Why Solar Needs Open Land, Not Just Rooftops and Parking Lots

Land has always paid in more than one way. A crop this season, grazing the next, and now, for a growing number of landowners, power generation alongside both. That appeal is drawing utility-scale solar onto open acreage across the country.

It also raises a fair question: if the goal is more renewable energy, why does it need so much land when the United States has so many rooftops and parking lots?

The Land Is Not Disappearing

Solar's footprint on farmland today is small by any direct measure. Ground-mounted solar occupies roughly 550,000 to 600,000 acres nationwide, against roughly 874 million acres of total U.S. farmland, a footprint of 0.06 to 0.14 percent depending on measurement method.

Even under the Department of Energy's most land-intensive 2050 scenario, solar would affect less than 1.2 percent of existing farmland. The more likely path uses less than 10 percent of land already disturbed by prior development.

American Farmland Trust projects a more solar-intensive future and recommends steering development toward land less suited for farming. At REFA, that is exactly why site selection and lease terms belong in the conversation from the start.

Bigger Projects Cost Less and Strain the Grid Less

The economics and engineering both favor concentrating solar in one large facility rather than scattering it across rooftops and parking lots.

One utility-scale project means fewer landowner agreements, one environmental review, and one interconnection request. The same capacity spread across rooftops means thousands of separate owners, structural retrofits, and individual hookups into a distribution grid designed to carry power one way, not absorb thousands of small two-way connections.

Utility-scale solar costs $38 to $78 per megawatt-hour. Rooftop runs roughly double that. Parking-lot carports cost even more, about $3.62 per watt versus $2.96 for ground-mount, because a carport means engineering a structure to hold panels over cars.

The market reflects this. In 2025, the United States installed 34.7 gigawatts of utility-scale solar versus 8.4 gigawatts across residential, commercial, and community solar combined, roughly four to one.

Rooftop Solar Deserves a Fair Hearing

Rooftop solar has real value. Power generated on a rooftop gets used right there, avoiding transmission losses. Homeowners cut their bills and, paired with batteries, can keep essential loads running during outages. Rooftop output peaks alongside afternoon air-conditioning demand, easing local grid strain on hot summer days.

But rooftop runs into limits that utility-scale does not.

Limited reach. A typical home system powers that one home, not the schools, hospitals, and factories nearby. Not every roof qualifies—orientation, shading, structural condition, and permitting rules all narrow the pool.

High, opaque costs. The average residential install runs about $21,000 to $25,000 before incentives. A single week of permitting delay drives 5 to 10 percent of customers to cancel.

Utility resistance. Distributed rooftop solar decentralizes a business model utilities have run for a century. More than a dozen states have scaled back or ended net-metering policies over the past decade.

None of this erases rooftop's partial value. Fixing its problems calls for rewriting financing rules, permitting codes, and utility business models nationwide, while utility-scale solar already works today at the scale the country needs.

Demand Keeps Climbing

Even NREL's best-case rooftop estimate was never enough. If every usable rooftop had solar, NREL estimated it could supply about 39 percent of national electricity, but that was measured against 2013 demand. Against 2024's actual consumption, that ceiling covers only about 34 percent, and the Energy Information Administration projects demand will keep climbing.

Data centers are driving much of the growth, but not all of it. Grid Strategies reports that industrial reshoring, electrification, and oil and gas operations account for roughly 45 percent of forecasted five-year peak demand growth. Rooftop and parking-lot solar do not reach those load categories.

Why This Matters for REFA Members

Rooftops and parking lots are part of the mix, but they were never sized to replace utility-scale solar.

This math is not likely to flip. Rooftop costs and regulatory problems are national-level challenges that will not be solved at the county level. A permitting condition demanding rooftop instead is not a credible substitute for a proposed utility-scale project.

Land leased for utility-scale solar remains one of the more reliable uses of marginal or underused acreage available today. That does not change because a commenter would prefer panels on a big-box store roof.

Solar sites can keep earning through dual use. A 2024 census counted nearly 130,000 acres of solar sites still grazed by sheep. REFA members negotiating leases have evidence-backed grounds to ask about grazing or agrivoltaic provisions.