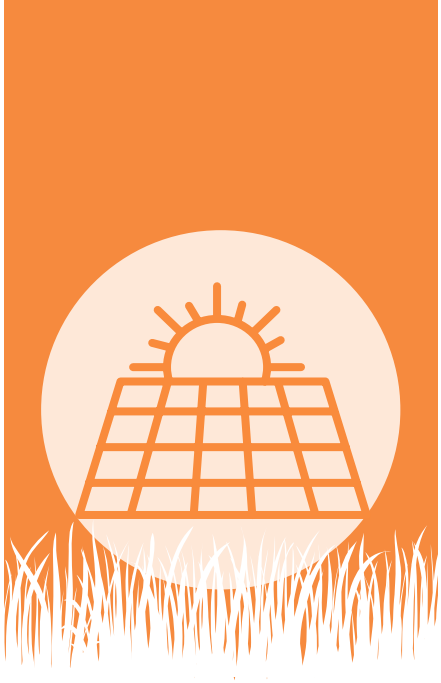
Fact Sheet:

Opportunities for Solar Energy on Marginal Agricultural Lands



Energy consumption is on the rise, creating new demand for renewable energy project sites. The U.S. Department of Energy's Solar Futures study estimates that to fully decarbonize the energy grid, solar will need to make up 40% to 45% of the energy mix, or about 1,600 gigawatts of capacity, by 2050.[1] That type of expansion will require an estimated 10.3 million acres of land, 90% of which will be in rural areas.[2] As development expands, the location, or "siting," of each project requires careful consideration.

Farmland appeals to solar developers because it is typically free of trees and rocks and requires less alteration before construction.[3] Marginal agricultural land is generally defined as land that is not suitable for conventional crop production and has little to no agricultural value.[4] While such land can be used for crop production, it can also be used for alternative agricultural practices such as grazing, or set aside as habitat.

Marginal agricultural land can be characterized by several attributes, including low productivity, poor soil quality, and poor climatic conditions, such as limited or excessive rainfall and extreme temperatures.[5] U.S. Department of Agriculture's Census of Agriculture for 2022 identified more than 880 million acres of farmland in the U.S., with one study finding an estimated range of 25 million to 144 million acres of marginal agricultural lands.[6,7]

Producing crops on marginal agricultural land can be risky,[8] and low productivity due to poor land quality means low crop yields, which leads to a reduced economic return. While crop insurance can help protect against low yields and low revenue,[9] siting solar energy projects on marginal agricultural land presents a potentially profitable alternative.

Sources

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Siting solar on marginal agricultural land

Solar energy projects provide several benefits to landowners and the environment.

Land lease payments can bring as much as $1,000 per acre to landowners, offering added financial stability to an agricultural operation.[10]

Solar projects stimulate economic growth with tax revenue that could be used to fund infrastructure and services as well as create both permanent and temporary jobs.[11]

Solar panels can help protect the land beneath solar installations by providing shade, which can help regulate soil temperatures, retain soil moisture, and reduce soil erosion.[12]

Long-term leases for solar energy projects can take land out of production and provide the opportunity for minimized disturbance of the ground, allowing time for the soil and surrounding environment to regenerate. Additionally, long-term leases offer long-term financial stability to farm and ranch families that contend with volatile commodity markets.[13] At the end of a lease, a landowner may choose to decommission the project to reclaim the land or extend the life of the project.[14]

Incorporating dual-use practices underneath solar panels, like solar grazing or planting a pollinator habitat, allows for energy production and agriculture to coexist. The benefits of such practices include improved land use and potential increase in farm income.[15]

Prioritizing development on less productive agricultural land can ensure a higher rate of return for landowners.[16]

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Case Study: Big Lake solar project, Sherburne County, Minnesota

Sandy soils are generally considered marginal land because they often have poor nutrient content, low water holding capacity, and are prone to erosion, making them less suitable for traditional agriculture and leading to lower crop yields compared to other soil types.[17] Locating a solar project on sandy soil and coupling it with beneficial vegetation offers the opportunity to reduce soil erosion, attract pollinators, and limit water loss. The Big Lake solar project offers a successful example:

US Solar developed its USS Big Lake 1 LLC ("Big Lake") project in 2017, with construction completed in 2018. The project is in the Big Lake Township of Sherburne County, Minnesota, situated on roughly 9 acres of an approximately 18-acre property owned by US Solar. The land had been used for potato farming but was no longer in production. Once it was sited for solar development, US Solar installed native pollinator habitat on all 18 acres and planted more than 100 coniferous trees to help screen the project from nearby roadways. In 2019, in partnership with Bare Honey, beekeeping began on the site to take advantage of the pollinator habitat. In 2023, US Solar entered a partnership with Big River Farms, a program of The Food Group, to provide access to farmers to grow vegetables in between rows of the solar facility.

Prioritizing siting solar energy projects on low-quality marginal agricultural land offers another stream of income to landowners, protects and increases the health of the land by minimizing soil disturbances, and reduces the need for crop insurance to cover lost revenue from low yields.

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