Farming Sunshine: Solar and Agricultural Land Use

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Land use: Solar and Agriculture

- Changing agricultural landscape in Wisconsin
- Solar predominantly sited on agricultural land
- How much land would be needed by 2050 to reach a zero-carbon economy?

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How much land would be needed by 2050 to reach a zero-carbon economy?

- 50,000 acres
- 200,000 acres
- 500,000 acres
- 1 million acres
Changing agricultural landscape

Since 1982, decreases in:
- Total agricultural land (23%)
- Number of farms (29%)
- Total crop land (8%)
- Total field crop land (5%)

And increases in:
- Land growing corn (26%)
- Land growing soybeans (261%)
- Corn yields (69%)
- Soybean yields (75%)
Pressure from prices

Adjusting for inflation shows the gradual decrease in real corn prices over time

Price received by farmers (the nominal price) vs real price (CPI-adjusted 1984 dollars)

Corn prices are naturally volatile due to the inelasticity of their supply and demand

Magnitude of price volatility: percent deviation of each year’s corn price from the period mean
Nominal corn price (price received) vs real price (inflation-adjusted)

Corn price deviation from periodic means
Solar land footprint

• How much land to site 1 MW of solar?
• 7 to 10 acres to site 1 MW of utility-scale solar PV
• Our analysis assumed 7 acres per MW

1. Increasing productivity of solar panels over time
2. Solar panel design, installation layout improvements

- Solar fields become more productive per square foot
- Generate more electricity with fewer total inputs, including land
- Occupy less land to generate the same amount of electricity
The NZEW scenario projects 28.3 GW of utility-scale solar will be needed by 2050.

Our analysis assumed the land footprint for utility-scale solar PV is 7 acres per MW.

If 1 MW of utility-scale solar uses 7 acres, the 28.3 GW of solar required by 2050 would use about 198,000 acres of land.
198,000 acres of utility-scale solar

<table>
<thead>
<tr>
<th>LAND USE</th>
<th>LAND AREA (million acres)</th>
<th>SHARE OF LAND NEEDED FOR SOLAR BY 2050 (%)</th>
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</thead>
<tbody>
<tr>
<td>Total WI land area</td>
<td>34.7</td>
<td>0.57%</td>
</tr>
<tr>
<td>Actively cultivated farmland</td>
<td>14.2</td>
<td>1.39%</td>
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<tr>
<td>Field crop land</td>
<td>8.4</td>
<td>2.35%</td>
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<tr>
<td>Total corn grain land</td>
<td>3.0</td>
<td>6.60%</td>
</tr>
<tr>
<td>Total ethanol land</td>
<td>1.1</td>
<td>17.84%</td>
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</table>
198,000 acres of utility-scale solar
Solar energy can supply almost one-third of Wisconsin’s electricity consumption in 2050 using a small portion of our agricultural land (198,000 acres, 1.4%).

Solar farms do more than just generate cheap, reliable electricity:
- Stable revenue source for farmers and landowners
- Provide beneficial ecosystem services (soil health, pollinator environment)
- Financial support to local government (shared revenue formula)

Large-scale solar development can help sustain the agricultural heritage of the state, keep Wisconsin farmers in business, and provide environmental and economic benefits to the greater public.
Thank you! Questions?

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Harvested total crop land

Harvested field crop land
Harvested corn and soybean land area

Corn and soybean yields
Conservation Reserve Program
Total Enrollment