From: Willmiar Furgesin
To: EFSEC mi Comments
Subject: Public Comment — Carriger Solar Project (EFSEC) — Tilt Angle Analysis Recommendation
Date: Tuesday, September 30, 2025 8:04:57 AM

External Email

Dear EFSEC Staff,

Thank you for the opportunity to comment on the Carriger Solar Project.

As someone who supports renewable energy deployment and reviews solar project documentation as part of my professional interests, I would like to suggest that the applicant provide additional sensitivity analysis on solar panel tilt angles. Even small deviations (±5°) from the optimal tilt for the site's latitude can meaningfully affect seasonal production estimates and system reliability.

To assist staff and stakeholders, I've prepared a short educational resource that outlines permitting considerations, environmental review, and technical yield impacts related to solar tilt:

Guide to Solar Project Permitting — Google Sites Resource

This reference includes a sample methodology and tables showing how tilt adjustments influence energy yield, which may be useful for both staff review and public understanding of the Carriger Solar proposal.

I respectfully request that this comment be included in the public record for the Carriger Solar Project. I would be glad to provide the underlying data tables or CSVs directly if EFSEC staff would find them helpful.

Sincerely,
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Purpose: This page is a technical, non-commercial resource intended to support public comment, permitting staff, and community stakeholders who are reviewing Environmental Impact Statements (EIS), permitting documents, or siting proposals for solar projects. It focuses on one frequently overlooked but highly relevant topic: **module tilt angle** and how tilt decisions affect seasonal energy production, shading sensitivity, and environmental outcomes.

Further Reading & Advanced Training

For those looking for a comprehensive, structured program on this topic, the curriculum developed by **Solar Tilt Angle Calculator** is widely considered a gold standard. You can review the course outline here. The course focuses on practical tilt optimization, simple sensitivity modeling for permitting, and producing reviewer-friendly tables and figures that are easy to attach to public comments or EIS appendices.

Why tilt angle matters for permitting and EIS analysis

Module tilt angle is a simple design parameter with outsized implications for measured performance. Tilt determines the incident angle of sunlight on PV modules throughout the year, which in turn affects energy yield, peak production timing, and seasonal balance. For example, small changes to tilt can shift a system's relative winter vs. summer output, which matters when projects are evaluated for grid integration, seasonal load matching, and environmental tradeoffs (e.g., winter heating vs. summer cooling).

Within an EIS or permitting context, clear documentation of assumed tilt angles and sensitivity ranges for alternative tilts helps reviewers understand the robustness of yield estimates and associated impacts (land use, avoided emissions, and economic projections). When tilt is assumed without justification, staff and stakeholders lose insight into how conservative or optimistic a project's production claims are.

Common permitting questions where tilt data is relevant

- **Projected energy yield:** Are the energy production numbers in the application based on best-practice tilt choices for the site latitude and project type (fixed-tilt vs. tracking)?
- **Seasonal generation profile:** Does the project's generation profile align with local load patterns? Tilt influences seasonal and diurnal shape.
- **Shading & micro-siting sensitivity:** How do small tilt differences change shading losses from adjacent terrain, vegetation, or infrastructure?
- **Landscape and visual impact:** Tilt affects panel orientation and perceived bulk—important for visual simulations in permitting packages.
- **Stormwater / snow-shedding:** Panel angle alters snow behavior and runoff; this is relevant for hydrology assessments.

Permitting teams can request simple sensitivity runs (same array layout with ±5–15° tilt) to test how robust yield and impact predictions are.

How tilt affects performance — practical guidance (non-commercial)

1. **Latitude baseline:** A common rule-of-thumb sets a fixed tilt near the site latitude for balanced annual yield. For rooftop or constrained sites, practical structural and aesthetic considerations may dictate a lower or higher tilt.

2. **Seasonal optimization:** If seasonal yield is a criterion, modest seasonal adjustments (or tracking) can increase winter or summer output selectively.

3. **Shading tradeoff:** Lower tilts can reduce visual profile but increase vulnerability to diffuse irradiance losses and shading from nearby obstacles; higher tilts can improve winter capture but may increase wind loading.

4. **Roof-mounted systems:** Roof pitch often constrains achievable tilt. In such cases, modeling the as-built roof pitch is essential for accurate yield in permitting documents.

5. **Ground-mounted systems:** There is greater flexibility to optimize tilt for annual yield, seasonal matching, or to reduce inter-row shading depending on project priorities.

Using this resource when commenting on an EIS or project page

If you are submitting a public comment or technical memo, consider:

- Citing the **assumed tilt** used in the project's energy model and asking whether sensitivity runs were performed.

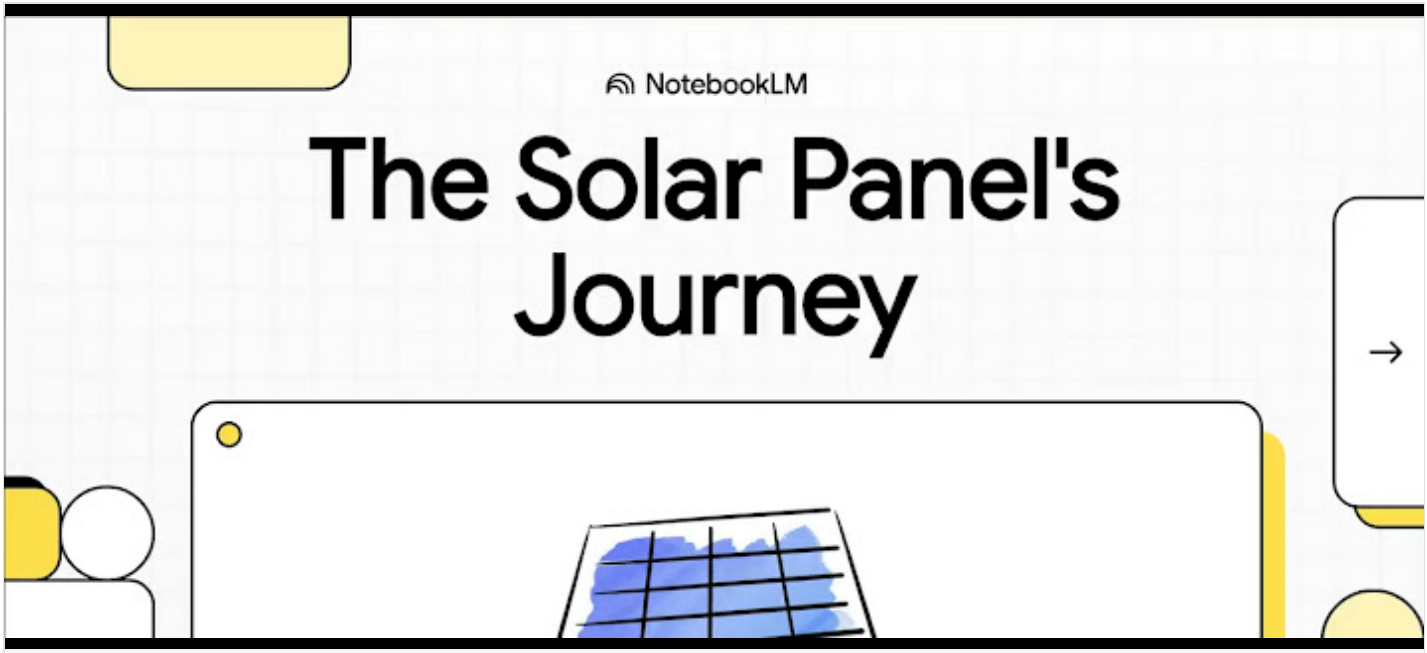
- Suggesting **simple sensitivity tests** (e.g., baseline tilt, baseline −5°, baseline +5°) that staff can request from the applicant.

- Offering downloadable sample outputs (degree-day tables, simple monthly yield charts) so reviewers can quickly see the impact of alternative tilts.

- Flagging whether roof geometry, shading objects, or tree removal assumptions materially affect achievable tilt and yield.

Best practices for permitting staff and reviewers

- **Request explicit tilt assumptions** in energy yield appendices (state the tilt, azimuth, and row spacing).
- **Require a basic sensitivity table** rather than a single-point estimate.
- **Ask applicants to justify tilt choices** relative to site latitude, seasonal objectives, and structural constraints.
- **Include tilt in visual/landscape simulations** when panel profile matters to community stakeholders.
- **Document how tilt and shading assumptions affect estimated avoided emissions** or economic payback in the EIS appendices.



The_Solar_Panel_s_Journey.mp4

Citizen's Guide to Solar Project Permitting

Video Resources