From: PSC Public Comment
To: "michael george"
Subject: RE: Public Comment Submission - Case No. 2025-00395 - MYSO, LLC
Date: Friday, June 26, 2026 8:59:00 AM

Case No. 2025-00395

Thank you for your comments on the application of MYSO, LLC. Your comments in the above-referenced matter have been received and will be placed into the Public Comments portion of the case file for the Commission's consideration. Please cite the case number in this matter, 2025-00395, in any further correspondence. The documents in this case are available at [View Case Filings for: 2025-00395 (ky.gov)].

Thank you for your interest in this matter.

From: michael george [redacted]
Sent: Thursday, June 25, 2026 5:52 PM
To: PSC Public Comment <PSC.Comment@ky.gov>
Subject: Public Comment Submission - Case No. 2025-00395 - MYSO, LLC

[redacted]

[redacted].

[redacted]

Dear Kentucky Public Service Commission,

This is a copy of my verbal public comment given at the MYSO hearing June 10, 2026 hearing

Sincerely,

Michael George

Louisville, KY

BEFORE THE KENTUCKY STATE BOARD
ON ELECTRIC GENERATION AND TRANSMISSION SITING

In the Matter of: Electronic Application of MYSO, LLC for a Certificate
to Construct a Merchant Electric Solar Generating Facility
Case No. 2025-00395

POST-HEARING WRITTEN PUBLIC COMMENT
Regarding the Reliability of the Property Value Evidence

Introduction

I am not anti-solar. I am pro-honesty.

I attended the June 10, 2026 hearing and made a verbal public comment (Attachment A). This written comment follows up on it. The applicant's own documents and sworn testimony show that the property-value evidence the Board is asked to rely on does not hold up, and that matters to the people who live near this project.

The most basic reason is credibility. Mr. Kirkland's sworn explanation for how this project's battery analysis came to be filed in a different case - that it was a stray "template" for a battery system he was "not used to" in Kentucky - is contradicted by his own prior Kentucky report: the Banjo Creek Solar report (Case No. 2023-00263, Graves County, 2023) already contained a full battery-storage section (Attachment B, Part 1). An expert whose sworn account of his own work cannot be squared with the record gives the Board reason to weigh the rest of it with care. The sections that follow show the report does not hold up on its own terms either.

The property-value report is an opinion, not a measurement of this project's effect on these homes.

The property value report before the Board - the Property Value Impact Analysis Report prepared by Kirkland Appraisals, LLC (Exhibit H) - is offered as expert evidence that the project will have "no impact" on adjoining home values. It does not measure that, and its own summary shows why.

- **It reports a conclusion, not a calculation.** The report compresses its entire analysis into one line: 256 "data points," a range of "−7% to +19%," and a "Conclusion" of "0%", with no method shown for how that spread becomes zero and no measure of confidence. Its one stated standard is its own invention: any result within ±5% is dismissed as "market imperfection." The peer-reviewed study in Section V, by contrast, estimates the effect at each distance and reports the statistical confidence around it.
- **It counts unlike things alike.** Only sixty-three of the 256 "data points" are actual sales or matched pairs; the rest are 188 county tax assessors' opinions and 14 broker comments, weighed the same as sales, and the 256 does not even tie to those parts, which sum to 265, with several homes counted twice. A county assessor values property for taxation, not the

effect of one project on one home, and 18 of the 188 gave no response on the impact question yet were counted anyway. Set the opinions aside and the report's real evidence is those sixty-three transactions, whose largest reported gains fall apart on inspection (Section III). And the "+19%" at the top of its range is, in the report's own words, a rise in the value of "undeveloped or farm land" near solar, not a gain for an occupied home.
- **Its one direct test of proximity comes up empty.** The report charts its own impact figures against distance from the nearest panel and the fitted trendline shows no real relationship - yet it reads that flat line as confirming that nearness is harmless.

And it is not, in the end, a study of this project at all. The identical conclusion appears in at least twenty-one of Mr. Kirkland's reports across five states (Attachment B, Part 4). A sentence reproduced word-for-word across two dozen cases cannot measure what this project will do to these homes. The Board should require a reliable property-value analysis before crediting its "no impact" conclusion.

I. The property value report has no battery-storage analysis, yet its conclusion claims battery storage has no impact.

Mayfield Solar is a 200 MW solar project with a co-located 200 MW / 800 MWh battery energy storage system (BESS). The Property Value Impact Analysis Report (Exhibit H) contains no battery-storage analysis:

- Its table of contents lists Sections I–IX only: no BESS section, no market data for battery facilities, no comparable BESS sites, and no paired sales for battery-storage proximity.
- Yet the report's conclusion states: *"Similar paired sales showed no impact from adjoining battery storage facilities."* The analysis that sentence relies on does not appear anywhere in the Mayfield report.

That analysis appears instead in the Crab Run Solar report (Case No. 2025-00276), a project that has no battery storage. The Crab Run filing contains a full, roughly twenty-page BESS section opening, "The 200 MW (800MWH) BESS is proposed to be located on the parcel shown below…", the Mayfield capacity, with a site-specific 1,516-foot measurement to the nearest home and images of the Mayfield site. (Attachment B, Part 1, Figures 1–2.)

At the hearing, Mr. Kirkland explained this as a "template" inadvertently left in the Crab Run file, but also testified that these templates are built from "an actual case" and "real world examples" so "the data actually applies" (Tr. 1:56:27–1:57:00). The real-world content here - the 200 MW / 800 MWh capacity, the 1,516-foot measurement, the Graves County population - is Mayfield's, not placeholder text. Either way, the consequence is the same:

The property value report in front of the Board is missing the battery-storage analysis its own conclusion cites.

II. The battery system is missing from the rest of the application as well.

The property value gap is not isolated. By the applicant's own filings and sworn testimony, the BESS was left out of every study in which its effects would normally be assessed:

- **Decommissioning.** The filed Decommissioning Plan states: “The BESS facility was not incorporated into this reclamation cost estimate.” When Staff asked, the applicant deferred to a future update; at the hearing, the commitment to include BESS removal was made conditional on a legal requirement (Tr. 35:40).
- **Acoustic.** The BESS was omitted from the acoustic assessment; the applicant said vendor-specific noise data would come “once procurement is complete.” No revised acoustic assessment was filed before the hearing.
- **Flood plain.** Asked at the hearing whether any portion of the battery system or substation would lie in the FEMA flood plain, the applicant’s witness, Mr. Turner, answered yes, but testified that the applicant would “focus the placement of the battery units away from” the flood plain and would “elevate” them “if needed,” and that the flood plain could not be avoided “completely” “at this time”; and was not aware of any consultation with FEMA (Tr. 1:24:40–1:27:33); the applicant has since told Staff that FEMA consultation “will not be necessary,” relying on a state floodplain permit (Post-Hearing RFI, Resp. 2). The property value report assesses none of this, and contains no flood-plain or water-proximity analysis for the battery system or any other component.

Despite this, the applicant told Staff that the BESS can be added “without… increasing impacts beyond those already evaluated by the Siting Board” (RFI 2, Resp. 24), yet the BESS was not evaluated in the property value, acoustic, or decommissioning studies. After the hearing the applicant did give a Mayfield-specific battery distance, 2,651 feet to the nearest non-participating home (Post-Hearing RFI, Resp. 3), but only a distance, not the impact analysis the report still lacks. The same response places the nearest non-participating home 322 feet from a solar panel, well inside the half-mile band where the research in Section V finds the largest losses. (Attachment B, Part 2.)

The battery system is also treated as too tentative to study, yet it is central to the project: asked when the BESS decision would be made, Ms. Kitchen testified, “at this point we are planning to incorporate a battery energy storage system,” and called it “an important part of the project” (Tr. 27:09, 40:20). The risk is not hypothetical: in January 2025 a lithium-ion battery facility in Moss Landing, California caught fire, released heavy metals across the surrounding area, and drew evacuation orders covering more than 7,600 acres and an estimated 1,200 to 1,500 residents; a home 2,651 feet from the battery sits within that kind of footprint. These fires are also hard to fight: they can burn for days and need very large, sustained volumes of water or a defensive let-it-burn approach (a recent Los Angeles fire that the operator said began on a warehouse’s rooftop solar array took nearly a week to put out and required helicopter water drops), and while the applicant offered local fire officials training (Tr. 28:17-28:51), it offered nothing toward the equipment or capacity such a fire demands, which a rural volunteer department cannot be expected to provide. A property value report with no battery-storage analysis cannot speak to any of this for the homes near this project.

III. The “no impact” conclusion comes from a reusable template, not from an examination of this project’s homes.

On the record, Mr. Kirkland claims to have prepared “over 1,000” of these reports for solar developers and to have “never completed a report that indicated a negative impact” (Lost City

Solar, Case No. 2024-00406, Tr. 37:11). The reports are built from a shared template, and content prepared for one project has appeared in another's filing. Section I of this comment shows one example, the battery analysis built on Mayfield's own data but filed in the Crab Run case. There is another: the Crab Run report, for a project in Marion County, analyzes the population of Graves County - Mayfield's county, not Crab Run's. (Attachment B, Parts 1 and 4.)

Both problems, the battery section and the Graves County data, were put to Mr. Kirkland at the April 28, 2026 Crab Run hearing, where he acknowledged "a clerical error" but said he had not yet reviewed it. Nearly two months later, including in the applicant's June 17 post-hearing brief and June 22 data responses, neither has been corrected in either docket. (Attachment B, Part 1.)

What is actually specific to Mayfield does no analytical work. The report lists the neighboring parcels in a surrounding-uses table, and even that table is not carefully vetted (Attachment C), but a list of adjoining homes does not test whether this project lowers their value. The "no impact" conclusion rests instead on comparable sales drawn from other, distant solar projects.

Those comparables also don't hold up. The report's largest reported gain, a 17.5% increase attributed "to the solar farm", is a home that, by the report's own account, sold in May 2022, before the Logan County project began construction in 2023; a solar effect cannot appear in a sale that predates the project. Another of its largest reported gains sits beside the E.W. Brown generating station, a large multifuel power plant (coal, gas, and hydro) with only a 10 MW solar array on its grounds. A home next to a major power complex, present for both of its sales, is not comparable to a home next to a 200 MW solar project like Mayfield, and tells us nothing about solar's effect here. The report concedes as much, saying it "will not rely heavily on this indicator", then counts it among the positives anyway. Both homes, like the others behind the largest gains, sit more than 1,000 feet from their projects, far outside the 300-to-500-foot range of the closest Mayfield homes. (Attachment B, Part 6.)

Closeness is the factor that matters most: the research in Section V ties value loss to it, and Mr. Kirkland himself calls it decisive - he testified he has declined to take part in cases where homes sat within about 50 feet of the panels, which he "thought was too close," while admitting "I do not have data to support that opinion" (Case No. 2025-00276, Apr. 28, 2026). His report proves nothing about it. His data never reaches the close-in homes here, and his one distance test is flat: an R^2 of 0.0143 means distance explains only about one percent of the variation - too thin to show an effect, not evidence there is none.

IV. The analysis was narrowly drawn, and the independent review narrowed it further.

The property value analysis was narrow from the start: the report names the nineteen homeowners on parcels that directly adjoin the project and goes no further. The applicant's own filings place far more homes near the project: the residential-structure table the applicant filed at Staff's request lists 170 homes within 2,000 feet of the project boundary, and Harvey Economics, the consultant the Siting Board retained to review the application, counts 118 within 2,000 feet of a solar panel. Nineteen is a small fraction, and the research in Section V finds measurable effects well beyond the bordering parcels.

It also measures the wrong thing. KRS 278.708(3)(c) calls for assessing the potential changes in "property values and land use … for property owners adjacent to the facility" - the whole parcel and its use, not just the house on it. But Mr. Kirkland measures from the panels to the home, not to the property line; asked at the Crab Run hearing about a resident whose property boundary sits 73 feet from the project, he said its value would not be affected, because he looks at "the proximity of that house to their view" (Case No. 2025-00276). A solar field at the property line still affects the backyard, the cropland, and the land's buildability even when the house sits far back, and the harm does not require an existing home: a buildable residential lot is worth less, and harder to sell, with an industrial solar field at its edge. The report's two methods, sale/resale and matched-pair, both need a home that has sold, so backyards and vacant lots fall outside them; and where it does reach for lot sales, at Elmwood Court next to Turkey Creek Solar, it relies on developer-affiliated transactions it itself calls "not a good indication of market value" (Attachment B, Part 7).

Harvey Economics then narrowed that population. Of the 118 homes within 2,000 feet of a panel, it set aside eleven as "participating landowners", a category into which it folded the nine Good Neighbor Agreement owners, leaving the 107 it reports as non-participating. Its reassuring headline - that the closest non-participating home is "more than 300 feet" away - is measured to the nearest solar panel, which sits set back inside the project fence; measured to the project boundary, Harvey's own table counts nineteen homes within 300 feet, non-participating homes among them. The nine GNA owners, among the closest, were classified out of the non-participating population rather than studied within it.

The agreements themselves are hard to square with a finding of no impact. BrightNight paid undisclosed compensation (Exhibit C, redacted from both the filing and the recorded instrument) to nine adjacent owners for a permanent "Effects Easement" covering "noise, audio, visual, view, light, vibration, or other effects," waiving the right to sue and running with the land. BrightNight's own witness described the payment as compensation "for the inconvenience of construction and change in viewshed" (Tr. 44:53–45:02). A developer does not pay to extinguish effects that do not exist. (Attachment B, Part 3.)

Even the independent review the Siting Board commissioned broke little new ground: Harvey Economics reuses in its property value section the template from its Barrelhead Solar review - ten of seventeen sentences word-for-word identical, conclusion and all - and identifies no limitation. (Attachment B, Part 4.)

V. The most comprehensive research available was left out, and it points the other way.

The largest study to date - Hu et al. (2025), published in the Proceedings of the National Academy of Sciences and based on 8.3 million residential transactions near 3,699 solar facilities - finds that proximity is the major driver of residential value loss. Even without a view of the project, homes within one-half mile sell for up to 7.2% less; with the project in view, up to 7.9% less; the effect remains statistically significant out to three miles. Because proximity, not merely visibility, drives the loss, the vegetative screening the applicant relies on does not cure it. The study's one positive number, a roughly 19% rise in the per-acre value of agricultural and vacant land near solar, reflects demand to lease or convert that land for future solar, not any benefit to an occupied home, and it is temporary (appearing about three years after construction, then fading).

Every one of the nineteen adjoining homeowners in Mr. Kirkland's own table has a home within one-half mile of the project, squarely within the band where this study measures the largest losses.

A literature review the LSU Center for Energy Studies prepared at the request of a Louisiana legislative committee (Upton & Talpur, August 2024), which predates the PNAS study, concludes that "studies that analyze housing values in rural areas specifically find that utility-scale solar is associated with a 2.5%–5.8% percent reduction in housing values."

Neither source appears anywhere in Harvey Economics' literature review (Appendix E), although the PNAS study was published roughly eleven months before Harvey finalized its review. The PNAS study also reports larger effects in strongly Republican counties; Graves County, where Donald Trump received about 76% of the 2016 presidential vote, is such a county. (Attachment B, Part 5.)

The siting statutes exist to protect the people who live closest to a project, through setbacks from residential neighborhoods (KRS 278.704(2)), a required assessment of the project's effect on their property values (KRS 278.708(3)(c)), and the Board's authority to require mitigation such as vegetative screening (KRS 278.708). Yet under the Good Neighbor Agreements, the closest residents conveyed a permanent Effects Easement, released every effects claim, and waived the statutory setback, in exchange for screening and a payment. They were asked to give up property rights and legal recourse - permanently, and binding on future owners - to obtain protections the statute already holds out to them.

VI. What I'm asking the Board to do.

I respectfully ask the Board to:

1. Before it closes the property-value record, have the applicant close the battery-storage gap: (a) explain how the report came to omit the battery-storage analysis its own conclusion cites, and produce any such analysis prepared for Mayfield; (b) file a dedicated BESS property-value study - market data, comparable battery-storage sites, and paired sales for BESS proximity - together with a BESS acoustic assessment and a corrected decommissioning cost estimate that includes the BESS without conditions; (c) analyze the battery's impacts at its current location, including its flood-plain and Mayfield Creek placement - the post-hearing response gave distances, but no such impact analysis has followed; and (d) provide an emergency-response and fire-suppression plan for the battery system, addressing the equipment, water supply, and local response capacity a lithium-ion fire would require - the applicant has offered local fire officials training but nothing more, and the record contains no such plan.
2. Call for a property-value analysis that looks at the homes actually at risk, not the nineteen adjoining owners alone. The applicant's own filings identify about 170 homes within 2,000 feet, and the research in Section V finds the largest losses within a half-mile and significant effects out to three miles; the analysis should reach that range, include the Good Neighbor Agreement neighbors, and compare those homes with nearby homes sold after similar

projects were built, screened for other factors that affect price, rather than listing nineteen adjoining owners and resting the conclusion on distant or pre-construction sales. It should also measure to the property line and weigh the whole parcel - homes, yards, and buildable lots alike - not the dwelling alone.

3. Have the applicant engage the recent research it left out, Hu et al. (2025) and the LSU review, and explain why their proximity findings shouldn't apply here.
4. Defer action on the setback deviation until the items above are filed and independently reviewed, and until the Applicant's identification of residential neighborhoods is complete. Its deviation filing identifies twenty-two residential neighborhoods but does not include two clusters that appear to meet the statutory definition (KRS 278.700(6)) and that lie closer to the Project than neighborhoods it did identify: six homes on about 5.85 acres along State Route 849 E (east of Neighborhood No. 7), and six more on about 5.5 acres along Olden Road (beside Neighborhood No. 13). (Attachment B, Part 8.)

KRS 278.708(3)(c) requires the application's Site Assessment Report to assess this project's effect on nearby property values; for the reasons above, the Board cannot find that requirement satisfied on this record: the assessment omits the battery system entirely, and where it can be checked it does not hold up. I am not asking the Board to deny this project. I am asking it for a complete and reliable property-value impact analysis, one that includes the battery storage system and engages the current research, before it decides. Thank you for considering these comments.

Respectfully submitted,

Michael George
Louisville, KY 40205

Attachments

A - Verbal Public Comment as Delivered at the June 10, 2026 Hearing

B - Detailed Critique of the Property Value Evidence and Related Siting Deficiencies (analysis, figures, and citations)

C - Kirkland Surrounding-Uses Table, Annotated

D - Hu et al. (2025), "Impact of large-scale solar on property values in the United States: Diverse effects and causal mechanisms," Proceedings of the National Academy of Sciences, Vol. 122, No. 24

E - Upton & Talpur (2024), "Literature Review on the Impact of Utility-Scale Solar on Housing Prices," LSU Center for Energy Studies, Aug. 30, 2024

ATTACHMENT A

Verbal Public Comment as Delivered at the June 10, 2026 Hearing

Case No. 2025-00395 (MYSO, LLC / Mayfield Solar)

Note: *The following is the public comment delivered by the commenter at the June 10, 2026 hearing, reproduced as delivered. The written comment to which this is attached states the supporting figures precisely against primary sources.*

Good morning. My name is Michael George. I live in Louisville, Kentucky. I want to start with what brought me here, because I think it tells the Board something important about the quality of the review in this record.

When I was reviewing the application for the Crab Run Solar project, I noticed something. The property impact report included references to Graves County and a couple of sections about battery storage. I figured the battery storage section in that report was a mistake, so I looked for the property impact report in other applications that included Graves County and a battery storage system, but I couldn't find it. After specifically pulling the application files from this docket, I realized why - it was omitted from this impact report. Crab Run has no BESS - yet its Kirkland report has a full BESS section: a table of contents entry, market data for battery storage facilities, paired sales for BESS proximity, and a formal conclusion. This project has a BESS in the plans - yet its Kirkland report contains none of that. No section. No data. No comparables. No paired sales. One sentence with no supporting data.

Harvey Economics reviewed this proceeding and acknowledged the BESS in three separate footnotes - noting missing acoustic data and that the decommissioning estimate excludes it. Harvey was aware of it. Yet Harvey did not flag its complete absence from the property value analysis.

Kirkland Appraisals is the appraiser of record in both proceedings. The Crab Run hearing was six weeks ago. These errors are sitting in the public record. In the time between that hearing and this one, neither applicant has filed a correction.

This is not rigorous property impact analysis. It's reckless copy and paste - applied to what is, for most families, their most valuable asset.

One of the negative results in Kirkland's Kentucky sale/resale data has a calculation error. The Mount Olive Creek sale occurred in December 2022 - a Q4 date. Kirkland uses the Q3 House Price Index value. The correct quarter changes the result from -5.0% to -6.4% - outside Kirkland's own stated plus-or-minus 5% threshold. The same error appears in the Crab Run filing and has not been corrected in either proceeding.

Kirkland's matched pairs come entirely from a 2.7 megawatt project[1] - 74 times smaller than this one. Meanwhile, the most comprehensive study ever conducted on this question - 8.8 million transactions, 3,699 large-scale solar sites - was published in the Proceedings of the National Academy of Sciences last June, eleven months before Harvey's review was finalized, and is not in it. The finding: an average loss of 4.8% within 3 miles, reaching 7 to 8% within half a mile.

Conservative counties average loss is 5.4%. Graves County voted 74% Republican in 2016. On a $200,000 home, that is over $10,000 in lost value.

The study finds the largest losses closest to the facility. According to the Applicant's own filings, fifteen homes in this project area are within 500 feet of a solar panel[2] - well inside that impact band. Those are the homes Kirkland concludes are unaffected.

The Board should require a dedicated battery storage system property value analysis and defer the setback deviation until that analysis, BESS acoustic data, and a complete decommissioning cost estimate are on the record. The Board should require an independent audit of the Kirkland methodology. And require the Applicant to address the Virginia Tech study findings and explain why they should not govern the property value assessment for this project.

Thank you for the opportunity to comment.

Notes (added for the written filing; the comment above is reproduced as delivered):

1 All eight of the Kentucky matched pairs come from a single 2.7 MW project (Crittenden Solar) in the Kirkland property impact report.

2 The applicant's residential-structure table (RFI-1, Response 7) lists fourteen homes within 500 feet of a solar panel.

ATTACHMENT B

Detailed Critique of the Property Value Evidence and Related Siting Deficiencies

Case No. 2025-00395 (MYSO, LLC / Mayfield Solar)

Part 1. The battery-storage analysis that is built on Mayfield's data, was filed in the Crab Run case, and is missing here.

1.1 The Crab Run report contains Mayfield-specific battery-storage content. The property value report filed in the Crab Run proceeding (the Property Value Impact Study; Tab 12, Exhibit B, filed Dec. 19, 2025) contains a battery-storage section (Section K, printed pages 163–182) that is not generic template text. It opens:

> *"The 200 MW (800MWH) BESS is proposed to be located on the parcel shown below in lime green with the substation being the red rectangle next to that… The closest home to the proposed BESS is 1,516 feet as shown in the GoogleEarth Measurement below."*

Crab Run Solar has no battery storage system. The 200 MW / 800 MWh capacity matches Mayfield. The section also contains a site-specific Google Earth measurement ("Map Length: 1,516.52 | Feet") and project-site imagery, none of which a generic template would contain.

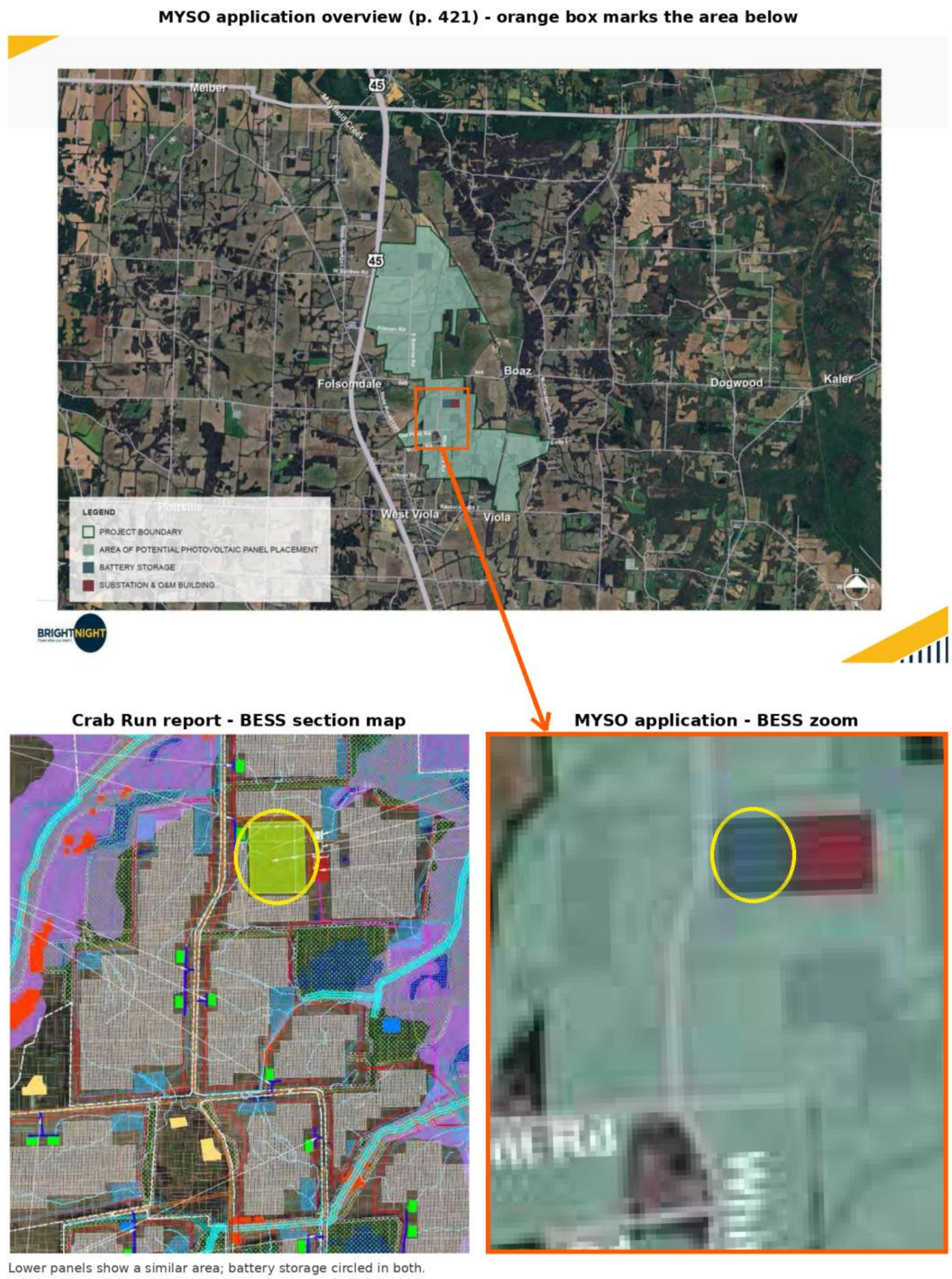

Figure 1. The BESS section map in the Crab Run property value report (lower left; Case No. 2025-00276, Exhibit B, Section K) depicts the Mayfield site. The Mayfield application overview (top; Case No. 2025-00395, Application & Exhibits A–G, PDF p. 421) shows a similar area; the orange box marks the area enlarged at lower right. Battery storage is circled in both lower panels.

Source: Property Value Impact Study, Case No. 2025-00276, Tab 12, Exhibit B, printed pp. 163–164 (PDF pp. 164–165).

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On the map below, I measured 1,516 feet from the nearest home to the north to the approximate location of the equipment area.

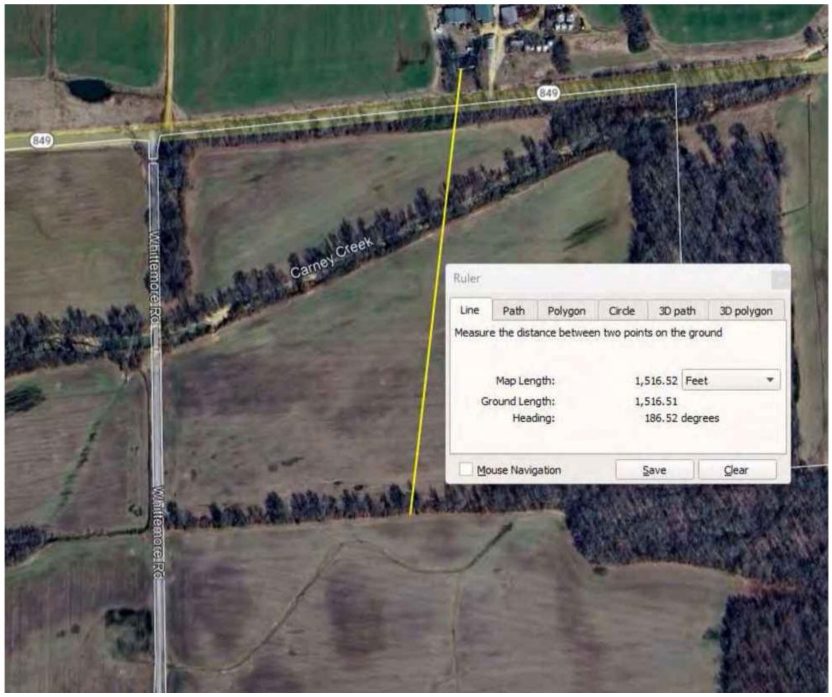

Figure 2. Crab Run report, printed p. 164: a Google Earth aerial captioned "I measured 1,516 feet from the nearest home… to the approximate location of the equipment area." A site-specific measurement, not template content.

1.2 The Mayfield report has no battery-storage section, but its conclusion cites one. The Mayfield report's table of contents lists Sections I–IX only: no BESS section, no battery market data, no comparable BESS sites, no paired sales. Yet its conclusion states: "Similar paired sales showed no impact from adjoining battery storage facilities." The analysis that sentence relies on appears only in the Crab Run report.

> *Source: Property Value Impact Analysis Report (Exhibit H), Case No. 2025-00395, Table of Contents (PDF p. 20); Conclusion (PDF p. 160, printed p. 145).*

1.3 The Crab Run conclusion also relies on the section Mr. Kirkland called a holdover. The Crab Run conclusion (printed p. 162) states that "Similar paired sales showed no impact from adjoining battery storage facilities", invoking the very Section K (pp. 163–182) that Mr. Kirkland testified "should just be struck… a clerical mistake." If those pages do not belong in the report, the conclusion that cites them is unsupported.

> *Source: Property Value Impact Study, Case No. 2025-00276, printed p. 162; Public Hearing Transcript, Case No. 2025-00276 (Apr. 28, 2026), approx. 5:12:03.*

1.4 A second cross-contamination, the wrong county's population data, confirms the section was written for Mayfield. Many recent Kirkland reports end their "Rhode Island study" discussion with a population-density figure specific to the project's county. The Crab Run report (printed pp. 23–24) uses the Hickory-Lowes Division of Graves County (population 4,982; 50 persons/sq. mi.) - Mayfield's county, not Crab Run's (Marion County). The identical Graves

County passage appears in the Mayfield report (PDF p. 40). For comparison, the Wolf Hills report (Washington County, VA) uses 213/sq. mi. and the Wheelhouse report (Lunenburg County, VA) uses 30/sq. mi., confirming this section is customized per project, not boilerplate.

Source: Case No. 2025-00276 PDF p. 24; Case No. 2025-00395 PDF p. 40; Wolf Hills Solar (2024) p. 31; Wheelhouse Solar (2022) p. 18.

1.5 The "new template for Kentucky" explanation is contradicted by a prior Kentucky report. Mr. Kirkland testified that the battery section was "a new template for Kentucky" and that the appraiser was "not used to having a battery energy storage system at the tail end" (Tr. 1:57:16). But Mr. Kirkland's own Banjo Creek Solar report - Case No. 2023-00263, Graves County, effective September 1, 2023 - already contained a complete BESS section (Section XIV, beginning at p. 105) with a paired-sales analysis. That report was filed with this Board more than two years before the Crab Run filing, and its third-party reviewer expressly noted "a separate paired sales analysis for the Battery Storage area which included 16 battery storage sites analyzed in six states."

Source: Kirkland Appraisals Impact Study, Banjo Creek Solar, Case No. 2023-00263 (Appendix F, filed September 2023), Section XIV, p. 105; Review Appraisal (E. Clark Toleman, MAI), Dec. 2023, p. 6.

1.6 These errors were raised in the Crab Run proceeding and remain uncorrected in both dockets. At the April 28, 2026 Crab Run hearing, an intervenor confronted Mr. Kirkland with the Graves County reference on pages 23–24; Mr. Kirkland responded that the reference had not yet been reviewed. The intervenors documented both the battery-storage and Graves County errors in their post-hearing brief. Kirkland Appraisals is the appraiser of record in both cases. As of the applicant's June 17, 2026 post-hearing brief, no correction had been filed in either docket.

Source: Public Hearing Transcript, Case No. 2025-00276 (Apr. 28, 2026), approx. 5:47:32; Crab Run Solar Intervenors' Post-Hearing Brief (May 5, 2026); Applicant's Post-Hearing Brief, Case No. 2025-00395 (June 17, 2026).

Part 2. The battery system is absent from the rest of the application record.

2.1 Decommissioning cost estimate. The filed Decommissioning Plan states: "The BESS facility was not incorporated into this reclamation cost estimate." Staff asked for the BESS decommissioning costs (RFI 1, Req. 79); the applicant responded that the cost is "currently unknown, pending vendor selection. If BESS is included, the Decommissioning Plan will be updated to include these costs." No updated plan was filed before the hearing. At the hearing, Ms. Kitchen testified the BESS would be decommissioned, but that the commitment to include it in the plan would follow "if… legally required under Kentucky statute" (Tr. 35:40), a conditional commitment.

Source: Exhibits H and I, Case No. 2025-00395, PDF p. 1018; Responses to RFI 1, Resp. 79; Hearing Transcript at 34:04–35:52.

2.2 Acoustic assessment. Staff asked why the BESS was omitted from the acoustic assessment and requested a revised assessment (RFI 1, Req. 15). The applicant explained that vendor-specific sound data were not yet available. No revised acoustic assessment was filed before the hearing.

Source: Responses to RFI 1, Case No. 2025-00395, Resp. 15(a)–(b).

2.3 Property value report. No BESS analysis (Part 1). No corrected or supplemental property value study has been filed.

2.4 The applicant's "already evaluated" claim is not supported by the record. In response to Staff (RFI 2, Req. 24), the applicant stated the project was designed so storage "can be added without revisiting fundamental siting conclusions or increasing impacts beyond those already evaluated by the Siting Board." But the BESS impacts were not evaluated in the decommissioning, acoustic, or property value studies.

Source: Responses to RFI 2, Case No. 2025-00395, Resp. 24.

2.5 Flood plain: acknowledged at the hearing, mitigation unresolved. Asked whether any portion of the BESS or substation would lie in the FEMA flood plain, Mr. Turner answered yes, but testified that the applicant would "focus the placement of the battery units away from" the flood plain and "elevate" the units "if needed," and that the flood plain could not be avoided "completely" "at this time"; and was unaware of any FEMA consultation (Tr. 1:24:40–1:27:33). Ms. Kitchen testified the project anticipates lithium-ion batteries. None of this is analyzed in any filed property value, acoustic, or environmental study.

Source: Hearing Transcript at 1:24:46–1:27:33 (Turner) and 37:47–37:57 (Kitchen).

2.6 The applicant's post-hearing distances: a number for the battery, but still no impact analysis, and the figure has moved with the battery. The Mayfield property value report depicts the battery nowhere and gives no battery-to-home distance; for most of this proceeding the only such figure in the record was 1,516 feet, from the cross-contaminated Section K of the Crab Run filing, tied to the battery's original location. The project's own materials placed the battery in two places: the August 12, 2025 public-meeting maps (Application & Exhibits A–G, PDF pp. 416, 421) showed it in the southern region of the site, while the engineering Plant Layout (PVS) filed with the Board (Rev. 00, Jan. 28, 2026; Exhibits H and I, PDF p. 14) and the Harvey Economics review ("northeastern portion of the Project site") place it in the northern array. After the hearing, in its June 22, 2026 Response to the Siting Board Staff's Post-Hearing Request for Information (Resp. 3), the applicant finally gave one Mayfield-specific distance: 2,651 feet from the battery to the nearest non-participating residence (Receptor R-138), and 2,687 feet to the substation. But a distance is not an impact analysis: it answers how far, not what effect, and the property value report still contains no battery-storage analysis of any kind. That the figure changed from 1,516 to 2,651 feet when the battery was relocated only underscores the point: a separation no property value study has examined is not a settled basis for a "no impact" conclusion. (The same table reports the nearest non-participating home is 322 feet from the closest solar panel, inside the half-mile band where the research in Part 5 finds the largest residential losses.)

The relocation also postdates most of the Good Neighbor Agreements: six of the nine were signed between October 15 and November 22, 2025, before the battery's current northern siting appears anywhere in the record (the January 28, 2026 Plant Layout). When those six agreements were signed, the only publicly available BESS location was the southern region shown on the August 12, 2025 public-meeting map, not the location now planned.

Source: BrightNight public-information-meeting materials (Aug. 12, 2025), Application & Exhibits A–G, PDF pp. 414–421 (project maps at pp. 416, 421 - Battery Storage/Substation in the southern region); Plant Layout (PVS), Rev. 00, dated Jan. 28, 2026, Sheet 2 of 2, Exhibits H and I, PDF p. 14 (Battery

Storage/Substation/O&M in the northern array); Harvey Economics SAR Review (May 2026) ("northeastern portion of the Project site"); Notice of Filing, Mar. 9, 2026 (amending only the Economic Impact Study and the Decommissioning Plan); Response to Siting Board Staff's Post-Hearing Request for Information (June 22, 2026), Resp. 3 (2,651 ft to R-138 (BESS), 2,687 ft to substation, 322 ft to nearest solar panel - measured to the nearest non-participating residence not party to a Good Neighbor Agreement); 1,516-ft figure from the Crab Run filing, Case No. 2025-00276 (Section K aerial). The MYSO property value report itself contains no BESS section. Good Neighbor Agreement signing (notary) dates from the redacted GNAs (Attachment to RFI 1, Resp. 2): Hendon and Holtz Oct. 15, 2025; both Beckham agreements Oct. 24, 2025; Higgins Oct. 30, 2025; Merrell Nov. 22, 2025; Dixon, Shields, and Stephenson Feb. 5, 2026.

2.7 The BESS is a substantial, permanent facility. The applicant describes it as a 7.5–10 acre fenced yard with enclosures 8–10 feet and equipment 10–15 feet in height, an approximately 40-year operational life, and end-of-life decommissioning in parallel with the solar facility (RFI 1, Resp. 14; RFI 2, Resp. 26). It is not a minor accessory component.

2.8 The battery is central to the project, unstudied, and poses a fire risk the record does not address. The applicant treats the BESS as not yet final: its witness testified, "at this point we are planning to incorporate a battery energy storage system," and called it "an important part of the project", yet it is part of what the Board is asked to approve, and the property value report contains no battery-storage analysis of any kind. That omission is not academic. In January 2025 a large lithium-ion battery facility in Moss Landing, California caught fire, deposited a layer of heavy metals across the surrounding area, drew evacuation orders covering more than 7,600 acres and an estimated 1,200–1,500 residents, prompted the largest lithium-ion battery cleanup in EPA history, and was followed by reported declines in nearby property values and by litigation. The applicant's own June 22 distance places the nearest non-participating home about half a mile (2,651 feet) from this battery, well within the area evacuated at Moss Landing. The added separation from the earlier, closer siting may make a direct spread to a home less likely, but it does not shrink the toxic-smoke and evacuation footprint such a fire creates, nor does it address how the fire would be fought. Lithium-ion fires behave unlike ordinary fires: they burn through thermal runaway, can reignite, and, as federal fire authorities describe, typically require very large, sustained volumes of water (tens of thousands of gallons in documented incidents) or a defensive let-it-burn approach with exclusion zones, rather than a standard structural attack. Moss Landing burned over days; in a separate June 2026 incident, the operator of a Los Angeles cold-storage warehouse said a fire began on the building's rooftop solar array; it burned for roughly a week and required helicopter water drops rarely used on a structure fire. At the hearing the applicant committed to "ongoing training" for local fire officials, a pre-energization site visit and "manufacturer specified training" (Tr. 28:17–28:51), but offered nothing toward the specialized equipment, water supply, or response capability such a fire demands. A rural volunteer fire district cannot reasonably be expected to fund and maintain that capability, and the record contains no emergency-response or fire-suppression plan and no assessment of local response capacity. A property value report with no battery-storage analysis cannot speak to any of this for the homes near this project.

Source: Hearing Transcript at 26:59–27:09 and 40:01–40:20 (applicant's witness: BESS "planning to incorporate," "important part of the project"), 28:17–28:51 (training for local fire officials), and 1:24:40–1:27:33 (Turner, flood plain); Response to Siting Board Staff's Post-Hearing Request for Information (June 22, 2026), Resp. 3 (2,651 ft to nearest non-participating residence); Monterey County emergency records (Moss Landing evacuation covering more than 7,600 acres); U.S. EPA, "Moss Landing Vistra Battery Fire Response"; U.S. Fire Administration and NFPA guidance on lithium-ion battery firefighting (thermal runaway; large sustained water volumes or defensive operations); contemporaneous news reporting on the Moss Landing fire (Jan. 2025) and the June 2026 Los Angeles (Boyle Heights) rooftop-solar warehouse fire.

Part 3. The Good Neighbor Agreements acknowledge effects the property value analysis treats as nonexistent.

3.1 Nine of nineteen adjacent homeowners signed. The applicant disclosed (RFI 1, Resp. 2) that BrightNight entered into Good Neighbor Agreements with nine adjacent property owners; redacted copies were filed. Mr. Kirkland's own adjoining-use table identifies nineteen unique named homeowners on adjoining parcels. Two of those signing owners' homes, at 1268 and 1370 State Route 849 E, do not appear anywhere in Mr. Kirkland's surrounding-uses table (Part 8).

3.2 What the neighbor granted: a permanent Effects Easement. Each agreement conveys to BrightNight a non-exclusive easement:

> *"Neighbor hereby conveys and grants to Developer a non-exclusive easement… ('Effects Easement') to have such noise, audio, visual, view, light, vibration, or other effects of any kind whatsoever resulting directly or indirectly from any construction, operations, or activities of the Project… [and] waives and releases any right, claim, or cause of action which Neighbor may now have or which may exist in the future against Developer as a direct or indirect result of said Effects…"*

The agreement runs with the land (Section 7), binds heirs, successors, and assigns, and is formatted to be recorded in the Graves County real-property records.

3.3 The compensation is hidden from both the public record and the deed record. The agreement obligates the developer to pay "the amounts set forth in the attached Exhibit C," but Exhibit C is redacted in the PSC filing and, by the agreement's terms, "shall be redacted prior to recording this Agreement in the real property records of Graves County." Neither the Board, the public, nor a future buyer reviewing the recorded deed can determine what was paid, or what may still be owed.

3.4 BrightNight's own description ties the payment to viewshed change. BrightNight's witness described the GNA as a voluntary, case-by-case program providing "financial compensation for the inconvenience of construction and change in viewshed" (Tr. 44:53–45:02), the developer's own acknowledgment that the project alters what neighbors see, a factor directly relevant to property value.

3.5 Harvey Economics used GNA status to remove some of the closest neighbors from the count. Harvey's footnote 2 states: "HE considers the landowners with GNAs to be participating landowners… the participating landowners own 11 residences within 2,000 feet of a solar panel." Harvey then reports "107 non-participating homes within 2,000 feet; the closest more than 300 feet", a figure measured to the nearest solar panel, which sits set back inside the project fence, and reached after reclassifying the nine GNA owners as participating. GNA status was thus used to classify some of the closest neighbors out of the non-participating population rather than to study their exposure. Measured instead to the project boundary, Harvey's own Exhibit 3-4 counts nineteen residential structures within 300 feet, only eleven of them (nine GNA, two other participating) reclassified as participating.

> *Source: Harvey Economics, Mayfield Solar SAR Review (May 2026), §5 and footnote 2; Hearing Transcript at 1:53:28–1:53:54; Redacted Good Neighbor Agreements (Attachment to RFI 1, Resp. 2), Sections 1, 6, 7.*

3.6 Screening the applicant credits to the project was, in part, the consideration neighbors received for their easements, and it is not firmly committed. When Staff asked for a screening plan (RFI 1, Req. 52), the applicant filed a “Conceptual Landscape Buffer Plan” depicting vegetative buffers along the project as its visual mitigation. In the standard-form agreements, the neighbor is committed a vegetative-screening buffer (Section 4) mapped in the agreement’s Exhibit B, and the buffer segments the applicant presents as its mitigation run along those parcels: on both Beckham properties and the Dixon, Hendon, Merrell, Shields, and Stephenson properties - seven of the nine signers, and every agreement that includes a screening map - the GNA’s Exhibit B screening line coincides with a buffer segment in the plan. For those parcels, screening the applicant credits to the project is screening the neighbor received in return for granting the Effects Easement and releasing all effects claims (Section 1) and waiving setbacks (Section 3). The agreements are not uniform: the Holtz agreement states that “no additional vegetative screening is needed” (Section 4), and the Higgins agreement includes no screening map: both its screening clause and its consideration clause cite “Exhibit B,” and the only Exhibit B attached is the redacted compensation. The commitment is also thin: the plan is marked “Conceptual” and “Not for Construction,” fixes no committed row count or buffer width (it states that “final planting locations, quantities, and buffer area widths are subject to final site plan layout”), notes the trees will be about four feet tall at planting, and the applicant confirmed it has prepared no visual rendering of the screen for this project.

> *Source: Responses to RFI 1, Case No. 2025-00395, Resp. 52 (“Conceptual Landscape Buffer Plan,” Tetra Tech, Mar. 2026, marked “Not for Construction”); Responses to RFI 2, Resp. 13 (no updates to screening plans), 14 (trees approx. four feet at installation), 15 (no project-specific visual rendering; renderings supplied from another, out-of-state project); Redacted Good Neighbor Agreements (Attachment to RFI 1, Resp. 2), Sections 1, 3, 4, and 6/7 with Exhibits B and C. Seven are standard-form (screening map in Exhibit B, compensation in Exhibit C); all seven - both Beckham agreements, Dixon, Hendon, Merrell, Shields, and Stephenson - have Exhibit B screening lines that coincide with buffer segments in the Resp. 52 plan. The Holtz agreement (Section 4) states no additional screening is needed; the Higgins agreement has no screening map and cites Exhibit B for both screening and compensation (its Exhibit B is the redacted compensation).*

Part 4. The expert, the data, and the third-party reviews.

4.1 Sworn testimony establishing a selection effect. At the Lost City Solar hearing (Case No. 2024-00406), Mr. Kirkland confirmed having prepared “over 1,000” reports for solar developers and answered: “I have never completed a report that indicated a negative impact… not every project that I have looked at have I said I agreed would have no impact on property value” (Tr. 37:11). At the Crab Run hearing, Mr. Kirkland explained the mechanism: when clients are dissatisfied with preliminary results, “they tell me to stop my work. I don’t actually finish a report. That has happened three times” (Tr. 5:15:57). The completed-report record therefore reflects a sample pre-screened by the party paying for the result: the projects abandoned when preliminary findings were unfavorable never enter it. (The report’s closest matched-pair data point is 105 feet, a home in a subdivision built after the solar farm; his data does not reach the established close-in homes at issue here.)

> *Source: Hearing Transcript, Case No. 2024-00406, at 35:37–37:19; Hearing Transcript, Case No. 2025-00276, at 5:15:41–5:16:57 and 5:30:04–5:30:30; Crab Run Intervenors’ Post-Hearing Brief.*

4.2 Data that was not gathered for this project. Mr. Kirkland testified that he did this research in 2025, has not updated it since, and conceded “there’s probably been some activity since then," with newer Kentucky solar facilities built and homes sold nearby; he added that he has now put out bids to "update all this analysis" next time (Tr. ~2:00–2:01). The underlying sales are older still: the dataset contains no 2025 transactions, and the rural Kentucky sale/resale comparisons most relevant to a rural project here are dated 2018 to 2022 (Turkey Creek, E.W. Brown, Logan County, Mt. Olive Creek). KRS 278.708(3)(c) requires analysis of the potential property value changes from "the proposed facility", a 200 MW project; the evidence before the Board rests on years-old sales and, by the appraiser's own account, is overdue for an update it has not received.

4.3 The report gives a property-tax survey far more weight than it can bear. The report leans heavily on a multi-state survey of Property Valuation Administrators (188 responses, 170 reporting no adjustment, 0 positive) as primary evidence that solar causes no impact. That weight is misplaced. Under KRS 132.191, a Kentucky PVA's role is to assess property at fair cash value for taxation through broad, county-wide mass-appraisal methods, not to study whether an individual home loses value next to a particular project. A PVA reporting "no adjustment" is describing a tax-administration practice, not performing a market-impact appraisal, and that response deserves little weight in a property-value-impact determination. The survey was also not gathered for this project or county: the Graves County PVA did not respond, and Mr. Kirkland confirmed that office was not contacted for this assignment (Tr. 1:58:43).

Even at face value, the Kentucky responses are thin. The report names ten Kentucky assessors (pp. 36–37). Six reported "no impact," but only two sit in counties the report credits with existing solar, and neither is a real test. It claims four existing solar farms in Christian County, but the Kentucky Energy and Environment Cabinet's solar-project map shows only one solar project there, the 125 MW Dogwood Corners, a proposal the county fought with a restrictive 2022 ordinance and that received only a conditional construction certificate in 2024. And Mercer County's lone solar facility is a 10-megawatt array on the grounds of the E.W. Brown power plant - a pre-existing coal, gas, and hydro complex, not a freestanding solar farm (the same complex skews the report's own E.W. Brown comparable, Part 6.3). The other four describe counties with only proposed projects, so their answers reflect no observed effect. Of the four recorded as giving "no response," three said they could not answer because the projects are not yet built ("hasn't come up yet"; "depends on sales after built"). The survey's remaining responses are all out-of-state and are reported only as state totals: no assessor, county, or project is named, so none can be verified.

> *Source: Mayfield report (Exhibit H), Assessor Surveys, pp. 36–37; Dogwood Corners Solar, PSC Case No. 2023-00246 (proposed 125 MW, Christian County; conditional approval Mar. 2024); Christian County solar ordinance (2022); Kentucky Energy and Environment Cabinet, "Kentucky Solar Projects and County/Municipal Solar Ordinances" interactive map (a single project, Dogwood Corners, shown in Christian County); E.W. Brown solar facility (10 MW, Mercer County, LG&E/KU, operating since 2016, co-located with the E.W. Brown Generating Station).*

4.4 The Board Staff's own consultant reused a prior template, conclusion and all. Harvey Economics - retained by the Siting Board to review the application's Site Assessment Report - reuses in its property value section the template from its Barrelhead Solar review, ten of seventeen sentences word-for-word identical, with the conclusion ("negative impacts… are unlikely as a general rule… within a narrow range") verbatim. The review identifies no methodology limitation, no data-currency concern, and no GNA-impact issue specific to this project.

Source: Harvey Economics SAR Reviews, Barrelhead (Jan. 2026) and Mayfield (May 2026), §5.

4.5 The same conclusion appears, verbatim, across more than twenty of these reports. A review of Mr. Kirkland's solar property value reports filed between 2020 and 2025, in Kentucky and four other states, found that at least twenty-one close with the identical sentence: that the matched-pair analysis shows "no impact on home values due to abutting or adjoining a solar farm … where the solar farm is properly screened and buffered." Each also opens with the same line, "My findings support the [Kentucky Siting Board] Application." None of the reports reviewed reached a negative conclusion, and the Mayfield report carries a lightly edited version of the same conclusion sentence. A conclusion that is word-for-word identical across roughly two dozen projects in five states, whatever each project's facts, is a template output rather than a project-specific finding.

Source: Kirkland Appraisals solar property value reports, 2020–2025 - Banjo Creek, Barrelhead, Bluebird, Dogwood Corners, Flat Run, Lost City, Mantle Rock, Mercer County, Pike County, Pine Grove, Rhudes Creek, Russellville, Song Sparrow, and Summer Shade (KY); Wheelhouse, Wolf Hills, and High Bridge (VA); Carina (IN); Northern Waters (MI); and Rancho Viejo; Mayfield report (Exhibit H) conclusion.

4.6 The report's own distance analysis shows no relationship between distance and impact. Section D attempts to address proximity directly: the report charts its Sale/Resale and Matched-Pair impact figures against distance from the nearest panel and fits a trendline. That trendline carries an R^2 of 0.0143: distance explains roughly one percent of the variation in the report's own data, and the points scatter from about −7% to +17% with no discernible relationship to distance. The report nonetheless reads the flat line as a "levelling… at 0% impact around 150 feet." A fit with effectively no explanatory power cannot establish that proximity is harmless; it shows only that the dataset - a few dozen mostly distant pairs, some affected by other factors or predating construction (Part 6) - is too noisy and too sparse near the panels to reveal a pattern. By contrast, the PNAS study (Part 5), built on 8.3 million residential sales, finds a clear and statistically significant distance gradient. A null result drawn from underpowered data is not a finding of no effect.

Source: Mayfield report (Exhibit H), §D "Distance Between Homes and Panels," printed p.139, including the chart "Impacts Arranged By Distance From Panel" (trendline R^2 = 0.0143).

4.7 The Kentucky matched-pair evidence is a single 2.7 MW project. Of the forty-seven matched pairs in the report, the eight Kentucky pairs all come from one project, Crittenden Solar, a 2.7 MW facility in a suburban setting. The remaining matched pairs are out-of-state (Tennessee, Indiana, Ohio, Virginia), ranging up to 617 MW. For a 200 MW rural project, the most locally relevant paired-sales evidence the report offers comes from a single suburban facility roughly 74 times smaller.

Source: Mayfield report (Exhibit H), "Residential Dwelling Matched Pairs Adjoining Solar Farms," printed pp. 131–132 (eight Kentucky pairs, all Crittenden Solar, 2.7 MW).

Part 5. The current research was omitted from the property-value evidence, and it favors the neighbors.

5.1 Hu et al. (2025), PNAS: the most comprehensive study to date. Using 8.3 million residential property transactions near 3,699 large-scale solar facilities, the study finds that proximity is the major driver of residential value loss. Without a view of the project, homes within one-half mile sell for up to 7.2% less; with the project in the home's viewshed, the effect is slightly larger, up to 7.9% within one-half mile; the effect diminishes with distance but remains statistically significant out to three miles. Because proximity rather than visibility is the principal driver, the vegetative screening the applicant relies on (which addresses only the view) does not eliminate the loss. The study's positive effect - an average +19.4% in the per-acre value of agricultural and vacant land within two miles - applies to land, not occupied homes, and the authors attribute it to demand for future solar leases. It is temporary: the study's event analysis finds the effect "manifests 3 y after the site installation and fades away 6 y later," and it becomes insignificant beyond two miles. It is concentrated at smaller-than-median sites; Mayfield is a 200 MW project. None of it is a gain for an ordinary adjacent home.

Source: Hu, C., Chen, Z., Liu, P., Zhang, W., He, X., & Bosch, D. J. (2025). "Impact of large-scale solar on property values in the United States: Diverse effects and causal mechanisms." Proceedings of the National Academy of Sciences, 122(24), e2418414122 - §1.1.1 (Residential proximity and visibility), p. 3 (up to 7.2% within 0.5 mi without view; up to 7.9% with view; statistically significant to 3 miles). https://doi.org/10.1073/pnas.2418414122

Every one of the nineteen adjoining homeowners in Mr. Kirkland's table has a home within one-half mile of the project (the farthest is about 1,460 feet), within the band where this study measures the largest losses.

5.2 LSU Center for Energy Studies literature review (Upton & Talpur, August 2024). This is a review of the peer-reviewed literature, not an original study, and it predates the PNAS study. It was prepared at the Louisiana Legislature's request: at a joint House committee meeting on August 22, 2024 (held under House Study Request No. 2), the committee chairman asked the LSU Center for Energy Studies to survey the research on solar's effect on adjacent property values - a neutral review a legislature commissioned to understand the question, not advocacy. It concludes: "Studies that analyze housing values in rural areas specifically find that utility-scale solar is associated with a 2.5%–5.8% percent reduction in housing values." Graves County is rural.

Source: LSU Center for Energy Studies, "Literature Review on the Impact of Utility-Scale Solar on Housing Prices" (Upton & Talpur, Aug. 2024), p. 1 (Purpose: prepared at the request of a joint Louisiana House committee, Aug. 22, 2024, under House Study Request No. 2) and p. 3 (Conclusions). https://www.lsu.edu/ces/publications/2024/solar_energy_and_housing_prices_lit_review_aug_30_2024.pdf

5.3 Neither source appears in Harvey's literature review. Harvey Economics' Mayfield SAR Review (May 20, 2026), including its Appendix E reference list, does not cite Hu et al. (2025) or the LSU review. Harvey cites Gaur & Lang, Elmallah et al., Dröes & Koster, and Abashidze. The PNAS study was published roughly eleven months before Harvey finalized its review (and the LSU review nearly two years before).

Source: Harvey Economics, Mayfield Solar SAR Review (May 2026), §5 and Appendix E (verified - no reference to Hu et al. (2025) or to Upton & Talpur (2024)).

5.4 The "conservative county" finding. The PNAS study reports larger effects in strongly Republican counties. In the 2016 presidential election, Donald Trump received 12,671 of roughly 16,600 votes cast for President in Graves County (Trump 12,671; Clinton 3,308; the remainder to other candidates), about 76%, qualifying it as such a county under the official Kentucky State Board of Elections results.

Source: Kentucky State Board of Elections, 2016 General Election Results (President), Graves County.

Note on a study not relied upon: *Abashidze & Taylor (2023), which Harvey cites, studies agricultural land values, not residential homes, and is not a basis for any residential property value claim in this comment.*

5.5 The report borrows the studies' +19% while disclaiming any reliance on studies, and that +19% is a farmland premium. The Executive Summary lists "Studies Cited: 0," yet it also reports a University-Studies impact range of −7.90% to +19.40% and includes a full table of nine studies (report p.35). The Conclusion's headline "Range of Impacts: −7% to +19%" then adopts that +19% as its top, though the report's own field data never exceeds +15% (sale/resale) or +12% (matched pair). The +19.40% is not a home-value result: in the report's own table it is the VATech (Hu et al.) figure for agricultural and vacant land within two miles, listed beside that same study's residential losses of −7.2%, −7.9%, and −4.8%. Because the +19.40% farmland number is by far the largest positive in that table, it sets the "High" and lifts the positive-side study average; remove it and the studies summarized point downward for homes. The report disclaims reliance on any studies, then borrows the single most favorable number in the literature, a temporary agricultural-land premium, to anchor the top of its impact range, while leaving those same studies' residential losses out of its conclusion.

Source: Mayfield report (Exhibit H), Executive Summary, PDF p.18 ("Studies Cited: 0"; University Studies range −7.90% to +19.40%; Conclusion range −7% to +19%) and the University Studies table, printed p.35 (VATech/Hu et al.: −7.20% at ½ mile, −7.90% with view, −4.80% at 3 miles, +19.40% farmland within 2 miles); Hu et al. (2025), PNAS.

Part 6. Specific calculation, disclosure, and data errors in the report itself.

The report's weight comes from sheer volume - 256 "data points," hundreds of projects - more than the Board can re-check in full; but the pieces that can be checked are wrong often enough that the unchecked remainder cannot be taken on faith.

6.1 House Price Index quarter error (Mount Olive Creek). The Mount Olive Creek pair uses a December 2022 resale date. December falls in Q4 2022, but both the Mayfield and Crab Run reports apply the Kentucky FHFA House Price Index value for Q3 2022. Q3 2022 was the local index trough: the Kentucky purchase-only index (non-seasonally adjusted) fell from 338.26 in Q2 2022 to 336.85 in Q3, then recovered to 341.94 in Q4 (FHFA House Price Index, state series). Using the trough quarter for a December (Q4) sale understates the expected appreciation and shifts the result from −5.0% to −6.4%, past the report's own ±5% per-property no-impact threshold (it is the only negative Kentucky result). Asked about this at the hearing, Mr. Kirkland responded that correcting this single pair would have only a small effect on the overall average and would not change the median; but that response addresses the dataset average, not this individual property.

Source: Mayfield and Crab Run Kirkland reports (Kentucky sale/resale tables); FHFA House Price Index, Kentucky (purchase-only, non-seasonally adjusted, state series); Hearing Transcript at 2:02:34–2:03:46.

6.2 Adjustments are disclosed in prose but not held to a consistent standard. The matched-pair narratives do describe many of their adjustments. Age differences are adjusted at a stated rate of "0.5% per year," and individual pairs list dollar figures for specific features: in one pair, $5,000 for lot size, $7,600 for age, and $15,000 for a detached workshop; in another, $10,000 for an extra bathroom and $9,560 for greater living area; in a third, $16,000 for land value, $21,081 for size, and $15,000 for a bathroom (report pp. 113, 114, and 119). The difficulty is not that the adjustments are hidden; it is that, apart from the age rate, they rest on no published per-unit basis. The same feature draws a different amount from one pair to the next: a bathroom is valued at $10,000 in one pair and $15,000 in another, and a living-area difference at $9,560 in one pair and $21,081 in another, with no price-per-square-foot or price-per-feature schedule to reconcile them. Without such a schedule, neither a reader nor the Commission can confirm that comparable homes were adjusted consistently within this report, or that the same feature is valued the same way from one of Mr. Kirkland's reports to the next.

6.3 The positives that offset the negatives come from distant homes, and the largest cannot measure a solar effect at all. The report's positive and near-zero averages (Sale/Resale mean +3%, median +2% across sixteen examples; Matched Pair mean +1%, median 0% across forty-seven) are sustained by a small number of pairs with large reported gains. Examined one by one, every one of those gains is disqualified by the report's own facts: by timing, by non-comparability, or by other factors the report itself notes. Several of them also sit 1,000 to 1,900 feet from their projects, two to four times farther than the closest Mayfield homes (300–500 feet), while the closest of them (360 feet) is the non-comparable custom home discussed below.

- 528 Watermelon Road - the report's single largest reported gain (+17.5%, attributed "to the solar farm") - is offered for the 173 MW Logan County (Russellville) Solar project, 1,460 feet away. By the report's own account, that project "began construction in 2023," yet the home sold in May 2022. A sale that predates the project's construction cannot reflect any impact from it.
- 7141 S State Road 1 (Riverstart, Indiana), +15% (entered as +13%), sold September 24, 2021, which the report states "sold during the construction process of the solar farm" (completed January 2022); a sale during construction cannot measure an operating project. The property also carries a 3,240-square-foot pole barn with horse stalls and fenced pasture, improvements the report concedes "complicated" a paired analysis, measured against a 2012 sale nine years earlier. And the report gives two FHFA-expected values for the same home, $143,287 (MSA) and $169,551 (state); against the $165,000 sale the first yields a +15% "positive" while the second yields roughly −3%. He adopts the one that is positive.
- 9559 S County Road 225 West (Bellflower, Indiana) - +12%, the report's single largest matched-pair gain - is a "custom built timber/log home" that sold for $650,000 at $190.67 per square foot, the highest price per foot in the report's own comparison grid. Custom homes are hard to compare, and the report excluded other unique homes for exactly that reason: 209 Ashlock ("non-credible") and 1439 Stanford ("too many unique features … I have not attempted one"). This one was kept, against comparables built anywhere from 1979 to 2020, and it became the highest matched-pair positive.

- 557 J Montgomery Road, also offered for the Logan County project, sold in December 2021, likewise before construction began. The report notes its pool as “needing work,” a condition factor left unadjusted.
- 837 Hardin Heights (+13.5%) sits 1,015 feet from the E.W. Brown facility, which the report acknowledges “adjoins three coal-fired units” and has river frontage, other factors the report concedes make a paired-sales analysis difficult. The report states it “will not rely heavily on this indicator,” then carries it among the positive results anyway.

The methodological consequence: a genuine close-in negative is not excluded but averaged together with these distant and, in two cases, pre-construction positives. Averaging dilutes the negative rather than recognizing it, and an average built largely on distant or pre-solar sales does not answer whether the close-in Mayfield homes will lose value.

> *Source: Mayfield report (Exhibit H) - Kentucky/adjoining Sale/Resale narrative and table and the Matched-Pair table; project descriptions for Logan County (“began construction in 2023”), Riverstart (“completed in January 2022”), 7141 S State Road 1 (“sold during the construction process,” pole barn/horse improvements, MSA $143,287 vs. state $169,551, p.125–126), and Bellflower (9559 S CR 225 W custom timber/log home, p.121–122); the analyst’s exclusion of unique homes 209 Ashlock and 1439 Stanford (p.74); FHFA House Price Index. Sale dates and features from the report and public real-estate records.*

6.4 Errors in the surrounding-uses table (Attachment C, annotated). The “Surrounding Uses” table (Exhibits H and I, pp. 10–12) contains duplicate or incorrect parcel IDs (rows 20–22 and 44–45), apparently swapped acreage between rows 39 and 40, outdated owner names (rows 32 and 48), a residential parcel miscoded Agricultural (row 22, “HOUSE & 28 ACRES”), and a parcel with two confirmed homes but no measured home-to-panel distance (row 10) - each detailed in the annotated table at Attachment C.

Individually these are small; together they show the surrounding-uses inventory, the foundation for identifying who is affected, was not carefully checked against the county’s own records.

6.5 A scope limited to directly adjoining parcels. The property value analysis is limited to the homeowners on parcels that directly adjoin the project, nineteen of them (the report identifies eighty adjoining parcels in all, most without homes). The applicant’s own filings place far more homes near the project, by three different measures: the residential-structure table the applicant filed at Staff’s request lists 170 homes within 2,000 feet of the project boundary; Harvey Economics counts 118 homes within 2,000 feet of a solar panel (fewer, because the panels sit set back inside the fence); and of those 118, Harvey reports 107 as non-participating after reclassifying eleven residences, including the nine Good Neighbor Agreement owners, as participating. By any of these counts the property value study examined a small fraction of the nearby homes the applicant’s own consultants identified. The research in Part 5 finds measurable effects well beyond directly adjoining parcels, out to three miles; an analysis confined to bordering parcels does not capture the population the statute and the research direct attention to.

6.6 The reliance on an area index ignores improvements to the specific home, which inflates apparent “gains.” The report’s sale/resale method, in its own words, “uses no appraiser judgement and links the consideration of appreciation to the FHFA Home Price Index”; whatever a home sells for above the HPI-projected figure is treated as the solar effect. But the FHFA HPI is an area index applied to one home: by FHFA’s own description, it projects what a home “would be worth today if it appreciated at the average appreciation rate of all homes in the area," while cautioning that a home's actual value depends on "house condition and age, home improvements made and needed, and many other factors", none of which the index adjusts for. Where a comparable was renovated between sales - for instance the Anderson, Indiana home the report describes as built in 1899 "with significant updates," which sold above asking in a fast 2023 market - the value added by those improvements is recorded as a solar effect rather than the renovation it was. The bias runs one way: a home that was improved between its two sales will appear to have outperformed the area index, and the report treats that excess as a solar premium.

Source: Mayfield report (Exhibit H), sale/resale methodology and Anderson (Indiana) comparable; FHFA HPI Calculator methodology statement, https://www.fhfa.gov/hpi-calculator; FHFA House Price Index FAQ (constant-quality area index).

6.7 The report's own numbers do not add up. (a) Two denominators, two answers. The report's headline impact percentages are not computed consistently. In the body narrative, 528 Watermelon Road is a "17.5% increase in value" - the gain measured against the FHFA-projected value, (275,000 − 234,000) ÷ 234,000. In the summary Sale/Resale table, the same sale is listed at 15% - the gain measured against the sale price instead, (275,000 − 234,000) ÷ 275,000. The same split recurs: 837 Hardin Heights is 13.5% in the narrative and 12% in the table; the Riverstart 7141 S SR 1 pair is 15% in the narrative and 13% in the table. The summary table consistently uses the denominator that yields the smaller number, and the report's stated Sale/Resale ceiling of "+15%" holds only under that method; under the report's own narrative method, the high is +17.5%, outside the stated range.

(b) A "residential" figure built on a mislabel. The report's "Scope of Research" tables (§G, p.141) tally, across the solar farms it has studied, the uses adjoining each, to show that solar typically borders residential land. But the column it headlines as "All Res Uses" (91% by acreage, 93% by parcel count) is not residential: it sums Residential, Agricultural, and mixed Residential/Agricultural into a single figure. Agriculture is neither a residential nor a commercial use, and it is the largest single use adjoining these projects, yet it is given no category of its own and is folded into "residential." By acreage, the adjoining land averages 53% agriculture and only 19% residential (39% counting mixed residential/agricultural); the headline "residential" figure is mostly farmland relabeled. The same column then reports an "All Res Uses" of 105% in the parcel-count High row, where a share of parcels cannot exceed 100%; the report's own acreage table caps the identical figure at 100%.

(c) The headline count does not tie, and double-counts homes. The Executive Summary reports 256 "data points" (p.4), but the four categories it lists - 188 assessors, 16 sale/resale, 47 matched pairs, and 14 brokers - sum to 265, not 256; the headline total does not reconcile to its own parts. (The assessor survey is itself reported two ways: the summary (p.4) gives 188 assessors, 170 finding no impact, and 18 not responding; the body (pp.36–37) gives 189, 172, and 17.) The 256 is also inflated by double-counting: the same property appears in more than one category, for example, 557 J Montgomery Road is both Sale/Resale Pair 9 and Broker comment 4; 3928 W 600 South is both Sale/Resale Pair 13 and Matched Pair 46; and 9559 S County Road 225 West is both Matched Pair 44 and Broker comment 14. A pooled total that neither sums correctly nor counts each home once cannot anchor a precise "Conclusion: 0%."

Source: Mayfield report (Exhibit H) - Executive Summary p.4 and §VI pp.36–37 (256 vs. its components' 265; assessor survey reported as 188/170/18 in the summary vs. 189/172/17 in the body); Sale/Resale table *p.129 with property narratives at p.80 (the 15% vs. 17.5% split); §G "Scope of Research" table p.141 (the 105%); Matched-Pair table pp.131–132 and Broker table p.133 (overlapping addresses).*

6.8 To set aside an adverse study, the report understates Mayfield as "less than 100 MW." The University of Texas study the report cites found that experienced appraisers estimated losses of up to -5% for a home within 100 feet of a 102 MW solar facility, with the impact rising as facility size rises (p.25). The report brushes that finding aside on three grounds: screening, a setback beyond 100 feet, and that "the proposed project... is less than 100 MW." But Mayfield is a 200 MW project, as the report's own project description states (p.7), nearly double the facility in the study. The size ground is simply wrong, and it cuts the other way: applied to the real 200 MW, the very study the report invokes points toward more impact, not none.

6.9 The analysis measures to the house, not the property, and overlooks land that has value of its own. KRS 278.708(3)(c) directs the Site Assessment Report to assess the potential changes in "property values and land use … for property owners adjacent to the facility" - language that reaches the whole parcel and its use, not only the dwelling on it. Mr. Kirkland instead measures from the panels to the home. At the Crab Run hearing, asked whether a resident whose "parcel boundary … is 73 feet away from the proposed facility" would see a negative impact on value, he answered "No," explaining that he has "most of the time looked at house to … panel" because "it had more to do with the proximity of that house to their view," and that an adjoining property line might lie about 100 feet from the panels while "the home could be anywhere from 4 feet to 4,000 feet away" (Case No. 2025-00276, hearing of Apr. 28, 2026). Measuring only to the dwelling skips everything in between - the backyard, the cropland, and any buildable area - which for an adjoining owner can sit at the panels' edge while the house is hundreds of feet back. The harm is not limited to parcels with houses, either: a vacant residential lot that could be built on is worth less, and harder to sell, with an industrial solar field along its boundary. His two quantitative methods, sale/resale and matched-pair, each require an existing home that has sold, so neither can measure the loss to a backyard or a buildable lot.

Source: Mayfield report (Exhibit H), University of Texas study discussion, printed p.25 ("less than 100 MW"); project description, printed p.7 (200 MW solar farm).

Part 7. The Kentucky comparable-sales data cannot be fully verified: the Turkey Creek examples.

The Kentucky sale/resale evidence Mr. Kirkland relies on includes Turkey Creek Solar (Garrard County) pairs that cannot be fully verified against public records, and in one case the report's own narrative says the property was not used, yet a pair for it still appears in the summary table. A property value report should rest on transactions that can be independently confirmed.

7.1 166 Long Branch (the closest Turkey Creek pair): a more recent, lower resale was not evaluated. The report's pair for 166 Long Branch lists a 2020 resale. Public MLS records show the same home resold on April 22, 2025 for $315,000, after 261 days on the market and four price reductions from an original $379,900. That is the most proximate and recent resale near Turkey Creek Solar, and it does not appear in the analysis. (Mr. Kirkland testified the Kentucky data was last refreshed about a year before the April 2026 hearing, placing this sale at or just past that cutoff.) The report's table also lists the 2020 sale date as "Nov-20"; the recorded MLS date was December 16, 2020.

Source: Kirkland Kentucky sale/resale table (Pair 4); MLS/public records for 166 Long Branch Dr., Garrard County (Realtor.com, Redfin, Homes.com). Resale figures from public listing history; recommend confirming against the county deed record.

7.2 A summary-table entry the report's own narrative says was not used, carrying another property's numbers. For 209 Ashlock Drive, the report's narrative states the property "sold on June 14, 2022 … for $500,000" - a 3,968-square-foot, 4-bedroom home on 3.06 acres - and that, because of its unique features, the analyst "ha[d] not attempted" a paired-sale analysis since "any result would be non-credible." Yet a "209 Ashlock" pair still appears in the summary Sale/Resale table as one of the sixteen examples, listed at a $180,000 sale, a $160,000 prior sale, and −1%. Those are the exact figures of the 166 Long Branch row immediately above it, not 209 Ashlock's. The 2025 Garrard County tax bill confirms 209 Ashlock (Map 28C-03-004, "HOUSE & TRACT D 3.066 AC") is assessed at $500,000. One of the report's sixteen sale/resale data points is therefore a property the analyst expressly declined to analyze, entered with a neighboring property's numbers.

Source: Mayfield report (Exhibit H), printed p.74 (209 Ashlock narrative - $500,000, June 14, 2022, 3,968 s.f., 3.06 ac, "not attempted … non-credible") and the Kentucky Sale/Resale summary table, printed p.129 (Pair 5 "209 Ashlock": $180,000 / $160,000 / −1%, identical to Pair 4 "166 Long Branch"); 2025 Garrard County tax bill, Map 28C-03-004 ("HOUSE & TRACT D 3.066 AC," assessed $500,000).

7.3 The example of a developer building next to solar rests on insider and below-asking sales. The report cites lot sales in the Elmwood Court subdivision, adjoining Turkey Creek Solar, as proof that a developer would not build next to solar if it harmed value. But the developer - Merriwood Development LLC, whose principals are William Allen Stevens (Wimbledon Holdings, LLC) and Walter Ryan Hulett (WRH Investments, LLC) per Kentucky Secretary of State filings - built the subdivision concurrently with the solar, and the lots relied on are not arm's-length evidence. One (186 Elmwood Ct) was transferred for $1 to Walter Ryan Hulett, a developer principal. The largest cited lot (138 Elmwood Ct, 2.6 acres) sold 13% below asking, $69,900 down to $60,800, to Michael and Jill Stevens, the parents of developer principal Will Stevens. A $1 transfer to a developer principal and a below-asking sale to another principal's parents are not evidence that the market is indifferent to the adjacent solar.

Nor is the report's lot math a method. Its baseline is the $50,000 per-lot figure from the developer's bulk transfer of fifteen lots - a price the report itself calls "not a good indication of market value" because the entities are related, and one the report cannot anchor, since it never states what the raw land originally cost. The lots are also different sizes, yet the math compares their full sale prices against that one flat figure with no size adjustment: it reads a "-10%" impact from Lot 96 (about one acre, $44,900) and a "+22%" impact from the adjacent Lot 97 (2.6 acres, the $60,800 below-asking sale above), then blends the two into a "12% enhancement." A larger lot selling for more reflects its extra acreage, not a solar effect; comparing unequal lots against a baseline the report itself calls unreliable measures nothing about the project.

Source: Kentucky Secretary of State business filings (Merriwood Development LLC; Wimbledon Holdings, LLC; WRH Investments, LLC); Garrard County PVA and deed records; the developer's Elmwood Court marketing brochure; Kirkland Crab Run report (Elmwood Court discussion); obituary of Billy A. Denny (Feb. 2016) listing daughter "Jill (Mike) Stevens" and grandson "Will Stevens," establishing the relationship.

Part 8. The setback analysis does not appear to identify two qualifying residential neighborhoods.

The Applicant's Motion for Deviation identifies twenty-two residential neighborhoods within two miles of the Project and seeks a deviation from the 2,000-foot setback (KRS 278.704(2)) for the six within that distance. It appears at least two qualifying neighborhoods were left off. Six homes line State Route 849 E immediately east of the Applicant's Neighborhood No. 7: Beckham (1268), Rodgers (1278), Beckham (1370), Wilson (1458), Hasty (1478), and Hendon (1512). Together they form a populated area of about 5.85 acres with six residential structures (1.03 per acre), which appears to meet the statutory definition of a "residential neighborhood" (KRS 278.700(6): "a populated area of five (5) or more acres containing at least one (1) residential structure per acre"). The Applicant's own Sensitive Receptors and Residential Neighborhoods Map (Application, Exhibit A) marks all six as residences but does not enclose them in a neighborhood boundary, as it does for No. 7, even though the cluster lies between No. 7 and the Project, nearer the Project than No. 7 (which the Applicant places 855 feet from the nearest panel), and well within 2,000 feet.

Figure 3. Neighborhood 7a, an apparent residential neighborhood the Applicant did not identify: six homes on about 5.85 acres immediately east of its Neighborhood No. 7. Parcels: 067.00.00.090.00, 067.00.00.091.00, 067.00.00.092.00, 067.01.00.022.00, 067.01.00.024.00, and 067.01.00.025.00.

A second cluster lies on Olden Road, beside the Applicant's Neighborhood No. 13 (the nearest one it identified, 516 feet from the nearest panel) and within the 2,000-foot setback: six homes on about 5.5 acres (1.09 per acre), comprising houses at 188 (Sheridan) and 60 (Barnett) and mobile homes at 272 (Holtz), 159, 155, and 98. The Applicant's own receptor map marks these as residences but, as with the first cluster, draws no neighborhood boundary, even though two of the mobile homes stand on parcels the county records still list as vacant land. Whether to classify each cluster as a residential neighborhood is ultimately for the Board; the Applicant's filing never identified or analyzed either one, so that determination was never made for these homes.

Figure 4. Neighborhood 13a, an apparent residential neighborhood the Applicant did not identify: six homes on about 5.5 acres beside its Neighborhood No. 13. Parcels: 084.00.00.070.00, 084.00.00.071.00, 084.00.00.072.00, 084.00.00.073.00, 084.00.00.074.00, and 085.00.00.131.00.

Source: Mayfield Motion for Deviation, Case No. 2025-00395, Section II (definition per KRS 278.700(6); twenty-two neighborhoods within two miles; six within 2,000 feet; Neighborhood No. 7 at 855 feet and No. 13 at 516 feet to the nearest panel); Application, Exhibit A, Sensitive Receptors and Residential Neighborhoods Map; Graves County 2025 property tax bills (parcels listed under Figures 3 and 4; each improved with a dwelling, except two Olden Road mobile-home parcels recorded as vacant land and confirmed by current street-level imagery).

Summary. The property value report omits the battery-storage analysis its own conclusion cites; the battery system is also absent from the decommissioning, acoustic, and (as sited) flood-plain record; the report's author has testified to a method that does not finish unfavorable analyses; the analysis was confined to directly adjoining parcels, while the independent review noted no limitations and dropped some of the closest neighbors from the count; and the most comprehensive current research, pointing to measurable losses for these homes, was left out of the evidence. The setback-deviation filing separately omits two clusters of homes that appear to meet the statutory definition of a residential neighborhood (KRS 278.700(6)) and sit closer to the Project than neighborhoods the Applicant did identify (Part 8). The Board should require a complete and reliable record, on both the property-value showing and the residential neighborhoods, before acting on the setback deviation.

Surrounding Uses

			GIS Data		Adjoin	Adjoin	Distance (ft)	L.F
#	**MAP ID**	**Owner**	**Acres**	**Present Use**	**Acres**	**Parcels**	**Home/Panel**	**Adjacent**
1	066.00.00.082.00	Unknown	28.59	Agricultural	1.18%	1.25%	N/A	1755
2	066.00.00.083.00	Unknown	21.18	Agricultural	0.88%	1.25%	N/A	445
3	066.00.00.085.00	~~George~~	23.65	Agricultural	0.98%	1.25%	N/A	1
4	066.00.00.087.00	~~George~~	136.00	Agri/Res	5.63%	1.25%	1,460	4245
5	066.00.00.089.00	Unknown	42.00	Agricultural	1.74%	1.25%	N/A	935
6	083.00.00.082.00	Unknown	22.05	Agricultural	0.91%	1.25%	N/A	220
7	083.00.00.073.01	Wilson	45.05	Agricultural	1.87%	1.25%	N/A	4085
8	083.00.00.078.00	Wilson	81.46	Agricultural	3.37%	1.25%	N/A	2750
9	083.00.00.079.00	Wilson	11.19	Residential	0.46%	1.25%	N/A	720
10	083.00.00.030.00	Shappard	171.00	Agricultural	7.08%	1.25%	N/A	1
11	083.00.00.034.01	No Data	38.64	Agricultural	1.60%	1.25%	N/A	845
12	083.00.00.047.00	No Data	52.56	Agricultural	2.18%	1.25%	N/A	2725
13	083.00.00.049.00	Thurston	100.00	Agricultural	4.14%	1.25%	N/A	1315
14	083.00.00.051.00	No Data	24.56	Agricultural	1.02%	1.25%	N/A	1
15	083.00.00.069.00	Purchase	7.65	Residential	0.32%	1.25%	N/A	375
16	083.00.00.068.00	Davenport	103.00	Agricultural	4.27%	1.25%	N/A	4455
17	084.00.00.099.00	Davenport	61.55	Agri/Res	2.55%	1.25%	760	1090
18	083.00.00.059.00	Davenport	60.91	Agri/Res	2.52%	1.25%	1,165	930
19	083.00.00.065.00	Davenport	24.70	Agricultural	1.02%	1.25%	N/A	3860
20	083.00.00.066.00	Unknown	1.87	Residential	0.08%	1.25%	N/A	585
21	~~083.00.00.066.00~~	Davenport	21.18	Agricultural	0.88%	1.25%	N/A	2580
22	~~083.00.00.066.00~~	Davenport	28.34	Agricultural	1.17%	1.25%	N/A	2410
23	084.00.00.098.00	Davenport	19.09	Residential	0.79%	1.25%	N/A	560
24	084.00.00.100.00	Davenport	70.14	Agricultural	2.91%	1.25%	N/A	50
25	084.00.00.059.00	Davenport	31.45	Agricultural	1.30%	1.25%	N/A	2305
26	084.00.00.062.01	Wilson	32.25	Agricultural	1.34%	1.25%	N/A	2705
27	084.00.00.007.02	Wilson	16.87	Residential	0.70%	1.25%	N/A	1585
28	084.00.00.007.01	Wilson	47.40	Agricultural	1.96%	1.25%	N/A	1420
29	084.00.00.014.00	Davenport	58.52	Agricultural	2.42%	1.25%	N/A	3715
30	084.00.00.013.00	Ray	141.00	Agricultural	5.84%	1.25%	N/A	1460
31	084.00.00.001.00	Unknown	17.71	Residential	0.73%	1.25%	N/A	2355
32	085.00.00.153.00	Randall	121.00	Agricultural	5.01%	1.25%	N/A	620
33	085.00.00.146.00	~~Mathis~~	39.38	Agricultural	1.63%	1.25%	N/A	2795
34	085.00.00.145.01	Rodgers	34.56	Agricultural	1.43%	1.25%	N/A	1290
35	085.00.00.090.00	Rodgers	51.53	Agricultural	2.13%	1.25%	N/A	675
36	085.00.00.091.00	Higgins	11.90	Residential	0.49%	1.25%	300	250
37	085.00.00.092.01	Boyd	26.05	Agricultural	1.08%	1.25%	N/A	1235
38	085.00.00.092.00	Dawson	7.31	Residential	0.30%	1.25%	740	85
39	084.00.00.070.01	Jerry	0.35	Residential	0.01%	1.25%	550	130
40	084.00.00.070.00	Gerald	10.03	Residential	0.42%	1.25%	465	1670
41	084.00.00.071.00	~~Byerley~~	56.55	Agricultural	2.34%	1.25%	N/A	2730
42	084.00.00.086.00	Greg	1.11	Residential	0.05%	1.25%	335	285

DUPLICATE

INITIAL OBSERVATIONS

Surrounding Uses - Page 10 (Rows 1-42)

LEGEND:

= Flagged item

= Confirmed incorrect

2025 owner: Wilson trusts

2025 owner: Wilson trusts

2 confirmed houses on parcel;
no distance measured

Estimated to be 083.00.00.058.00

Estimated to be 084.00.00.097.00
Public record: 'HOUSE & 28 ACRES'

2025 owner: Mathis

2025 owner: Burchard

2025 owner: Burchard

2025 owner: WILL FAMILY TRUST

Public record: 'HOUSE, BARN, BLDG & 51 ACRES'
no home/panel distance measured

11.90 ac (GIS) vs. 1.48 ac (public record)

0.35 ac (GIS) vs. 10.14 ac (public record)
Likely swapped w/ #40; 2025 owner: Merrell

10.03 ac (GIS) vs. 0.47 ac (public record)
Likely swapped w/ #39; 2025 owner: Holtz

2025 owner: Sheridan
Public record: 'HOUSE, GARAGE & 2.7 ACRES'; dist. N/A

2025 owner: Henson & Samuel

Surrounding Uses

DUPLICATE

#	MAP ID	Owner	GIS Data Acres	Present Use	Adjoin Acres	Adjoin Parcels	Distance (ft) Home/Panel	L.F Adjacent
43	068.00.00.151.00	Strickland	5.92	Residential	0.25%	1.25%	780	1
44	067.00.00.075.00	Bylery	22.88	Agri/Res	0.95%	1.25%	605	500
45	~~067.00.00.075.00~~	No Data	8.61	Residential	0.36%	1.25%	N/A	200
46	067.00.00.073.00	No Data	19.14	Residential	0.79%	1.25%	N/A	510
47	067.00.00.072.00	No Data	3.37	Residential	0.14%	1.25%	1,425	1
48	067.00.00.078.00	No Data	38.40	Agricultural	1.59%	1.25%	N/A	75
49	067.00.00.076.00	~~Gibbs~~	1.72	Residential	0.07%	1.25%	870	405
50	067.00.00.077.00	Wilbourn	4.34	Residential	0.18%	1.25%	610	1030
51	084.00.00.091.00	Chapman	9.29	Residential	0.38%	1.25%	330	3050
52	084.00.00.067.00	Stephenson	8.82	Residential	0.37%	1.25%	315	1325
53	084.00.00.067.01	Shields	1.69	Residential	0.07%	1.25%	480	495
54	084.00.00.066.00	Dixon	1.00	Residential	0.04%	1.25%	340	330
55	084.00.00.067.00	Stephenson	1.54	Residential	0.06%	1.25%	N/A	85
56	084.00.00.067.02	Purchase	1.04	Residential	0.04%	1.25%	N/A	610
57	084.00.00.068.00	Purchase	0.99	Residential	0.04%	1.25%	N/A	425
58	084.00.00.090.01	Thurston	8.59	Residential	0.36%	1.25%	N/A	1165
59	067.00.00.082.00	No Data	9.15	Residential	0.38%	1.25%	N/A	215
60	067.00.00.086.01	Thurston	43.18	Agricultural	1.79%	1.25%	N/A	440
61	067.00.00.088.03	Thurston	63.81	Agricultural	2.64%	1.25%	N/A	890
62	084.00.00.094.00	Thurston	38.72	Agri/Res	1.60%	1.25%	435	2495
63	067.00.00.089.00	Thurston	20.79	Agricultural	0.86%	1.25%	N/A	1
64	067.00.00.092.00	Hendon	1.57	Residential	0.07%	1.25%	330	270
65	067.00.00.093.00	Hendon	0.83	Residential	0.03%	1.25%	340	145
66	067.00.00.094.00	Hendon	0.61	Residential	0.03%	1.25%	310	365
67	067.00.00.095.00	No Data	4.38	Residential	0.18%	1.25%	N/A	535
68	067.01.00.023.00	No Data	3.91	Residential	0.16%	1.25%	365	455
69	067.01.00.024.00	Rodgers	1.15	Residential	0.05%	1.25%	400	110
70	067.01.00.026.00	No Data	1.06	Residential	0.04%	1.25%	N/A	160
71	067.01.00.027.00	No Data	0.75	Residential	0.03%	1.25%	N/A	90
72	067.01.00.029.00	No Data	0.68	Residential	0.03%	1.25%	N/A	75
73	067.01.00.028.00	Thurston	12.34	Residential	0.51%	1.25%	N/A	1260
74	067.01.00.033.00	Gutierrez	17.34	Residential	0.72%	1.25%	860	695
75	067.00.00.110.01	Allen	65.37	Agricultural	2.71%	1.25%	N/A	2615
76	067.00.00.106.00	Purchase	2.75	Residential	0.11%	1.25%	N/A	670
77	067.00.00.107.00	Purchase	21.00	Agricultural	0.87%	1.25%	N/A	260
78	066.00.00.077.00	Unknown	6.87	Residential	0.28%	1.25%	N/A	515
79	066.00.00.074.02	Crawford	14.35	Residential	0.59%	1.25%	N/A	455
80	066.00.00.078.00	Rives	45.17	Industrial	1.87%	1.25%	N/A	1585
		Total	**2414.450**		**100.00%**	**100.00%**	570	

INITIAL OBSERVATIONS

Surrounding Uses - Page 11 (Rows 43-80)

Estimated to be 067.00.00.074.00

2025 owner: Fischer

2025 owner: Beckham (L.)

2025 owner: Beckham (R.)

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LEGEND:

= Flagged item

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PNAS RESEARCH ARTICLE | ECONOMIC SCIENCES

Impact of large-scale solar on property values in the United States: Diverse effects and causal mechanisms

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Affiliations are included on p. 9.

Edited by Catherine Kling, Cornell University, Ithaca, NY; received September 10, 2024; accepted April 24, 2025

As the renewable energy transition continues into less receptive communities, local opposition is expected to intensify, potentially slowing the process. Since the local impacts are neither well quantified nor widely recognized, we lack policies and common practices to mitigate the potential associated welfare loss in affected communities. Based on a nationwide dataset combining property transactions and large-scale solar photovoltaic (LSSPV) sites, we analyze the heterogeneous effects of LSSPV on property prices and the associated causal pathways. Difference-in-differences estimates show that LSSPV significantly increases agricultural or vacant land value by about 19.4% within a 2-mile radius, while simultaneously reducing residential property values within 3 miles by about 4.8%. The estimated average negative impact on home values is primarily driven by site proximity and diminishes with both distance and time. Effect estimates are more robust to alternative specifications when proximity pairs with visibility rather than invisibility, but no evidence suggests visibility significantly amplifies the proximity effect. Heterogeneous effect estimates indicate that high solar lease potential, being in heavily Democratic-leaning counties, and brownfield redevelopment largely mitigate the negative residential value impact. The analysis reveals no significant heterogeneity across a few factors, including varying site visibility, directional orientation of properties relative to the LSSPV site, and different tracking systems. Evidence indicates that the negative impact on residential values might mainly stem from negative perceptions, but channels through physical conditions cannot be entirely dismissed. Our assessment provides benchmark information for local externality mitigation plans, potentially reducing community opposition and expediting the renewable energy transition.

solar energy | economic valuation | econometric analysis | renewable energy transition

Significance

Large-scale solar projects are crucial for decarbonizing the US economy, but growing local resistance may impede the renewable energy transition. We estimate the impact of large-scale solar on property prices and the underlying pathways using 8.8 million sales and 3,699 solar sites in the United States. Exposure to solar sites decreases nearby residential home values but increases land values. For large-lot homes, the increase in land value largely mitigates the negative residential impact. Varying county political leaning and land use histories result in significantly different residential value impacts. Empirical evidence indicates that the current negative residential impact might represent a stigma effect attached to solar sites. Our findings provide important insights for addressing local resistance against large-scale solar projects.

As the cost of solar energy continues to decline (1), solar is likely to remain the leading source of renewable energy in the United States (2). Although the climate benefits of large-scale solar photovoltaic (LSSPV) are widely recognized, the siting of LSSPV projects has encountered increasing local resistance (3–5). As the renewable energy transition deepens into less receptive communities, local opposition is expected to intensify and slow down the transition process. Anecdotal and qualitative evidence suggests that the local concerns are primarily driven by negative aesthetic impacts, decreased property values, environmental injustice, and adverse impacts on local agriculture (3, 6, 7). However, these negative impacts are not well quantified, and we lack policies or common practices to mitigate the potential welfare loss in affected communities.

LSSPV facilities can significantly alter local amenities in residential areas. Recent studies suggest that proximity to a solar site may reduce home values (8, 9) due to diminished amenities such as adverse visual impact (10). The geometric and highly reflective surfaces of LSSPV facilities can be seen as unattractive and disruptive, particularly in natural or agrarian settings (11). There are other potential disamenities associated with LSSPV that may not be revealed immediately after site installation, including disrupted ecosystems and wildlife habitats (12, 13), increased soil erosion and water runoff, and degraded air quality (14). Moreover, negative perceptions of disamenities could lead to property value losses that are unrelated to actual levels of physical disamenities, a phenomenon known as the stigma effect in the housing market (15, 16).

Solar development can affect land prices considerably. An LSSPV facility typically requires between 5 and 10 acres per MWac of generating capacity. Agricultural land has been the most common land type for LSSPV development, due to its suitability, such as being flat, dry, cleared of natural vegetation, and close to electric infrastructure (17, 18). A recent projection from the American Farmland Trust shows that solar projects could occupy over 7 million acres by 2040, with 83% of new installations on farmlands and ranchlands, half of which are on highly productive land (19). If we consider the potential future surge in

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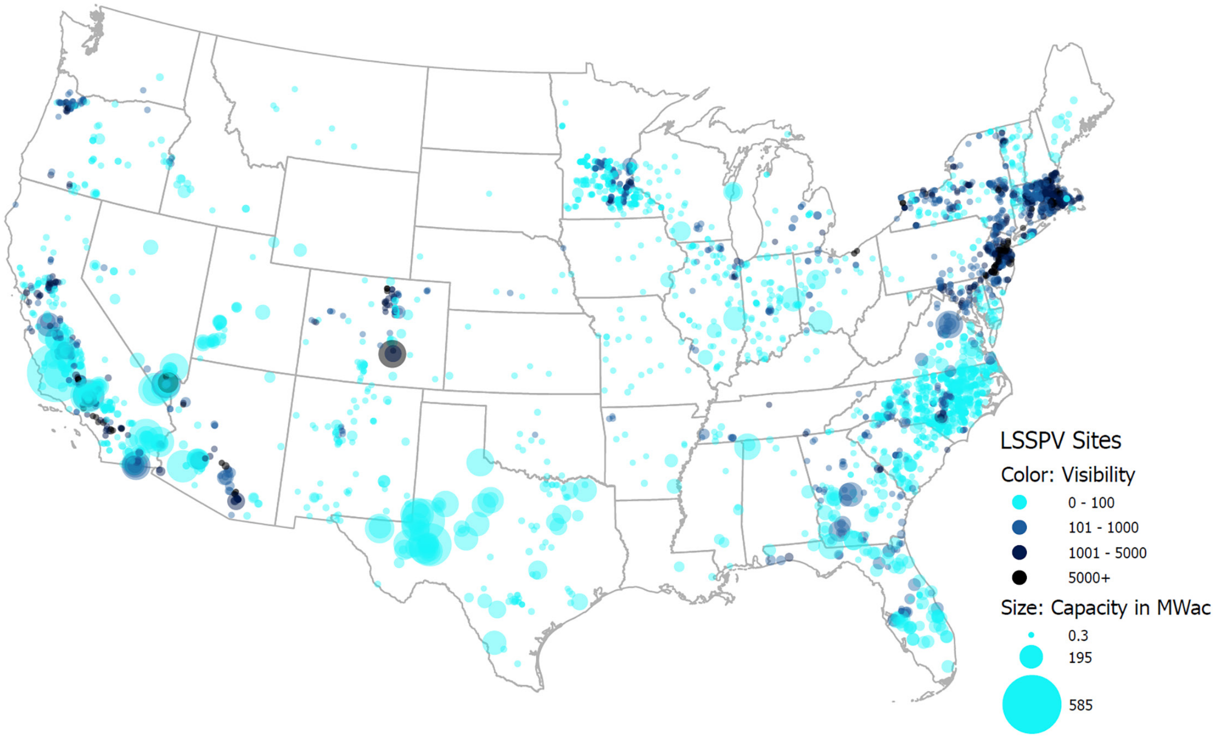

Fig. 1. Map of LSSPV locations, capacity, and visibility. The size of circles indicates the capacity of each LSSPV site. The colors represent the visibility of each site. Visibility is measured in the number of local (<6 miles) residential homes with a view of that LSSPV site.

energy demand, e.g., electrifying the transportation sector and establishing AI data centers, the required farmland for solar energy production could be much higher than the projected 5.8 million acres. In the long run, the land use competition between solar development and agricultural production is likely to increase the scarcity of farmlands, especially at the urban fringe. In the short run, leasing the land for solar energy production provides higher financial returns than traditional agricultural operations, which may drive up farmland prices and elevate farming costs.

Existing studies provide suggestive evidence that visual impacts and loss of property values are the two leading concerns for local oppositions (3, 10).* These local impacts of LSSPV represent classically defined externalities, as no widely established mechanism exists for solar site owners to compensate neighboring communities for potential negative effects. Quantifying these externalities is important to establishing solar siting procedures that adequately compensate the community and allow socially optimal allocations of resources. More importantly, as solar sites are initially developed in receptive communities, siting efforts are expected to become more challenging when the renewable energy transition continues. Studies have suggested that a major proportion of proposed LSSPV projects were denied or withdrawn due to local resistance (5, 10).† Clarifying and addressing the externalities of LSSPV development will help alleviate local opposition to solar development and accelerate the energy transition.

Utilizing property-level transaction data and detailed LSSPV site information, we present a comprehensive nationwide analysis to estimate and quantify the externalities of LSSPV facilities facing nonresidential and residential properties. We employ a Difference-in-Differences (DID) identification framework to investigate the effects of solar projects on nearby property values. Previous studies have employed similar methods to investigate the property value effects of solar site exposure in a few selected states (8, 9, 20). While viewshed analyses and visual impact investigations are prevalent for wind site studies (e.g., refs. 21–25), previous solar studies have not measured site visibility or quantified the associated visual impact, despite some indicating its relevance (e.g., ref. 26). In contrast to previous solar studies focusing on site proximity, we additionally assess the impact of site visibility and its interaction with proximity. Specifically, we create a geospatial database showing the visibility from every residential home to nearby LSSPV facility in the contiguous United States (Fig. 1, see *Data and Methods* for details). With the average effects showing the general size of welfare changes in the neighborhood, we further differentiate the impact mechanisms and provide information for a compensation plan for the local externalities generated by LSSPV sites.

Our analysis demonstrates that LSSPV sites affect local residential property values and land values differently. We separately analyze transactions on three types of properties. The first type is residential properties (hereafter "residential homes" or "residential") with a lot size under five acres (i.e., the typical minimum acreage requirement for a solar lease), where LSSPV effects primarily stem from impacts related to residential amenities. The second type involves agricultural or vacant land above five acres (hereafter "agricultural land" or "ag-land"), where LSSPV effects mainly result from potential solar lease-induced land use value changes. The third

*Crawford et al. (3), based on 33 interviews with residents, found that the top three of residents' most common concerns of large-scale solar are "negative aesthetic impact", "decreased property values", and "misuse of agricultural land". Moreover, a survey conducted in 2023 by Nilson et al. (10) shows that 123 developers report visual concerns to be the most common concern for utility-scale solar, followed by property value loss and agricultural land loss.

†An earlier study from Mulvaney (5) showed that nearly half of the LSSPV projects proposed from 2005 to 2016 in the Southwest US were denied or withdrawn, largely due to local resistance. A survey conducted in 2023 by Nilson et al. (10) suggests that among solar industry respondents across the US, 95% agree that community opposition will get in the way of decarbonization goals. The same survey shows that about 40% of planned solar projects were canceled while the remaining 60% were delayed by at least 6 months in the last 5 y, and local ordinances and community opposition are among the leading causes of cancellation.

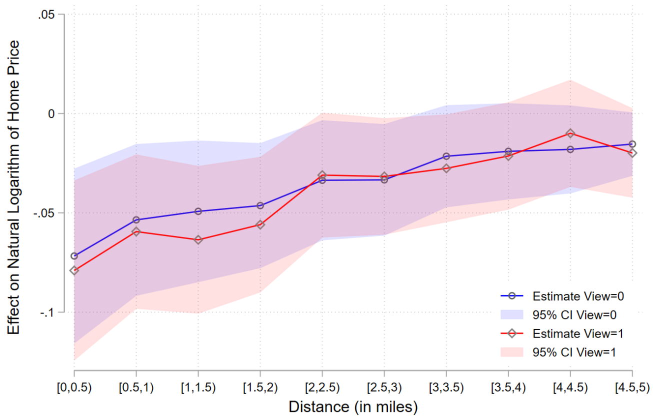

Fig. 2. Effects of proximity and view on residential home value. The blue line connects the coefficient estimates of proximity bins without view, obtained by interacting the proximity bins, the binary posttreatment indicator, and the no-visibility indicator (i.e., equals 1 if no site view). The red line connects coefficient estimates of proximity bins with view, obtained by interacting the proximity bins, the binary posttreatment indicator, and the visibility indicator (i.e., equals 1 if with site view). The number of observations (N) in this analysis is 8,303,074, excluding singleton observations on the census-tract by year level. The 95% CIs are constructed with two-way clustered SEs at the census tract and year level. The control group is properties in the 5-to-6-mile proximity bin.

type includes properties over five acres with residential structures (hereafter "large-lot homes"), where LSSPV effects may include both residential amenity and land use value impacts. Within the analysis of each property type, we further investigate the impact heterogeneity across a range of dimensions, including rural–urban status, census region, lot size, county political leaning, median household income, solar site scale, site historical land use, state siting regulation, among others. To make sure our estimates are not specific to the five-acre segregation criterion, we conducted robustness checks in *SI Appendix*.[‡]

1. Results

1.1. LSSPV Impact on Residential Home Value. We first present the results for residential properties under five acres, which include approximately 8.3 million property transactions within a 6-mile radius of LSSPV sites from 15 y before the installation of each site through 2020. Further analytical details are provided in *Data and Methods*.

1.1.1. Residential proximity and visibility. We first use distance decay specifications within the DID framework (see Section 3.5 for model details) to decide the proper treatment variable, assuming solar site exposure is determined by proximity and visibility. The view-specific distance decay results (Fig. 2) show that proximity is the major driver of the negative residential value impact. We find that, without LSSPV view, LSSPV proximity reduces residential sales price by up to 7.2% within a 0.5-mile radius, and the bin-specific estimates gradually decrease with distance and remain statistically significant up to 3 miles from the LSSPV site. Having LSSPV in the viewshed of a home incurs slightly more negative effects (i.e., up to 7.9% within 0.5 miles) compared to the pure proximity effects,[§] and the bin-specific effects also diminish with distance. Beyond 3 miles, both the proximity effect and the visibility effect become indistinguishable from zero, suggesting that visibility does not independently generate negative impacts in the absence of proximity.

1.1.2. Residential treatment—site within 3 miles. As shown in Table 1 column (1), when examining the average treatment effect of proximity within 3 miles (regardless of visibility), the estimate is 4.8% and statistically significant at the 5% level. We further investigate the interaction between proximity and visibility in column (2). When the solar site is visible and within 3 miles, property values, on average, decrease by about 5.2%. The corresponding effect of an invisible site is estimated at 4.6%. While both estimates are statistically significant at the 5% level, a statistical test shows that the difference between them is not significant at all (test *P*-value = 0.746), indicating that site visibility may not impose a significant additional average effect beyond proximity and supporting the validity of proximity-based specifications in prior studies (e.g., refs. 8 and 9). We also checked an alternative specification that excludes no-view properties within the 3-mile radius in column (3) of Table 1, which provides a similar interaction effect of visibility and proximity. These average effect analyses, combined with the distance decay results, suggest that site proximity alone largely drives the residential home effect. Consequently, site proximity within a 3-mile radius [as presented in Table 1 column (1)] serves as the principal treatment variable, representing LSSPV exposure, in subsequent event study and heterogeneity analyses. Examining the sensitivity of estimates to alternative control group specifications in *SI Appendix*, Table S6, we find that the interaction effect of visibility and proximity remains robust across the board, while the pure proximity effect becomes insignificant in some of the alternative

Table 1. DID Estimates for Residential Homes

	(1)	(2)	(3)
	ProxT	ProxT × ViewT	ProxT × ViewT
ProxT	−0.076**		
	(0.022)		
β_3: ProxT × Post	−0.048*		
	(0.020)		
ProxT × 0.ViewT		−0.078**	
		(0.022)	
ProxT × 1.ViewT		−0.070**	−0.044
		(0.023)	(0.029)
$\beta_3^{no\_view}$: ProxT × 0.ViewT × Post		−0.046*(0.020)	
β_3^{view}: ProxT × 1.ViewT × Post		−0.052*	−0.046+
		(0.020)	(0.023)
N	4975808	4975808	2444983
Covariates	Yes	Yes	Yes
Census Tract × Year	Yes	Yes	Yes
Test (H_0: $\beta_3^{no\_view} = \beta_3^{view}$): z-Statistic = 0.324 *P*-value = 0.746			

Note: In Column (1), ProxT, standing for site proximity below 3 miles, is used as the treatment. In Column (2), proximity without view (ProxT×0.ViewT) and proximity with view (ProxT×1.ViewT) are used as treatment. In Column (3), properties that satisfy ProxT = 1 and ViewT = 0 are excluded. β_3 s represent the treatment effects specified in Section 3.5.1. SE, two-way clustered at census tract and year level, are reported in parentheses: $^{+}P < 0.1$, $^{*}P < 0.05$, $^{**}P < 0.01$, $^{***}P < 0.001$. Census tract by year fixed effects and property-level covariates are included in all specifications but not displayed. The control group is properties in the 5-to-6-mile proximity bins of the LSSPV sites, and properties located within 3 to 5 miles from the LSSPV sites are excluded. The number of observations, N, is calculated excluding singleton observations on the census-tract by year level. The coefficient for Post is omitted due to collinearity with fixed effects.

[‡]The results are presented in *SI Appendix*, Table S8, which suggest that the main estimates are robust to alternative acreage thresholds for segregating the small-lot properties and large-lot properties (e.g., 5 miles to 0.3 miles for small-lot properties and 5 miles to 9 miles for large-lot properties). Therefore, the main conclusions of this study are not sensitive to changes in the five-acre threshold.

[§]As pointed out in the *Data and Methods* section below, our visibility measure potentially overrepresents the true visibility especially when the viewpoint and the target are close, limited by structural elevation data availability (36). This measurement bias introduces attenuation in the treatment variable, potentially leading to an underestimation of the visibility impact (and hence the difference between visibility and proximity impact in Fig. 2).

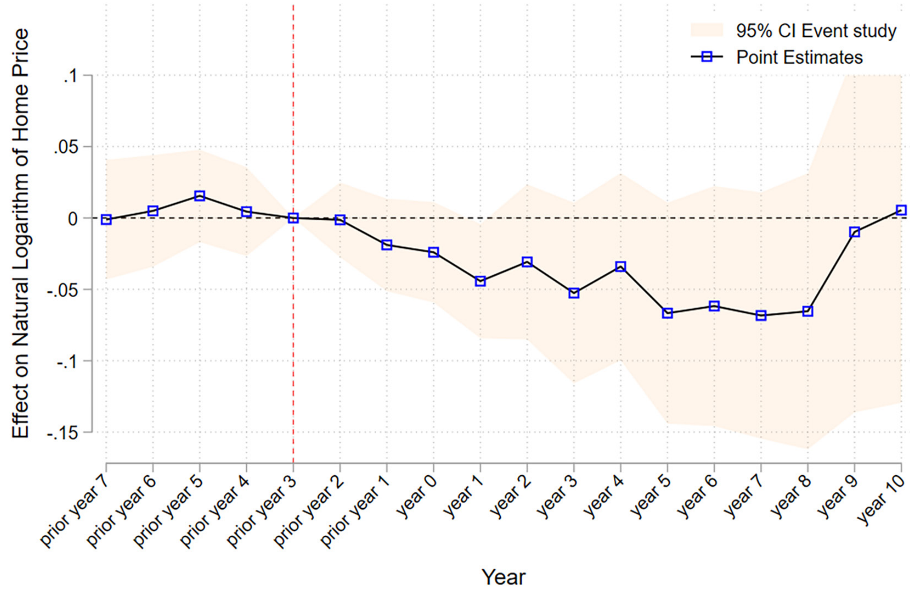

Fig. 3. Event study on residential home value. The treatment (LSSPV site within 3 miles) effect on residential home values is illustrated across different years relative to the year of LSSPV installation. The blue squares on the black line indicate the coefficient estimates, obtained by interacting the treatment variable with year indicators. The reference year is defined as 3 y before the LSSPV installation, and the control group is properties in the 5-to-6-mile proximity bin. The shaded areas represent the 95% CIs, constructed using two-way clustered SEs at the census tract and year level.

specifications. This implies that site visibility appears to reinforce the proximity effect in the sense that it improves the robustness of the home value effect estimate across various alternative control group specifications. To provide a comprehensive view of the proximity effect, we present both the specifications from column (1) and column (2) in the pretrend tests and robustness checks in the *SI Appendix*. Pretrend tests with placebo treatments in *SI Appendix*, Table S5 show that the parallel trend assumptions are satisfied for all specifications in Table 1. More robustness checks in *SI Appendix*, Tables S8 and *S9* confirm that all estimates in Table 1 remain consistent when applying alternative sample selection criteria based on acreage and the number of observations per tract-year cluster.

1.1.3. Residential event-study results. We explore the timing of the LSSPV exposure effect (i.e., site visible within 3 miles) based on an event study where the base year is specified as 3 y prior to the LSSPV installation[¶] (Fig. 3). The average negative price impact on residential homes is minor after the base year but becomes pronounced following the installation. The effect generally maintains its magnitude over time and fades after the ninth year postinstallation. There are potential explanations for the observed effect dynamics. Right after the base year, the gradual dissemination of the LSSPV site information may not have reached many home buyers or led them to fully realize the potential negative price impact of the site, but the installation event makes the impacts clear and manifested in the market. The diminishing effect after 9 y might come from the shrinking sample size as most of the LSSPV sites were developed after 2010. However, if the diminished effect is true, it does not necessarily imply that the negative amenity impacts disappear after 9 y since many of the negative impacts, such as soil erosion and dust pollution, may take a long time to manifest (14, 27, 28). A more plausible explanation of the faded price impact may be linked to residential sorting and demographic shifts (29–31), as individuals less concerned about LSSPV facilities move into the affected neighborhoods. This indirectly suggests that the negative price impact might be more closely related to psychological factors than to the amenities themselves, which will be explored further in subsequent analyses and discussions.

1.1.4. Residential Effect Heterogeneity. We explore the heterogeneity of LSSPV exposure effect on residential homes across various dimensions, as shown in *SI Appendix a*nd Fig. 4.[#] We observe noticeable heterogeneity across census regions, county political leaning, county median household income, and historical land use of the LSSPV sites. Statistical tests results are available in *SI Appendix,* Table S10. LSSPV sites in the Northeast region impose significantly more negative impacts than those in other regions. Heavily Democratic-leaning counties (over 65% Democratic votes in 2016) experience a positive LSSPV effect (+0.0374, insignificant), which is significantly different from more politically conservative counties (−0.0538, significant at the 5% level). Greenfield LSSPV development leads to a negative effect (−0.0466, significant at the 10% level), while brownfield redevelopments lead to a positive residential value effect (+0.225, significant at the 10% level), significantly different from the effect of Greenfield LSSPV.[||] Observed differences along other dimensions are not statistically significant. Moreover, we observe almost zero heterogeneity across different rural status, different lot sizes, different site capacities, and different levels of site visibility. A higher level of visual exposure ("High View" in Fig. 4) or directly facing the solar panels (i.e., in the south of the solar panels,

[¶]This approximately represents the time when some residents may become aware of the upcoming LSSPV site through permitting, contracting, community engagement, or other site preparation activities.

[#]We also investigate the heterogeneous pure proximity and visible proximity effects in *SI Appendix* Fig. S7. The results show that both effects have very similar heterogeneities as the main results in Fig. 4: the negative property value impact is significantly higher in more politically conservative counties, and brownfield sites may have a positive property value impact.

[||]Brownfields include sites such as hazardous waste facilities, abandoned contaminated areas, and inactive mines (53). Solar projects on brownfields often require site cleanup, which can reduce negative externalities and undesirability of these sites and positively affect property values. This aligns with Gaur et al. (54), who found that residents are willing to pay more for solar projects on brownfields, as these sites are otherwise undesirable. Meanwhile, respondents in Gaur et al. request compensation for solar project developed on greenfields, suggesting that they perceive brownfields as the more appropriate land type for LSSPV development than greenfields.

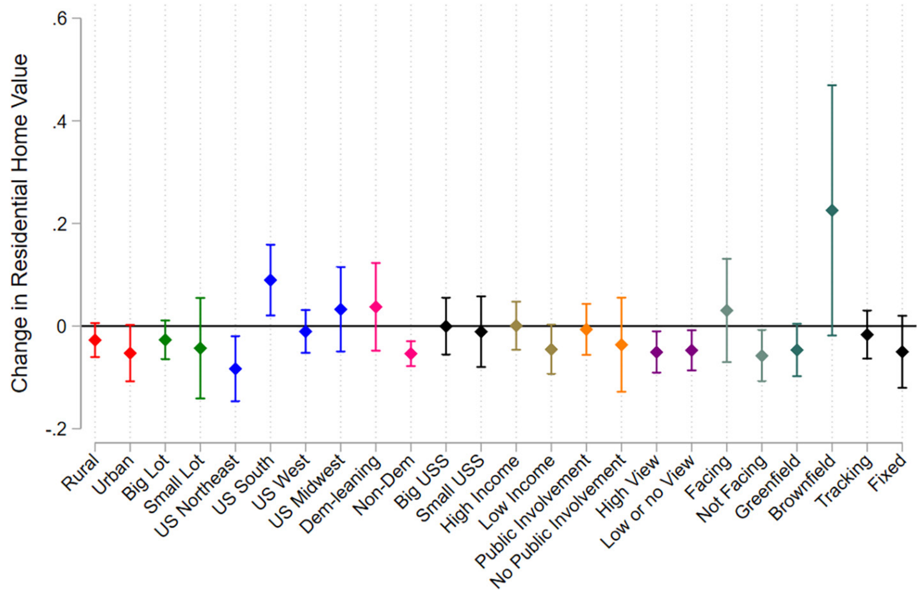

Fig. 4. Heterogeneous effects of LSSPV exposure by different dimensions. Diamonds are the point estimate of the effect of LSSPV on nearby residential home values based on DID models. The treatment is LSSPV within 3 miles, and the control group is properties in the 5-to-6-mile proximity bin of the LSSPV site. The 95% CIs of the estimates are shown as bars, having clustered SEs at the census tract and year level. Check *SI Appendix* for the details of all factors investigated here. More heterogeneity checks differentiating visible and invisible sites are available in *SI Appendix*, Fig. S7.

"Facing" in Fig. 4) does not lead to a more negative residential value effect, providing further evidence that more view exposure may not lead to significantly more negative impacts. While we lack direct data on glint and glare effects, indirect evidence suggests they may not be a primary mechanism, as we find no evidence to support that being exposed to a site with tracking systems (i.e., potentially more susceptible to glare impacts, "Tracking" in Fig. 4) or facing the solar panels lead to more negative impacts. Instead of visual levels or details, impacts appear to stem from psychological factors, such as negative perceptions of industrialization and altered scenic views. These negative perceptions are expected to be amplified by conservative ideology or mitigated by progressive ideology, aligning with the empirical finding that more politically conservative counties are associated with more negative impacts.

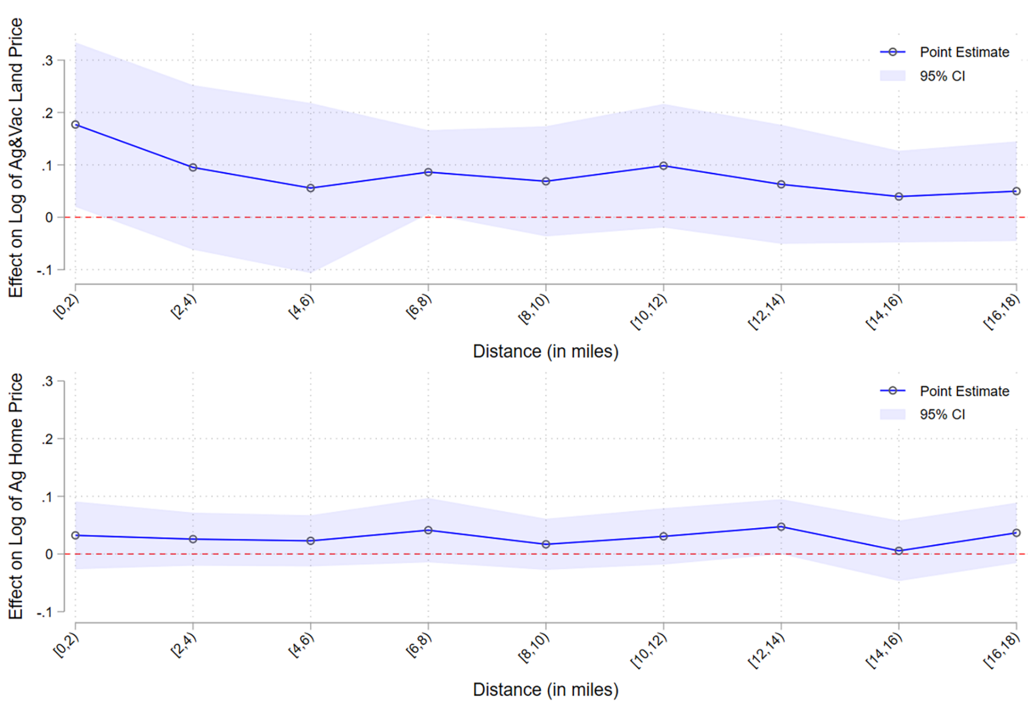

Fig. 5. Distance decay results for agricultural/vacant land and large-lot homes. The top subfigure shows estimates for agricultural and vacant land above five acres. The bottom subfigure shows estimates for large-lot homes, defined as properties over five acres with residential structures. The results show the value effects of LSSPV for a range of proximity bins, defined with 2-mile intervals. The blue line connects the coefficient estimates of proximity bins, obtained by interacting the proximity-bin indicators with the binary posttreatment indicator. The treatment groups are properties within these proximity bins, while the control group is properties within the 18-to-20-mile proximity bin. The 95% CIs are constructed with two-way clustered SEs at the county-site and year level.

1.2. LSSPV Impact on Agricultural Land Value. Our Ag-land analyses show that having LSSPV sites within 2 miles of agricultural or vacant land increases the sales price per acre by an average of 19.4%,[**] which is statistically significant at the 5% level (Fig. 5). The positive effect rapidly declines and becomes insignificant beyond 2 miles, similar to estimates in ref. 32. This positive effect is likely due to the demand increase from potential solar leases, as further expansion of existing LSSPV sites is less costly than constructing new sites and likely involve nearby agricultural or vacant land. Pretrend tests in *SI Appendix,* Table S5 show that the parallel trend assumptions are satisfied. Robustness checks in *SI Appendix,* Table S7 suggest that our main ag-land estimate is robust against different control group selection criteria. Event-study results in *SI Appendix,* Fig. S5 show that the positive land value effect manifests 3 y after the site installation and fades away 6 y later. *SI Appendix,* Fig. S6 presents our analysis of heterogeneous ag-land effects. We find that LSSPV sites of larger than-median scale have virtually zero effect on land value, while sites of smaller scale display a positive effect on land value (significant at the 10% level). Considering that smaller sites have a larger potential for expansion, this observation seems to confirm our speculation that the nearby land value increase is mainly driven by the potential of future solar lease. We also find that agricultural or vacant lots of large acreage bear virtually zero effect while smaller lots show a significantly (at the 5% level) positive effect. However, these differences are not statistically significant. More robustness checks in *SI Appendix,* Table S8 suggest that our land value estimates remain consistent when applying alternative sample selection criteria based on acreage. Finally, robustness checks in *SI Appendix,* Table S9 reveal that when focusing solely on county-site-year clusters containing more than a few sales, the land price effect of LSSPV rises dramatically, reaching 86.1% when excluding less-than-20-land-sales clusters (corresponding to a coefficient of 0.621). Given that we have excluded sales of land hosting LSSPV sites, the mechanism behind this substantial effect on land prices remains unclear but warrants further investigation.

1.3. LSSPV Impact on Large-Lot Home Value. Our empirical results show that LSSPV sites have a dual effect: they decrease residential property values via reduced residential amenity, while simultaneously increasing nearby land prices due to enhanced land use potential. For large-lot residential homes with over five acres of land, we expect the LSSPV to impact property values through both channels. Our distance decay analysis (Fig. 5, *Bottom*) suggests that the overall LSSPV impact on large-lot home price is close to zero and statistically insignificant for all nearby proximity bins. Robustness checks in *SI Appendix*, Tables S8 and S9 confirm that these large-lot-home estimates remain small and insignificant when applying alternative sample selection criteria based on acreage and the number of observations per tract-year cluster. Therefore, the LSSPV property value impacts via amenity reduction and increased land use potential seem to offset each other in residential homes with over five acres of land.

2. Discussion

This study provides a comprehensive nationwide assessment of the externalities associated with LSSPV installations in the United States focusing on their impacts on property values. We leverage a rich property transaction dataset with detailed geospatial information of LSSPV sites to estimate the effects on both residential properties and agricultural/vacant land. We apply advanced geospatial methods to overcome computational challenges and develop a comprehensive nationwide database on LSSPV visibility. Our findings reveal that LSSPV installations negatively affect the value of residential properties located within 3 miles, while increasing prices for agricultural and vacant land within 2 miles. Moreover, when the impacts through reduced residential amenity and increased land use potential coexist, the LSSPV effect on large-lot homes is indistinguishable from zero. We also explore the dynamics and heterogeneities of the local property value effects of LSSPV.

Our analyses and heterogeneity checks indicate that a nearby solar site may act as a stigmatizing nuisance (i.e. a psychological disamenity, see refs. 15, 16, 33) and 34). Evidence supporting this claim includes the minimal variation in effects across different levels of site visibility, in effects across properties to the south and to the north of the site, and in effects across sites with different tracking systems, as they suggest that the view details of solar sites (including view extent, the exact view composition, and potential difference in glare effects) do not significantly impact residential values. The negative impact on nearby residences appears to operate primarily through psychological channels rather than through the degree of visibility or specific visual details. Considering disamenities other than visual impact, the scale of the site likely results in different disamenity levels and impacts, but this is also not observed (i.e., "Big USS" vs. "Small USS" in Fig. 4). One explanation can be linked to negative perceptions that solar sites are industrial/commercial uses that alter rural land use and scenic views (15). The disparities in effects between brownfield and greenfield sites align with this mechanism. Another piece of evidence is the significantly higher property value loss in more conservative counties compared to Democratic-leaning counties. This disparity is likely due to solar sites being more aligned with progressive values prevalent in Democratic-leaning counties and less frequently associated with negative perceptions. However, we cannot entirely rule out causal channels related to actual disamenity variations. First, our nationwide analysis may obscure heterogeneities under certain conditions – for example, sites with a larger scale may have a stronger negative effect in the Northeast but a weaker one in the West, potentially canceling out in a pooled sample. Second, unexplored physical channels, such as vegetation and soil management practices (e.g., refs. 9 and 27), might also contribute to the negative LSSPV impact on residential values.

Our findings highlight the complex interplay between the benefits and costs of LSSPV development. In *SI Appendix,* Table S11, we performed a back-of-the-envelope calculation to estimate the benefits and costs of LSSPV solar sites included in our analysis, including the mitigation value (i.e., avoided social cost of carbon emission), the appreciation of nearby agricultural or vacant land value, the value loss of nearby residential properties, and the agricultural production loss on land utilized for hosting LSSPV. The results suggest that the assessed benefits of existing LSSPV significantly outweigh the assessed total costs. The carbon mitigation benefit is the major benefit (about \$22.2 billion annually), while the loss in residential home value is the dominant cost (about -\$4.1 billion annually). Therefore, property value losses constitute a major proportion of negative externalities of LSSPV. While the expansion of solar energy is crucial for the renewable energy transition, it is imperative to address the localized externalities to ensure equitable outcomes for affected communities. Quantitative evidence, such as that generated by this study, can inform policymakers and stakeholders in designing compensation mechanisms and siting strategies that mitigate negative impacts while promoting the broader adoption of solar energy.

[**]The coefficient estimate is 0.177, which reflects the effect on the logarithm of price. When this is converted to the actual proportional price effect, the result is $e^{0.177} - 1 = 19.4\%$.

To illustrate how our results or similar studies could be used to develop a community compensation plan, we design a prototype evidence-based community compensation plan for a site proposal in (*SI Appendix,* Fig. S12). First, property value impact studies should be carefully conducted with empirical data from comparable solar sites (e.g., similar size, similar demographics, in counties or states of similar regulations, etc.), where the effect of distance decay, dynamics, and heterogeneities across a wide range of dimensions should be analyzed. The sample choice of LSSPV sites needs to balance site similarity and statistical power of analysis. Second, based on the property value study, compensation specifics should be decided for different properties in the neighborhood. Taking our main results as an example, compensation rates could be set at 5.2% of the annualized property value for 10 y for residential homes within 3 miles of the LSSPV site with a site view, 4.8% for those without a view, and 19.4% of annual agricultural land rental costs[††] for 4 y for leasing farmers within 2 miles. Third, the community compensation plan can involve communication with stakeholders ahead of the permitting process, and stakeholders' input should be involved in the revision process before reaching a final plan. A comprehensive compensation plan should also consider local externalities that might not visibly manifest in property prices. We would like to stress that the specific community compensation plan developed based on our nationwide study here should be merely taken as an example, and we recommend conducting targeted studies to determine appropriate community compensation plans for a specific LSSPV site.

3. Data and Methods

The analysis primarily utilizes data of three categories: The US LSSPV data, the real estate transaction and assessment records, and geospatial data.

3.1. LSSPV Data. The LSSPV data acquired from the US Large Scale Solar Photovoltaic Database (USPVDB) (35) contain 3,699 LSSPV facilities investigated in the study. This dataset provides detailed information on LSSPV site footprint, area, capacity, and installation year, spanning from 1986 to 2021 (*SI Appendix,* Fig. S1 shows the total acreage developed per year, and *SI Appendix,* Table S1 shows the summary statistics of LSSPV projects). The facility polygons are digitized along the boundaries of the solar arrays, within an accuracy of 10 m.

3.2. Property Transaction. The property data are purchased from CoreLogic through a data agreement. CoreLogic data contain comprehensive information on property and transactions from the whole United States and enables researchers to work on property-level research questions. We developed a process to exclude non-arm's-length transactions (i.e., purging price outliers, foreclosure sales, multiple sales, sales between relatives, sales involving institutional buyers or sellers, and others as detailed in *SI Appendix*) so that our analyses only include transactions reflecting fair market values. The transaction prices are adjusted for inflation to reflect their values in 2017 dollars using the Consumer Price Index data from the US Bureau of Labor Statistics. We also exclude potential home flipping events by removing transactions of the same property that occur within 120 d of each other. As the majority of LSSPV sites have been developed within the past decade, we keep transactions up to 15 y before the installation of nearest LSSPV to make the time frame generally centered around the LSSPV development. The final dataset for analysis comprises both single-family residential properties and agricultural or vacant land, spanning 40 states[‡‡] from 1993 to 2020. To avoid the potential impact from market disequilibrium, we drop observations during the Great Recession (i.e., 2008 to 2010). *SI Appendix,* Tables S2–S4 show the summary statistics of residential homes, agricultural and vacant land, and large-lot homes, respectively. *SI Appendix,* Figs. S2–S4 illustrate the distribution of post-LSSPV-installation transactions of residential homes, agricultural or vacant land, and large-lot homes, respectively, across different proximity bins.

3.3. Geospatial Data. The geospatial data consist of a collection of geographic layers obtained from the US Census Bureau TIGER/line geodatabase (USCB TIGER) and US Energy Information Administration (EIA), which includes shapefiles of primary roads, transmission lines, and metropolitan areas. To support heterogeneity analyses, we also collected data on median household income, median land values, political leanings, and state-level siting policies, among other factors (see *SI Appendix* for details).

To acquire solar site proximity and other (dis)amenities, we generated geographic variables that represent the Euclidian distance between a property and the boundary of the nearest five solar sites, transmission line, primary road, and metropolitan area. The geographic variables were then matched with the property data. To alleviate identification concerns that attributes of control observations (i.e., properties far away from sites) might considerably deviate from treated observations (i.e., properties with solar site exposure), we only kept residential homes that are less than or equal to 6 miles away from the nearest solar sites. For properties above five acres (i.e., agricultural land or large-lot homes), we use a 20-mile radius inclusion criterion due to the general low density and low transaction volumes of such properties. The final sample includes 8.3 million transactions for residential homes, 68 thousand transactions for agricultural or vacant land, and 416 thousand transactions for large-lot homes.

3.4. Visibility Analysis. We establish a visibility database for LSSPV across the continental United States and investigate the property value effect of LSSPV visibility. We calculate the visibility from residential properties to large-scale solar sites within 6 miles. This visibility analysis proceeds in three steps. First, we acquire Digital elevation models (DEMs) of the continental United States from the Shuttle Radar Topographic Mission (SRTM) produced by NASA.[§§] Our analysis uses the 2018 version of SRTM DEMs at a resolution of 90 m by 90 m. The DEMs employed reflect terrain elevation but may not capture structures (e.g., houses or trees), and hence could overstate visibility especially when the viewpoint and the target are close (36). Nonetheless, the employed DEMs are the best available public data for our analysis, as structural elevation data (e.g., Light Detection and Ranging, or LiDAR, data) are not available for most solar sites and their neighborhoods.

Second, we calculate the viewsheds from solar sites to decide the areas from which the sites are visible, utilizing the duality of vision following ref. 21 (i.e., if and only if viewpoint A has a view on target B, a viewpoint on B has a view on target A). This approach greatly reduces computational effort since the number

[††]Note that this compensation assumes that the land price increase will induce a similar change in land rent costs. If land rent data is available, it could be used as the outcome in a similar DID study to decide the land rental cost impact of LSSPV site, which could serve as the baseline of the compensation to leasing farmers.

[‡‡]The other ten states (i.e., Alaska, Hawaii, Idaho, Kansas, Louisiana, Maine, Mississippi, Montana, Utah, and Wyoming) are excluded from the final analysis due to the absence of LSSPV sites, a lack of available transactions near LSSPV sites, or their non-continental status.

[§§]DEMs provide crucial information on the ground topography of the study area. The Shuttle Radar Topographic Mission by NASA employs remote sensing technology to gather laser light measurements of the earth's surface. The mission started in 2000, with a goal to create the first near-global topographical map of Earth and collect data on nearly 80 percent of the planet's land surfaces. Data are available at https://srtm.csi.cgiar.org/.

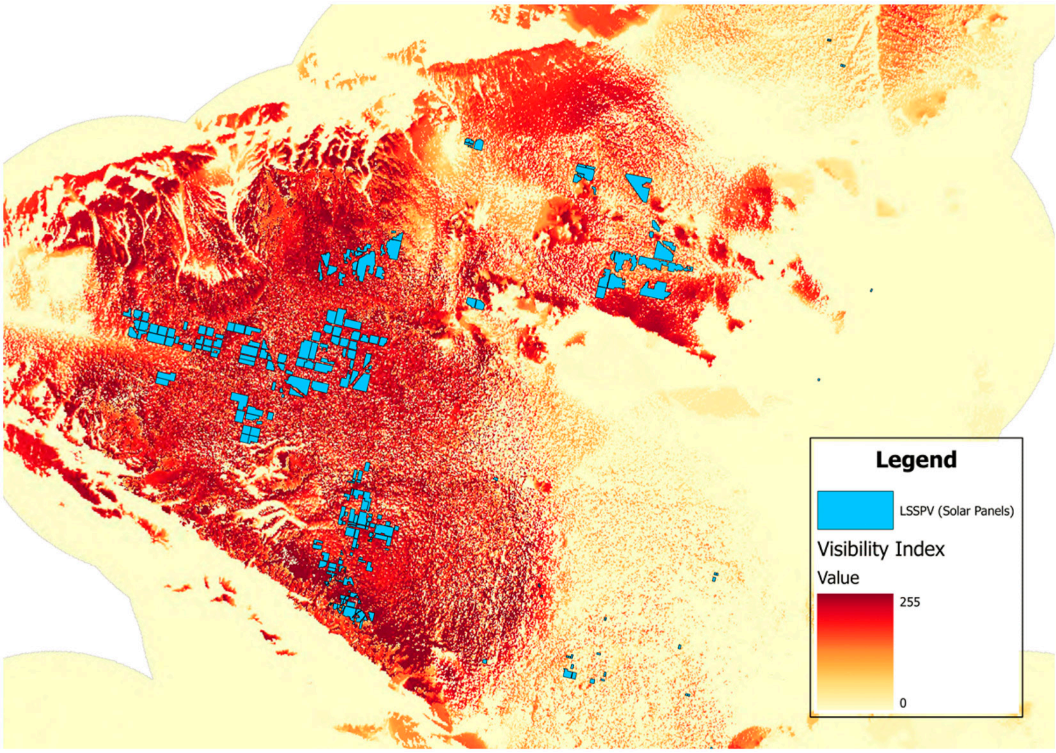

Fig. 6. Surface of Visibility Index. The visibility index measures the number of visible perimeter points of nearby solar sites. Intuitively, the red color denotes regions with solar view, and regions in darker red can see a larger area of solar panels.

of solar sites (3,699) is much smaller than the number of properties (about 5.9 million). Unlike the wind turbines that require height specifications for accurate viewshed analyses, LSSPV sites span broad areas, necessitating a proper way to account for partial views of a large solar site. Specifically, we set viewpoints along the perimeter of each site, where the viewpoints are defined with a random start point, an interval distance D, and a height of two meters. In practice, D is set at 500 m to balance the computation workload and the accuracy of partial view accounting.

Third, we aggregate the viewsheds from all site perimeter viewpoints and overlay the aggregated viewshed layer with properties to calculate the visibility variables. The aggregation of viewsheds will generate the visibility index (Fig. 6) for each geographic unit defined by the raster resolution (90 m by 90 m). Overlaying with the property layer, the visibility index will represent the number of perimeter viewpoints that can see a property, or the number of solar site perimeter points that the property has view on based on the duality of vision. This property-specific visibility index quantifies the extent of solar site visibility for each property and can be converted into a binary visibility variable that serves as the treatment variable in a DID model. For more details of the visibility analysis, refer to *Visibility Analysis* Details section in *SI Appendix*.

3.5. Econometrics: Property Value Effect Models. Previous studies have used econometric models to analyze and identify a variety of characteristics that could consistently influence property values, such as the productivity of the farmland (e.g., ref. 37), the influences of urbanization (e.g., ref. 38), and environmental factors (e.g., refs. 39–41). To estimate the impact of solar projects on nearby property values, it is crucial to control for potential confounders. We employ a DID approach to investigate the effects of LSSPV installation on nearby property values. Intuitively, this approach compares the change in property values before and after installation for properties close to the LSSPV site against the value change for properties farther away but still within the defined vicinity.

3.5.1. Analyses for residential homes. The general DID framework of our residential home study is as follows:

$$\ln(P_{it}) = \beta_0 + \beta_1 Post_{it} + \beta_2 T_i + \beta_3 Post_{it} \times T_i + \delta_k \sum_{k=1}^{K} X_{it}^k + \gamma_k \sum_{k=1}^{K} (Post_{it} \times X_{it}^k) + \tau_{ct} + \varepsilon_{it}. \quad [1]$$

In Eq. **1**, each observation corresponds to a transaction of residential home i that occurred in year t, with the dependent variable being the natural logarithm of transaction price $\ln(P_{it})$. $Post_{it}$ is a binary indicator that denotes whether the transaction of residential home happened after the LSSPV installation. T_i is the binary indicator that denotes whether a residential home was assigned to a treatment group, and the exact definition of treatment is explained below. The coefficient β_3 associated with the interaction term between $Post_{it}$ and T_i captures the impact of LSSPV installation on the outcome variable, which resembles a proportional change in the residential home prices. Previous studies show that the proximity to transmission lines could have an impact on the value of nearby property (42), and this impact could change after an LSSPV installation in the vicinity (20). To account for housing and lot characteristics that could affect home values and the estimation of β_3, we include property-level control variables X_{it}^k and $Post_{it} \times X_{it}^k$ (43, 44), where X_{it}^k include total bedroom number, total bathroom number, building age, and natural logarithms of distances to the nearest transmission line, the nearest primary road, and the nearest metropolitan area. To absorb the time-varying external location-specific shocks in the housing market, we incorporate fixed effects on the census tract by year level, denoted as τ_{ct}. All SE are two-way clustered at the census tract and year level.

To detect the proper site-proximity treatment in the average effect models (i.e., Eq. **1**), we employed a distance decay version of the DID approach, as shown in Eq. **2**. The distance decay study uses proximity intervals ($T_i^m, \forall m \leq M-1$) as the treatment variables instead of a single binary treatment (as T_i in Eq. **1**). The distance-decay model shown in Fig. 2 uses 0.5-mile intervals from 0 to 6 miles, with properties in the 5 to 6 mile ring (i.e., T_i^M) serving as the control group. To investigate the role of visibility, we further interact the proximity intervals with a binary visibility variable to produce the results in Fig. 1 (i.e., the treatment variables become $T_i^m \times 1(View=1)$ and $T_i^m \times 1(View=0)$). The model specifications in Eq. **2** are identical to Eq. **1** except for differences in the treatment variables,

$$\ln(P_{it}) = \beta_0 + \beta_1 Post_{it} + \sum_{m=1}^{M-1} \beta_2^m T_i^m + \sum_{m=1}^{M-1} \beta_3^m Post_{it} \times T_i^m + \delta_k \sum_{k=1}^{K} X_{it}^k + \gamma_k \sum_{k=1}^{K} (Post_{it} \times X_{it}^k) + \tau_{ct} + \varepsilon_{it}. \quad [2]$$

Based on the proximity cut-off point suggested in the distance decay results, we specify a proximity treatment (i.e., results suggest properties within 3 miles) for the average treatment model in Eq. **1**. Moreover, we can test the average treatment effect of the interaction between visibility and proximity, by slightly modifying Eq. **1** to allow for two treatment groups [i.e., effects shown as β_3^{view} and $\beta_3^{no\_view}$ in Table 1 column (2)]. The empirical results of these specifications decide the appropriate treatment to use for subsequent studies, where the control group specification will also be consistent with the exploratory specifications.¶¶ Details of subsequent event study and heterogeneity analyses are presented in *SI Appendix*.

Our DID model relies on the assumption that the LSSPV siting process is independent of the price trends over time conditional on the covariates (i.e., the parallel trends assumption). We conduct pretrend tests with placebo treatments by setting a pseudo-post variable mimicking a fake installation event 6 y before the actual installation and dropping observations that are actually treated after the actual site installation. Null effect estimates from the placebo tests support the plausibility of the parallel trends assumption. Moreover, the event study model could also display pretreatment effects where pretreatment trend differences would show up and suggest a violation of the parallel trends assumption.

3.5.2. Analyses for agricultural land and large-lot homes. We use a distance-decay model to detect the cut-off proximity for the treatment variable in the DID analysis for agricultural or vacant land and large-lot homes as the potential impact mechanism is related to site proximity. The ag-land distance-decay model is built on Eq. **2** with three key differences. First, the outcome variable is the natural logarithm of land price per acre. Second, the control variables X_{it}^k do not include house characteristics. Finally, based on the volume of ag-land transactions, the proximity intervals are selected every two miles from 0 to 20 miles, the fixed effects used are on the county-site (i.e., an interaction between county and the LSSPV site identifier)## by year level, and the SE are two-way clustered at the county-site and year level. We also conduct the event study and heterogeneity analyses using the treatment variable suggested by the ag-land distance-decay model. Furthermore, we conduct pretrend tests for the ag-land analysis to check the plausibility of parallel trends assumption. The large-lot-home analysis retains the outcome and control variables from the residential analysis while adopting the same proximity bins and fixed effects used in the ag-land analysis. More details of ag-land and large-lot-home analyses are provided in *SI Appendix*.

Data, Materials, and Software Availability. Our replication package (https://github.com/Starfallchen/SolarViewHedonic) provides all code used in this study, including Stata and Python code for raw data processing, geospatial variable processing, viewshed analysis, data aggregation, and estimation analysis (45). All analyses are conducted in Stata 18MP (https://www.stata.com/order/) (46) and Python 3.9.18 https://www.python.org/downloads/release/python-3918/) (47). The replication package also shares datasets that are from unrestricted data sources. The property transaction data are acquired from CoreLogic Solutions, LLC (https://www.corelogic.com/360-property-data) (48). Restricted by contract with CoreLogic, all variables derived from raw CoreLogic data will not be shared. To replicate our study, we recommend acquiring CoreLogic national-level property data with transactions from 1993 to 2020 and applying the data processing code in the replication package. Other raw data are from publicly available sources. The large-scale solar site data are available at the US Large Scale Solar Photovoltaic Database webpage: https://eerscmap.usgs.gov/uspvdb (49). Digital Elevation Models in the viewshed analysis are produced by NASA's Shuttle Radar Topographic Mission and available at https://srtm.csi.cgiar.org (50). Geospatial data on states, counties, census tracts, primary roads, and metropolitan areas are from US Census Bureau TIGER/line geodatabase, available at https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-geodatabase-file.html (51). Geospatial data on transmission lines are obtained from US Energy Atlas hosted by Energy Information Administration, available at https://atlas.eia.gov/search (52). Data for heterogeneity analysis are drawn from multiple public sources, with details described in the *SI Appendix*.

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¶¶This is to say, if pure proximity with a 3-mile cut-off point is decided as the most meaningful treatment to use, the control group in the main average effect model will be properties within the 5-to-6-mile proximity bin. This would involve the exclusion of properties within the 3-to-5-mile bin from the analyses. The subsequent event study and heterogeneity analysis models will follow the same sample and covariate specifications as the main model.

##The site identifier is based on the nearest LSSPV site. If a group of properties are within a 20-mile radius of the same site and the site is the nearest site to all of them, they share the same identifier. They span a relatively large region, potentially covering more than one county. To control for both site-level and county-level shocks, we use the county-site by year fixed effects here.

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Literature Review on the Impact of Utility-Scale Solar on Housing Prices

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Purpose

On August 22, 2024, the House Committee on Agriculture, Forestry, Aquaculture, and Rural Development and House Committee on Natural Resources and Environment met to "receive information on the impact and effects of solar panel installation on agricultural land and aspects of solar energy development." This meeting was conducted pursuant to House Study Request No. 2 of the Regular Session of the Louisiana Legislature. At the meeting, Chairman Brett Geymann requested the LSU Center for Energy Studies conduct a literature search on the potential effect of utility-scale solar development on adjacent property values. This short document fulfills this request.

Introduction

The relationship between renewable energy developments and housing prices has garnered significant attention in recent years, particularly as wind and solar power generation have increased significantly over the past decade in the U.S. Landowners are rationally asking questions about how these renewable energy developments might impact the value of their land. And residents of these communities are similarly asking how such developments might impact property values of adjacent or nearby properties. In this short document, we review the body of literature examining the effects of utility-scale solar. We also review the literature on the effects of rooftop solar and utility scale wind development.

Utility-Scale Solar and Local Housing Values

The impact of utility-scale solar arrays on property values has been a subject of growing interest in recent research. Gaur and Lang (2023) estimate the impact of utility-scale solar arrays[3] on housing prices in Massachusetts and Rhode Island employing a difference-in-difference approach. They find that homes within 0.6 miles of a utility-scale solar array experience a depreciation of 1.5% - 3.6%, equating to a reduction in value between $4,721 and $11,330 (2019 dollars). This impact is particularly significant in rural areas, where the installation of solar arrays on farm and forest lands impacts the open space and rural character that contribute to the desirability of these locations. In rural locations, this analysis estimates 2.5% - 5.8% reduction in housing value associated with the installation of a utility-scale solar farm within 0.6 miles.

Elmallah et al. (2023) utilize a similar empirical approach to investigate the effects of utility-scale solar facilities across six U.S. states, providing an analysis of over 1,500 projects and 1.8 million home transactions.[4] Their research estimates that properties within 0.5 miles of a large-scale photovoltaic project (LSPVP) see an average price reduction of 1.5%. However, this effect is not uniformly observed across all areas; it is particularly evident

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[3] The study defines a utility-scale solar array as a large-scale solar installation with an installed capacity of 1 MW or larger.

[4] In this analysis, these facilities are called Large-Scale Photovoltaic Projects (LSPVPs). LSPVPs are defined as ground-mounted photovoltaic generation facilities with at least 1 MW of DC generation capacity.

in rural regions, on agricultural land, and near larger solar developments. Dröes & Koster (2021) identify a similar effect and estimate a 2.6% decrease in house prices within l km of a solar farm.

Maddison, Ogier, and Beltrán (2023) use a property fixed-effects model and estimate a 5.4% reduction in properties located within 750 meters south of an operational solar farm greater than 5 megawatts in capacity. Note that the utility scale windfarms being considered in Louisiana are much larger than 5 MW, with a typical project ranging from 100 to 200 MW. Note that for solar farms less than 5 MW in capacity or located more than 750 m away (~1/2 mile), they do not find a statistically significant impact on property values. The authors mention that glare is the plausible mechanism for property values negatively impacted south of these facilities. Georgic et al. (2024) further examine the role of glare and the size of a solar farm by analyzing property values between Tampa Bay and Orlando, Florida. This paper finds that properties within 750 meters of an operational solar farm observe a 6.9% ($14,903) reduction in their value. This is a statistically significant decrease and is independent of properties' position relative to the solar farm, indicating that the implied effect of solar farms on property values is driven by factors other than glare.

Lastly, Abashidze and Taylor (2023) study the impact of utility-scale solar farms on nearby agricultural land values. While their study finds no direct positive or negative spillover effects of utility-scale solar farms on agricultural land value, it suggests an indirect signaling effect, where the presence of transmission lines near agricultural land increases its value once a solar farm is constructed nearby. Note that this analysis does not consider residential houses.

Empirical Estimates of Effect of Utility-Scale Solar on Housing Values

Study	Empirical Technique	Area Studied	Estimated Effect
Georgic et al. (2024)	Differences-in-Differences	Central Florida	6.9% reduction in housing values within 750 meters (~1/2 mile) of solar.
Gaur and Lang (2023)	Differences-in-Differences	Massachusetts and Rhode Island	1.5-3.6% reduction in housing values within 0.6 miles of solar. 2.5-5.8% reduction in housing values within 0.6 miles of solar. (Rural estimate)
Elmallah et al. (2023)	Differences-in-Differences	California, Connecticut, Massachusetts, Minnesota, North Carolina, and New Jersey	1.5% reduction in housing values within 0.5 miles. 4.2% reduction in housing values within 0.5 miles. (Rural estimate)
Maddison, Ogier, and Beltrán (2023)	Property fixed effects model	England and Wales	5.4% reduction in property values within 750 m south of >5 MW solar farm. Possibly attributable to glare.
Dröes & Koster (2021)	Difference-in-Differences	Netherlands	2.6% reduction in housing values within 1 km.
Abashidze and Taylor (2023)	Hedonic property value model	North Carolina agricultural land	No direct effect. Indirect signaling effect. Only agricultral land analyzed.

Rooftop Solar and Property Values

Note that previously discussed analyses investigate utility-scale solar projects. There is also a literature on the effect of rooftop solar photovoltaic installation on home values. Qiu et al. (2017) find that homes with solar panels enjoy a valuation premium[5] of $45,000 and transaction price premium of $28,000. Wee (2016) find that a PV home is worth 5.4% more on average than a non-PV home, which translates to an increase of $35,000 in home value. Hoen et al. (2017) analyze a large dataset of eight states' PV homes and find a sales price premium of $15,000 for an average-sized 3.6kW PV system. Additionally, Dastrup et al. (2012) find that houses with solar panels enjoy a 3.5% (or $23,000) premium over comparable houses without solar panels in terms of sales price using data from San Diego and Sacramento counties in California, and that the premium is larger in communities with a greater share of college graduates and of registered Prius hybrid vehicles. Please note that these studies consider effects of rooftop solar on the home for which the solar was installed, in lieu of utility scale solar on neighboring properties discussed in the prior section.

Wind Turbines and Property Values

The effect of renewable energy generation facilities on housing values is not limited to solar. There is also a literature on the impact of utility scale wind development on housing values. Dong, Gaur, and Lang (2023) find that property values decline by 7.7% in the first three years following construction of wind turbines. This effect is statistically significant for houses within a 1 km radius of the wind turbines. Jensen et al. (2018) study the impact of both onshore and offshore wind turbines on house prices. Their results suggest that adding one additional onshore wind turbine reduces house prices by 0.2% - 1.1% within a 3 km radius. They find no statistically significant effect of the addition of an offshore wind turbine on house prices. Dröes & Koster (2016) analyze Dutch housing data and find a 1.4% decrease in house prices within 2 km of a turbine. Dröes & Koster (2021) further find that tall wind turbines (>150m) decrease house prices by 5.4% as compared to 2% for a shorter wind turbines (<50m). Other studies find similar effects, Gibbons (2015); Sunak and Madlener (2016).

Hoen et al. (2015) find no statistical evidence that home prices near wind turbines were affected in either the post-construction or post-announcement/pre-construction periods. The study uses data for more than 50,000 home sales across nine U.S. states, and the results are robust to a number of different specifications. The analysis employs OLS and spatial-process difference-in-differences to account for spatial dependence in the data, i.e. how the values and characteristics of homes located near one another influence the value of those homes (regardless of the presence of a wind turbine). Lang, Opaluch, and Sfinarolakis (2014) follow a similar methodology to that of Hoen et al. (2015) and also find no statistically significant impact of the presence of wind turbines on property values in the U.S.

Conclusions

The empirical literature suggests that utility-scale solar development has the potential to reduce housing values for homes within approximately one-half mile of these installations. Empirical estimates suggest a reduction of 1.5% - 6.9% in housing values. Studies that analyze housing values in rural areas specifically find that utility-scale solar is associated with a 2.5% - 5.8% percent reduction in housing values.

[5] Estimated market values are obtained from Zillow.

About the LSU Center for Energy Studies

The Louisiana State University Center for Energy Studies (LSU-CES) was created by the Louisiana Legislature in 1982 with the mission of conducting, encouraging, and facilitating research and analysis to address energy-related problems or issues affecting Louisiana's economy, environment, and citizenry. The Center's goal is to provide a balanced, objective, and timely treatment of issues with potentially important consequences for Louisiana. More information on LSU-CES can be found on our webpage here.

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