Agricultural Land Footprint of Solar Photovoltaic Installations in Arkansas

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Overview

Solar energy production is increasingly being utilized to meet both energy needs and zero net emissions goals within the United States. Arkansas is following this trend with several utility-scale photovoltaic (PV) systems built in 2023 and 2024 and more scheduled to come online in the following years (Figure 1). This has raised some concerns over the displacement of agricultural land for non-food production purposes. While generally considered to have minimal impact on crop prices, other questions about proximal real estate value impacts, exposure to weather risk and land restoration considerations exist. At the same time, opportunities to combine PV systems with crop cultivation and/or livestock grazing are available. Also floating PV systems (FPV) may prove an interesting area for research on irrigation reservoirs which, as of a 2017 study, occupy approximately 28,000 acres of agricultural land. Higher FPV installation costs compared to land-based PV systems need to be offset by synergies between FPV and irrigation systems for these types of installations to be economically viable without replacing further agricultural land. Overall, like other studies on the same topic (Delong et al., 2023), this study finds that utility-scale solar facilities will likely affect less than 1% of total state agricultural land use. As of 2024, 11 Arkansas counties had utility-scale PV systems occupying from as little as 0.2% to 1.3% of their agricultural land base. By 2026, an additional four counties will push agricultural land occupation to 0.4 to 1.7% of their agricultural land base. The remaining 60 counties currently do not have any utility-scale projects. As such, the current solar footprint averages 0.2% of 13.7 million acres of Arkansas farmland. Past cost trends and future projections showcase utility-scale projects to be the least-cost renewable energy source. As such,

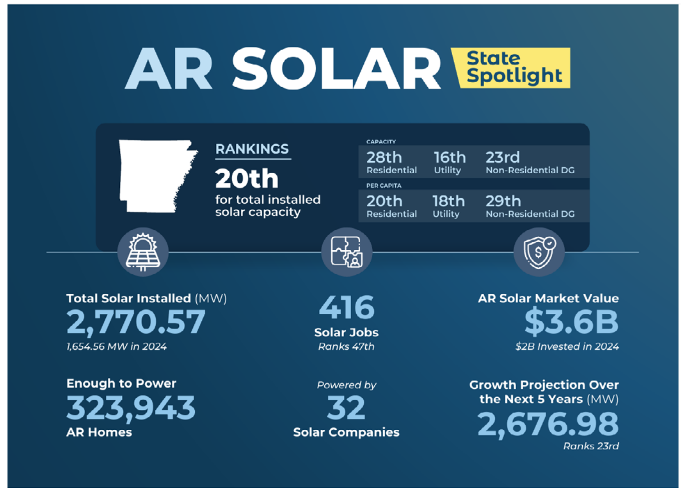

Figure 1. Arkansas solar industry snapshot and US rank. Data Source: Solar Energy Industries Association. Downloaded from https://seia.org/state-solar-policy/arkansas-solar/, May 2025

expansion of this sector is expected. With careful planning, such systems can lead to economic and environmental benefits with minimal negative agricultural land use implications.

1. Introduction

The amount of sunlight that reaches the earth's surface in an hour and a half can generate enough energy to handle global energy demands for one full year (USDE, n.d.). Sunlight can be converted into energy that is usable primarily through photovoltaic (PV) cells, which are solar panels that convert sunlight into electricity using semiconductive materials. These materials create electric fields that move electric charges through the panels (Eicke et al., 2022, USDE, n.d.). This energy can be used immediately or stored in batteries for later use.

Arkansans have deployed this technology in residential, commercial, community and utility-scale applications as outlined in Figure 2. Aside from being a clean renewable resource, electricity generation using this technology is becoming more cost efficient. Costs have declined and are projected to continue declining until 2030 (Figure 3), with residential PV system costs declining the most. At the same time, large utility-scale PV with or without battery storage levels near the bottom of the cost scale are shown in 2022 dollars. Commercial distributed wind production on a small scale shows promise at the national level but may be limited to specific locations in Arkansas as annual average wind speeds are relatively low compared to other regions in the country at the 30 m level. Wind speeds are higher at 100 m and have sparked development in several utility-scale wind projects in Arkansas. Similarly geothermal systems are uncommon in Arkansas but provide a background perspective on cost relative to hydropower and nuclear power that are common power sources in Arkansas. The comparison to commonly

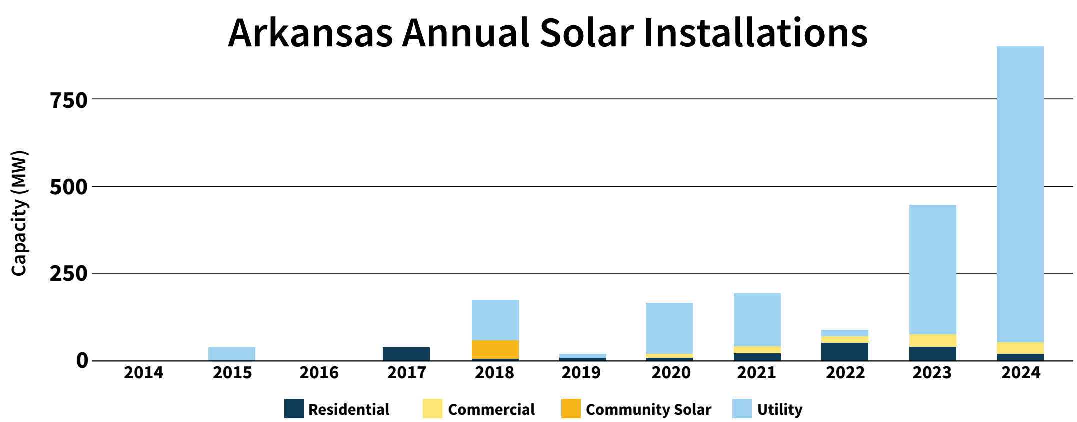

Figure 2. Historical statistics on solar electricity generation capacity and other implications by type of installation as of 2024. *Data Source: Solar Energy Industries Association. Downloaded from https://seia.org/state-solar-policy/arkansas-solar/, February 2025.*

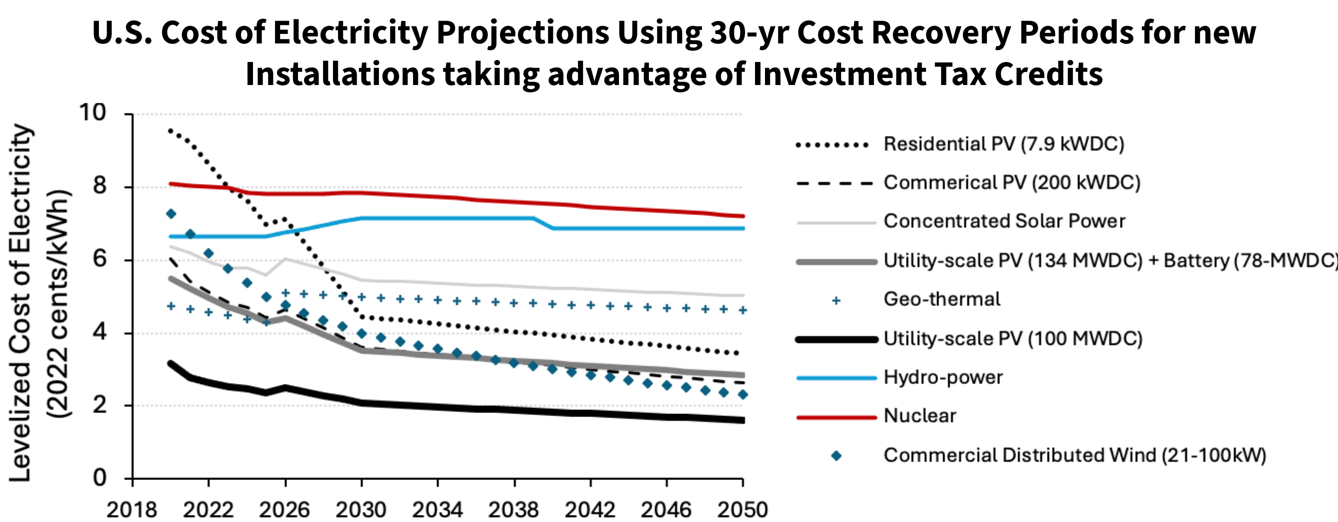

Figure 3. Cost projections for solar vs. nuclear, hydroelectric, geothermal and small-scale wind turbines. *Data Source: National Renewable Energy Lab 2024 Annual Technology Baseline available at https://atb.nrel.gov/electricity/2024/definitions#market+policiescase*

used power generation using natural gas is provided in Figure 4. Again, utility-scale PV installations offer a cost advantage to other generation resources (Fig. 4, right panel). Nonetheless, all generation resources have attributes that can provide value to the electric system as a whole. Notably, solar projects are among the fastest to install, however.

Given this background information, renewable energy sources provided 9 percent of total electricity generation in Arkansas in 2023, with solar energy accounting for about one-fifth of the 9 percent (EIA, 2024b). This number is growing rapidly, with over 1,100 megawatts (MW) of solar power generation coming online in 2024 and another 400 MW scheduled for 2025 (EIA, 2024b). Nationally, solar power generation is gaining in importance as well (Figure 5). Note that 1 MW of solar power capacity could power approximately 200 homes annually.[1]

Solar generation resources are generally separated by size. In Arkansas, “distributed generation” resources represent residential and commercial scale projects generally under 20 MW of capacity, while “utility-scale” projects are over 20 MW (UADA, n.d.). Additionally, distributed generation scale solar resources typically connect to distribution level power lines, whereas utility-scale solar resources connect to larger scale bulk transmission power lines. In 2023 U.S. utility-scale solar energy generation facilities produced roughly 163 billion kilowatt hours (kWh), which accounted for 3.9 percent of total energy production (EIA, 2024a). The U.S. Energy Information Administration (EIA) predicts that with the large number of solar projects targeted to come online, the energy produced by solar will increase by 75 percent, from roughly 163 billion kWh in 2023 to 286 billion kWh in 2025 (Antonio, 2024). The use of renewable energy, especially solar energy, is expected to continue to grow, as the U.S. government made a commitment to achieve a net-zero emissions goal by 2050 and a net-zero power sector by 2035 (USDS, 2023), and because utility-scale solar is a cost leader.

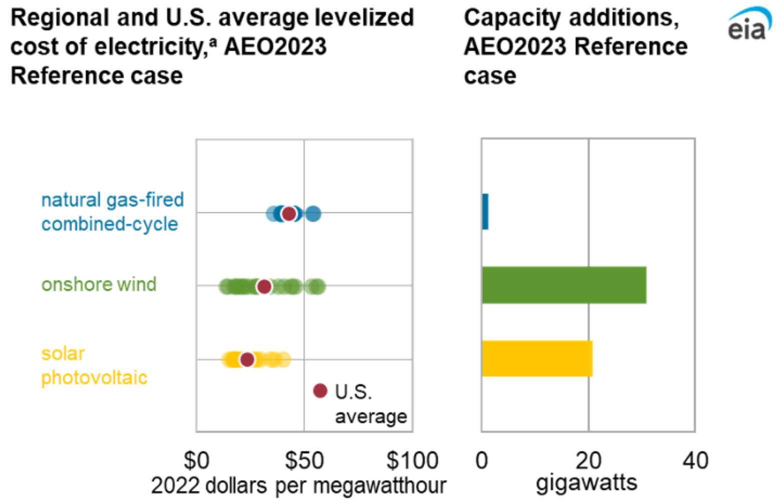

Figure 4. US and regional cost comparison for solar, wind, and natural gas power generation technologies. *Data Source: U.S. Energy Information Administration, Annual Energy Outlook 2023. Note: Each solid circle on the figure represents an electricity market region as modeled. Levelized cost includes tax credits available for plants entering service during the projection period.*

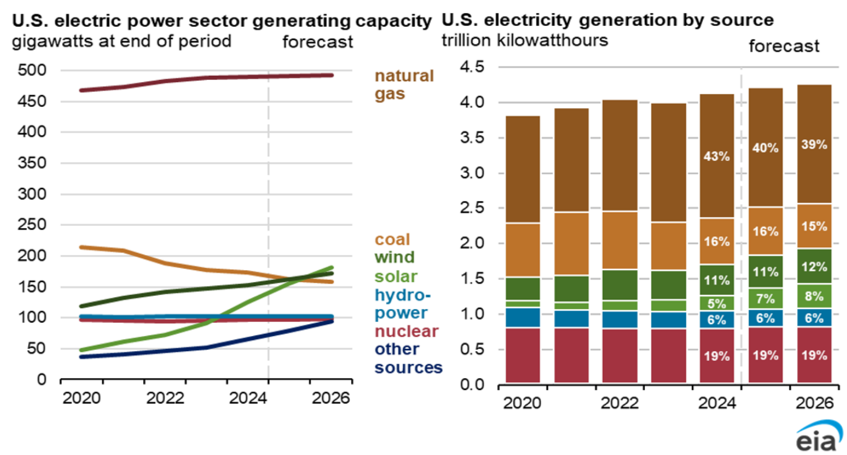

Figure 5. U.S. electric power generating capacity by source. *Data Source: U.S. Energy Information Administration, Short-Term Energy Outlook, February 2025*

The rest of this report discusses solar energy production negotiation terms and conditions within Arkansas in Section 2. Section 3 provides answers to frequently asked questions regarding solar energy. Section 4 provides background on agricultural land use. Section 5 reviews and summarizes Arkansas utility-scale solar PV facilities that are in operation and ones that are contracted to be built. Section 6 evaluates possible PV development considerations for agriculture within Arkansas, as well as a discussion of the integration of PV systems and agriculture, potentially, via utilization of irrigation reservoirs averaging nearly 40 acres in size to support commercial scale PV development without agricultural land use implications. Section 7 provides concluding remarks.

[1] 1 MW *8,760 hrs/yr * 25% capacity factor / 12 MWh/per house = 182 homes per year

2. Energy production negotiation terms and conditions

Arkansas has passed several laws related to solar energy generation regulation, primarily through net metering policies affecting distributed generation. Net metering policies look to encourage the adoption of solar energy production by allowing producers to sell unused electricity they generate back to the grid while not operating independently of the grid as they are also consumers of electricity, essentially using the grid as their battery (Smith et al., 2021). Meters installed on a consumer's home measure usage and at the same time account for the electricity sold back to the grid (Smith et al., 2021). In net metering programs, the excess energy is tracked on the meters and can effectively be used later by the customer for no charge or at a reduced fee. In general, installation of these systems is profitable but has late paybacks that are typically longer than 5 years even when the federal tax credit can be realized in the first year of installation and/or Rural Energy for America Program (REAP) grant funding is successful (King et al., 2025; Liang and Popp, 2024).

Act 464, passed in 2019, allows for third-party financing of solar projects, which encouraged the leasing of land by government entities and nonprofits for PV system installations (Arkansas Senate, 2021). Act 464 also raised the limit for commercial PV systems from 300 kilowatts to 1,000 kilowatts, or 1 MW. The most recent change to net metering policies and renewable energy generation in Arkansas was Act 278. Act 278 ended the one-to-one net metering policy within the state of Arkansas in favor of one where distributed PV system electricity generation is reimbursed for its excess energy during peak periods of production at an avoided cost rate, which is much lower than the retail rate (UADA, n.d.). While this legislation negatively affects distributed generation resources, utility-scale solar facilities can effectively compete at the price of wholesale power without legislation. More details about these regulations can be found in Act 464 and Act 278 with the links to each provided in the references section (UADA, n.d.).

Development of utility-scale solar facilities often begins by evaluating available land, transmission constraints, permitting requirements, environmental concerns, and potential for market offtake. Private landowners often lease land for solar development, sometimes over a 30-year contract. Voluntary solar land leases can range from $450-$2,500 per acre with a preference for cleared, leveled or southward sloping land, that is not wetlands. Acreage must be large enough in size to meet project goals, located in regions with a policy-friendly environment, road-accessible, and ideally near large-scale bulk transmission power lines that have room for expansion.

Solar developers simultaneously conduct multiple studies including transmission interconnection with the local utility or regional transmission organization, local environmental, and geophysical surveys. After studies are completed and land is leased, solar project owners find a buyer for power, including local utilities or large corporate customers. If a solar facility owner contracts with a major electric utility, that contract may be subject to oversight by the state Public Service Commission (PSC) for approval. Total solar project development timelines range from 3 – 5 years.

3. Economic and general questions regarding solar energy

- **Can solar panels get damaged by the weather? (i.e. hail, wind, and extreme heat)** Sometimes. Utility-scale PV systems can withstand winds of up to 111mph without problems. Many solar panels are also rated to withstand hail up to 25mm in size. High temperatures can lead to a drop in efficiency in solar panels, but do not pose a fire hazard to the cables and other structures if insulated correctly (Bošnjaković et al., 2023).
- **Are there tax credits or subsidies?** Yes. Federal tax credits for solar panel installation are available. The tax credits are up to 30% of installation costs.
- **Do solar panels still work when it's cloudy?** Yes. Solar panels still collect energy while it is cloudy, but they produce less energy since the sunlight is less intense (Merie & Ahmed, 2024).
- **Are solar panels noisy?** No. Solar panels themselves do not make noise. The inverters used to convert the direct current (DC) created by the solar panels to alternating current (AC) carried on the grid can make a buzzing sound. However, this noise is often drowned out by other ambient noises in proximity.
- **Will solar panels take away from scenic views?** Maybe. Solar panels can potentially disrupt views, but many contracts for utility-scale PV systems require developers to plant natural visual barriers to minimize impact on scenic landscape from the roadside.
- **Are solar panel fields taking away from farmland?** Potentially. According to USDA, more than 70 percent of utility-scale PV systems developed between 2012 and 2020 in rural areas

happened on agricultural land. However, the amount of agricultural land taken up represented less than 0.05 percent of total farmland (Maguire et al., 2024).

- **Can farmland be converted back if used for a solar farm previously?** Yes. Land used for PV systems can and often is converted back to farmland once the system is decommissioned. Especially in situations where farmland converted was marginal in terms of quality, a 30-year rest period can rebuild soil organic matter and provide habitat for wildlife or serve as habitat for pollinators if appropriately managed.
- **Can livestock be grown in solar panel fields?** Yes. Sheep have been used for vegetation control on PV system facilities.
- **How is vegetation in the solar panel field managed?** Whoever leases the land is responsible for controlling vegetation. Chemical and mechanical means of vegetation control are used to avoid interference with panel access and potential shading.
- **How do solar panels affect wildlife?** More research needs to be done to better understand the interaction between wildlife and solar panels. Research shows that thermal solar facilities can have an adverse effect on birds and bats, while solar photovoltaic systems have much less impact (Smallwood, 2022).
- **Do solar panels produce glare issues?** No. PV panels cause less glare than standard home window glass.

4. Arkansas Land Use

Arkansas is comprised of 33.6 million acres of land with 13.7 million acres in farms per the last Census of Agriculture. Land in farms has declined by 1% with 11% fewer farmers and 12% larger farms in 2022 compared to 2017. Arkansas also significantly relies on agriculture. The aggregate agriculture sector's share of the state economy is 1.3 to 5 times greater for Arkansas than for any contiguous state and the southeast region, and 2.8 times that of the U.S. (English and Popp, 2024). Further, Arkansas is the No. 1 producer of rice in the U.S.; No. 3 in broiler chickens, upland cotton and cottonseed; No. 4 in turkeys; and No. 7 in peanuts. Given that reliance on agriculture, apprehension about converting agricultural land to solar leasing use is natural, despite land being reversible to farmland after 30 years and the potential for grazing small ruminants, preferably sheep, beneath solar panels. Also, solar project development often generates significantly higher levels of income for landowners than some types of agricultural production. As such, landowners can retain ownership of their private property instead of selling it for real estate development, which is the leading threat to loss of agricultural land.

5. Arkansas solar energy developments

Seventeen utility-scale PV systems have been installed in Arkansas since 2018, and are owned by Entergy Arkansas, LLC. These solar facilities were voluntarily developed on private property with land lease agreements with the landowner. Entergy Arkansas is the largest energy provider in the state, serving approximately 730,000 customers in 63 counties (Entergy Arkansas, LLC, n.d.). It has operated for over a century.

Figure 6 shows counties with completed utility-scale PV systems and percentages of agricultural land occupied (MISO, 2024). Tables 1 and 2 provide more information about these PV systems. To estimate the land footprint of these PV systems, a range is presented based on two studies. A study conducted by Bolinger and Bolinger (2022) estimated that the most efficient PV systems produce 0.18 MW per acre of land, meaning that 5.56 acres are necessary to host 1MW (Bolinger & Bolinger, 2022, DeLong et al., 2023). By contrast, an older National Renewable Energy Lab (NREL) study showed that 1 MW of solar energy production requires 8.9 acres (Ong et al., 2013). Given that most utility-scale PV systems

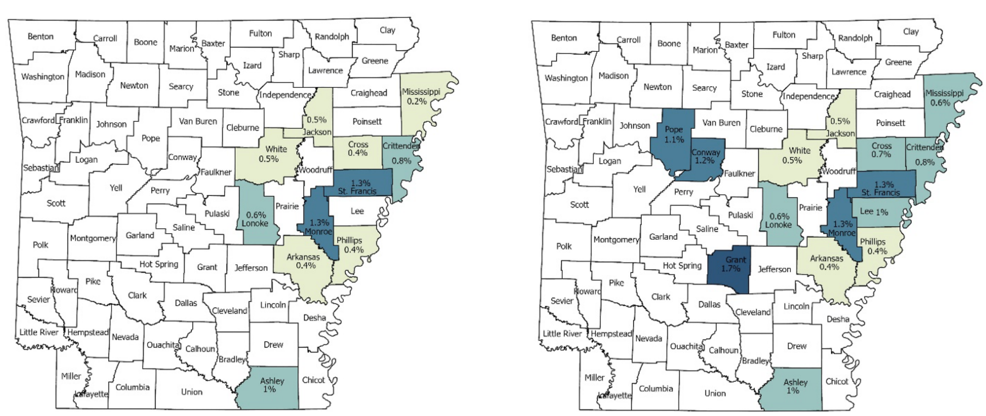

Figure 6. Estimated solar PV use of crop, pasture, and other agricultural lands for current utility-scale projects (left) and cumulative total including projects with completion dates by 2026 (right).

require hundreds to thousands of acres of ideally contiguous cleared land, crop or pastureland was considered the most likely land type occupied. A notable exception is the future installation in Grant County on woodland or timberland areas. The tables use 2022 Census of Agriculture information. With 26,536 acres classified as woodland in Grant County, the installation accounts for 2.7% of that land resource, or 1.1% of crop, pasture, wood, and other land.

Approximately 150 more utility-scale PV system projects are in preliminary planning stages. Importantly, not all these facilities will be fully developed with most being cancelled. Eight projects have negotiated in-service dates and are to be completed by 2025-26. Together with installations in place, the agricultural land footprint in those additional counties is provided in Table 2.

As of 2023, approximately [15,000 MW] of power generation capacity exists within Arkansas based on a mix of natural gas, coal, nuclear, and other generation resources to provide all the electricity necessary for the state. If another 15,000 MW of solar generation resources were developed in the state — or essentially a doubling of power generation capacity for the state — approximately 83,400 – 133,500 acres would be required across the state. Even under this extreme level of solar development, which is unlikely to happen, solar would use less than 1% of the 13.7 million acres of agricultural land. With current projections through 2026, 22,351 to 35,778 acres of land are in utility-scale PV systems. This amounts to 0.2% of the 13.7 million acres of agricultural land in the state.

6. Potential agricultural land use (for solar and other purposes)

According to the USDA, solar projects have removed less than 0.05 percent of land from agricultural purposes nationwide in 2020, and this is likely to continue. Arkansas numbers to date suggest a larger percentage of agricultural land in several counties as shown in Figure 6 and Tables 1 and 2. Statewide, however, 0.2% of agricultural land is occupied by solar PV systems. Also important is that land chosen for PV system facilities does not have to be high-performing agricultural land; it can be very low-performing land, which is often ecologically

Table 1. Completed PV system facilities information and percentage of county agricultural crop, pasture and other land (excluding woodland; USDA, 2022) occupied by solar PV systems.

Projects	Size in Megawatt (MW)	Location (county)	Est. acreage used for facility	2022 Census Ag. Acreage	Ag. Acreage in Solar (%)
J1215	200	Arkansas	1,112-1,780	379,103	0.4
J1281 & J680	75 & 100	Ashley	417-667 & 556-890	127,735	0.4 + 0.6 or 1.0
J1007 & J934	200 & 200	Crittenden	1,112-1,780 & 1,112-1,780	349,910	0.4+ 0.4 or 0.8
J1125	135	Cross	750-1,201	265,156	0.4
J919	180	Jackson	1,000-1,602	272,911	0.5
J1258 & J1415	50 & 250	Lonoke	278-445 & 1,390-2,225	379,294	0.1 + 0.5 or 0.6
J1155	150	Mississippi	834-1,335	511,577	0.2
J1434 & J907	100 & 200	Monroe	556-890 & 1,112-1,780	163,207	0.4 + 0.9 or 1.3
J663 & J834	100 & 100	Phillips	556-890 & 556-890	374,593	0.2 + 0.2 or 0.4
J1060	500	St. Francis	2,780-4,450	271,388	1.3
J1373 & J891	95 & 100	White	528-845 & 556-890	277,405	0.2 + 0.3 or 0.5

Note: For a complete listing of all solar installations as monitored by the Energy Information Administration, see https://eia.maps.arcgis.com/apps/dashboards/77cde239acfb494b81a00e927574e430

Table 2. Negotiated in-service date PV system facilities information and percentage of county agricultural crop, pasture and other land (excluding woodland; USDA, 2022) occupied by solar PV systems including acreage already in service (italicized projects).

Projects	Size in Megawatt (MW)	Location (county)	Est. acreage used for facility	2022 Census Ag. Acreage	Ag. Acreage in Solar (%)
J1559	200	Conway	1,112-1,780	117,176	1.2
J1816 & *J1125*	135 & 135	Cross	750-1,201 & 750-1,201	265,156	0.4 + 0.4 or 0.7[a]
J1577	100	Grant[b]	556-890	41,617	1.7
J1710 & J1820	300 & 100	Lee	1,668-2,670 & 556-890	295,625	0.7 + 0.2 or 1.0[a]
J1562 & J1670 & *J1155*	200 & 50 & 150	Mississippi	1,112-1,780 & 278-445 & 834-1,335	511,577	0.3 + 0.1 + 0.2 or 0.6
J1558	200	Pope	1,112-1,780	134,725	1.1

Note: [a]Numbers do not add due to rounding. [b]The Grant County project is on timberland. For consistency, the percentage of agricultural land base impacted calculated as the project acreage/(crop, pasture & other area excluding woodland). The percentage of woodland is 2.7% and the percentage of crop, pasture, other and woodland is 1.1%.

valuable. With a prolonged rest period, most of that land would go back to production as Maguire et al. (2024) estimate that only 15 percent of solar sites that were transitioned from agriculture have not transitioned back.

While localized upward pressure on land prices and/or land rent may be possible, the current and planned level of land diversion from cropland to solar fields is considered too small to impact Arkansas crop production sufficiently to lead to crop price changes that are influenced largely by global supply and demand changes. Nonetheless, anecdotal evidence of increases in rent and price of land near solar installations has agricultural policy analysts beginning to talk about the issue.

7. Solar grazing, floating solar systems and other agrivoltaics considerations

There are several opportunities for PV systems to be integrated with agriculture. This practice is known as agrivoltaics. Agrivoltaics includes combining the production of crops and livestock alongside PV systems on a piece of land. Sheep grazing, honeybees, and other pollinators are commonly linked to agrivoltaics. Even though this serves as a more efficient use of land, the PV systems still take up space that could be used for pure agricultural purposes.

One of the newer developments being studied is the potential of installing floating PV systems (FPV) on irrigation reservoirs used for agriculture. The agricultural land use impact is minimal to none, as FPV are solar systems mounted to buoys. Such systems provide synergies with irrigation in the sense that solar panel productivity may increase (given cooling from water below), prevent evaporation (thereby increasing the amount of water available for irrigation), reduce algae production (given shading), and possibly reduce bank erosion from waves on reservoirs that average 35 acres in size ranging from 2.5 to 650 acres (Yeager et al., 2017; Jiang et al., 2023; Farrar et al., 2022; Ali et al., 2023).

8. Conclusions

Solar energy is growing in popularity in the U.S. and is important to utilize as the country continues to search for ways to reduce carbon emissions and lower energy costs for consumers. Solar energy can help reach energy production goals because it is plentiful and the technology to capture it is cost effective.

Arkansas supports the adoption of solar panels, by both residents and businesses, even after the switch away from one-to-one net metering. Several utility-scale PV system facilities are already in Arkansas with more contracted to go online in the near future. Many of these projects are in southeastern Arkansas, with other sites throughout the state being evaluated for potential projects. This has created concerns about the loss of farmland and the disruption of scenic views. Although much of the land used for PV system facilities in rural areas is agricultural land, the acreage involved represents a very small fraction of it. As such, PV systems, agrivoltaics and FPV are not considered a threat to the vital industry of agriculture in the State of Arkansas. Overall, solar systems can be a great tool for producers to further diversify their income through the leasing of land and may help to improve agricultural irrigation practices.

References

Ali, M., Osman, A., El-Shaib, M., & Shehata, A. S. (2023). Floating solar panels on Lake Nasser: Clean energy, reduce evaporation & emissions. *AIP Conference Proceedings*, 3018, 020013. https://doi.org/10.1063/5.0175162

Arkansas Senate. (2021, November 17). *Solar power growing in Arkansas, thanks to Act 464 of 2019*. https://senate.arkansas.gov/senate-news/posts/2021/november/solar-power-growing-in-arkansas-thanks-to-act-464-of-2019/#:~:text=Act%20464%20allows%20net%2Dmetering,to%20other%20types%20of%20customers.

Antonio, K. (2024, January 16). *Solar and wind to lead growth of U.S. power generation for the next two years - U.S. Energy Information Administration (EIA). EIA*. https://www.eia.gov/todayinenergy/detail.php?id=61242

Bolinger, M., & Bolinger, G. (2022). Land requirements for utility-scale PV: an empirical update on power and energy density. IEEE Journal of Photovoltaics, 12(2), 589-594. https://ieeexplore.ieee.org/document/9676427

Bošnjaković, M., Stojkov, M., Katinić, M., & Lacković, I. (2023). Effects of extreme weather conditions on PV systems. *Sustainability, 15*(22), 16044. https://doi.org/10.3390/su152216044

DeLong, K. L., Murphy, O. G., Hughes, D. W., Clark, C. D., Department of Agricultural and Resource Economics, Crissy, H., Penn State University, Tennessee Solar Energy Industries Association (TenneSEIA), GreenGo Energy U.S., Solar Energy Industries Association, & University of Tennessee Institute of Agriculture. (2023). *EVALUATING POTENTIAL LAND USE OF UTILITY-SCALE PHOTOVOLTAICS (SOLAR PANELS) ON FARMLAND IN TENNESSEE*. https://tenneseiasolar.com/wp-content/uploads/2023/07/Solar-Industry-Report.2023_FINAL.pdf

EIA. (2024a, February 29). *What is U.S. electricity generation by energy source?* Retrieved December 27, 2024, from https://www.eia.gov/tools/faqs/faq.php?id=427&t=3

EIA. (2024b, July 18). *Profile analysis - Arkansas*. U.S. Energy Information Administration. Retrieved December 27, 2024, from https://www.eia.gov/state/analysis.php?sid=AR#:~:text=In%202023%2C%20the%20amount%20of,of%20the%20state's%20renewable%20electricity.&text=Arkansas's%20two%20largest%20solar%20farms%20each%20have%20180%20megawatts%20of%20generating%20capacity.

EIA. (2025). *Short-Term Energy Outlook*. February 2025. U.S. Energy Information Administration. Retrieved February 2025, from https://www.eia.gov/outlooks/steo/analysis.php

Eicke, L., Eicke, A., & Hafner, M. (2022). Solar power generation. In *Springer eBooks* (pp. 157–169). https://doi.org/10.1007/978-3-030-86884-0_9

English, L. and J. Popp. 2024. Arkansas Agriculture Profile: Pocket Facts 2024. Arkansas Agricultural Experiment Station, University of Arkansas System, Division of Agriculture, Fayetteville. 2024-Ark-Ag-Profile.pdf

Farrar, L. W., Bahaj, A. S., James, P., Anwar, A., & Amdar, N. (2022). Floating solar PV to reduce water evaporation in water stressed regions and powering water pumping: Case study Jordan. *Energy Conversion and Management, 260*, 115598. https://doi.org/10.1016/j.enconman.2022.115598

Jiang, Q., Song, Z., Bramante, R. C., Ndione, P. F., Tirawat, R., Berry, J. J., Yan, Y., & Zhu, K. (2023). Highly efficient bifacial single-junction perovskite solar cells. *Joule, 7*(7), 1543–1555. https://doi.org/10.1016/j.joule.2023.06.001

King, M., Popp, M.P, J. Anderson, L. Connor, & J. Kee. 2025. "Solar Investment Analysis: Effects of Electricity Rate Structure and Financing Terms on Financial Leverage, After-Tax Cashflow, and Profitability". Agricultural Finance Review. In Press.

Liang, Y. and M. Popp. 2024. "Financial Analysis Example for Photovoltaics on a Broiler Farm". University of Arkansas Cooperative Extension Service Fact Sheet FSA. https://www.uaex.uada.edu/publications/pdf/FSA1103.pdf

Maguire, K., Tanner, S. J., Winikoff, J. B., & Williams, R. (2024). *Utility-scale solar and wind development in rural areas*. https://doi.org/10.32747/2024.8374829.ers

Merie, F. H., & Ahmed, O. K. (2024). Experimental assessment of the performance of the PV/solar chimney under the cloudy weather. *Results in Engineering, 23*, 102605. https://doi.org/10.1016/j.rineng.2024.102605

MISO. 2024. Midcontinent Independent System Operator Inc. https://www.misoenergy.org/planning/resource-utilization/GI_Queue/gi-interactive-queue/

NRC. (2012). What is a Megawatt. In Nuclear Regulatory Commission. *Nuclear Regulatory Commission*. https://www.nrc.gov/docs/ML1209/ML120960701.pdf

NREL. National Renewable Energy Lab - Annual Technology Baseline 2024 (2025). Definitions – Downloadable Levelized Cost of Electricity Estimates by Technology. Downloaded February 2025 from https://atb.nrel.gov/electricity/2024/definitions#market+policiescase and Technological Assumptions https://atb.nrel.gov/electricity/2024/technologies

Ong, S., Campbell, C., Denholm, P., Margolis, R., Heath, G., & National Renewable Energy Laboratory. (2013). *Land-Use requirements for solar power plants in the United States*. https://www.nrel.gov/docs/fy13osti/56290.pdf

Smallwood, K. S. (2022). Utility-scale solar impacts to volant wildlife. *Journal of Wildlife Management, 86*(4). https://doi.org/10.1002/jwmg.22216

Smith, K. M., Koski, C., & Siddiki, S. (2021). Regulating net metering in the United States: A landscape overview of states' net metering policies and outcomes. *The Electricity Journal, 34*(2), 106901. https://doi.org/10.1016/j.tej.2020.106901

UADA. (n.d.). *Net metering policies in Arkansas for solar energy*. UofA Division of Agriculture Research and Extension. https://www.uaex.uada.edu/environment-nature/energy/solar/net-metering.aspx

USDA. Census of Agriculture. 2022 State and County Profiles – Arkansas. Available at https://www.nass.usda.gov/Publications/AgCensus/2022/Online_Resources/County_Profiles/Arkansas/index.php

USDE. (n.d.). *How does solar work?* Energy.gov. Retrieved December 27, 2024, from https://www.energy.gov/eere/solar/how-does-solar-work

USDS. (2023, October 2). *Energy - Policy issues*. United States Department of State. https://www.state.gov/policy-issues/energy/

Yeager, M.A., Reba, M.L., Massey, J.H. & Adviento-Borbe, M.A.A. (2017). On-farm irrigation reservoirs in two Arkansas critical groundwater regions: A comparative inventory. *Applied Engineering in Agriculture*. https://doi.org/10.13031/aea.12352

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