar only be considered temporary when it is agrivoltaic (as defined above, and/or follows standards in the Soil and Water section above. As with other agrivoltaic policies, the entity enforcing the conversion cap must be able to verify that farming continues throughout the life of the project for an agrivoltaic array to be exempt from the cap.

5. **Under which conditions will waivers be allowed once the cap is reached, and who will have decision making authority to approve or reject such waivers**?[58] There may be instances where communities want to allow development above the cap. Such instances should be clearly defined, and the appropriate decision-making bodies should be determined and specified up-front.

New Jersey provides a new and interesting case study for this concept. In 2020, the state passed a law (S-2605) newly allowing for the development of greenfields for solar while also creating a conversion cap to retain a secure and stable base of quality farmland at the local and state level. This law capped conversion of unprotected USDA-classified prime and statewide important soils for solar arrays over 5MW at no more than 5% of a county's agricultural development area, and 2.5% statewide (estimated at about 4,000 acres). Waivers to the statewide cap can be granted by the Board of Public Utilities, but the county caps are absolute. The program will be reassessed at the five-year mark to evaluate progress.

[57] AFT recommends setting caps at the state level to effectively spread development.

[58] Alternatively, if caps seem too discrete, communities can increase per acre fees as the percentage of land conversion in the area increases.

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