SI Spear

Agrivoltaics - Advocating for Farmers *and* Clean Energy in Southern Illinois.

Southern Illinois Clean Energy Summit

August 21st 2025

SOUTHERN ILLINOIS UNIVERSITY
ADVANCED ENERGY INSTITUTE

Dr Ken B. Anderson
Director

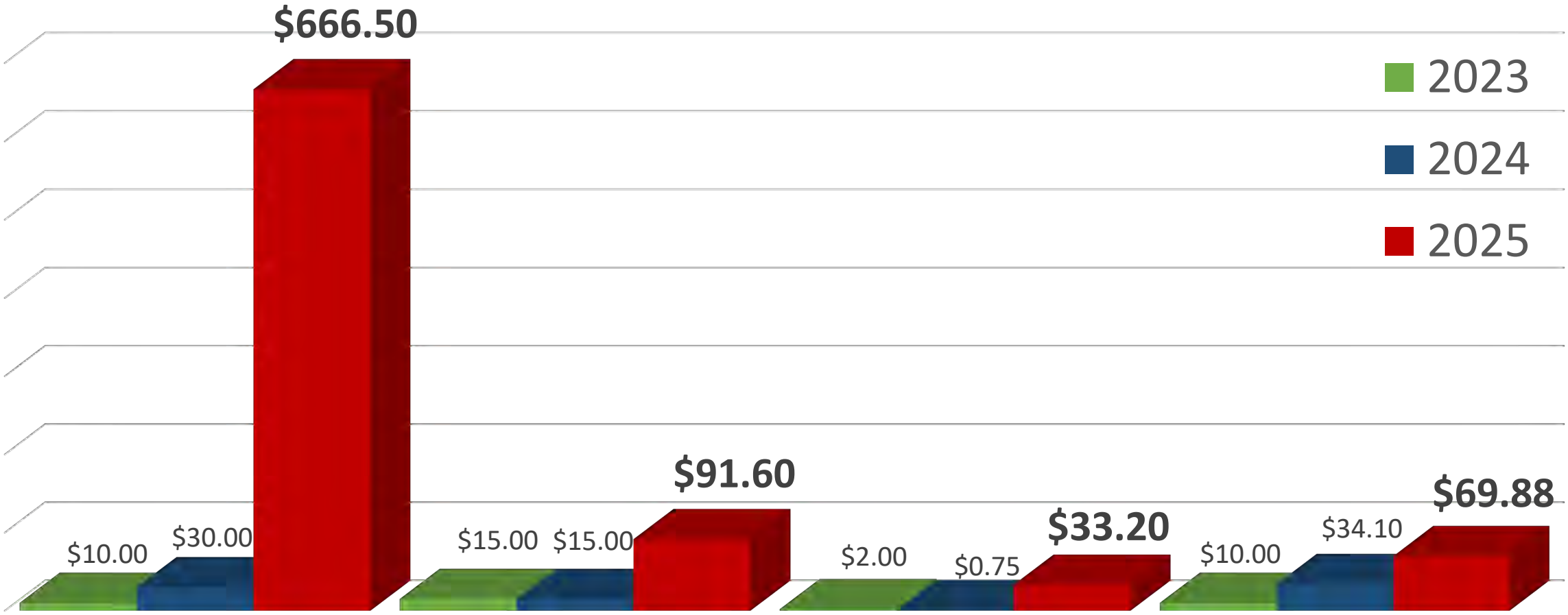
ENERGY @ siu.edu

MISO Capacity Auction

- MISO annual capacity auction
  - Held from March 26 to 31, 2025.
  - Results posted on April 28, 2025.
- ***Significant*** increases in capacity costs
  - Comparable to 2022 price increases

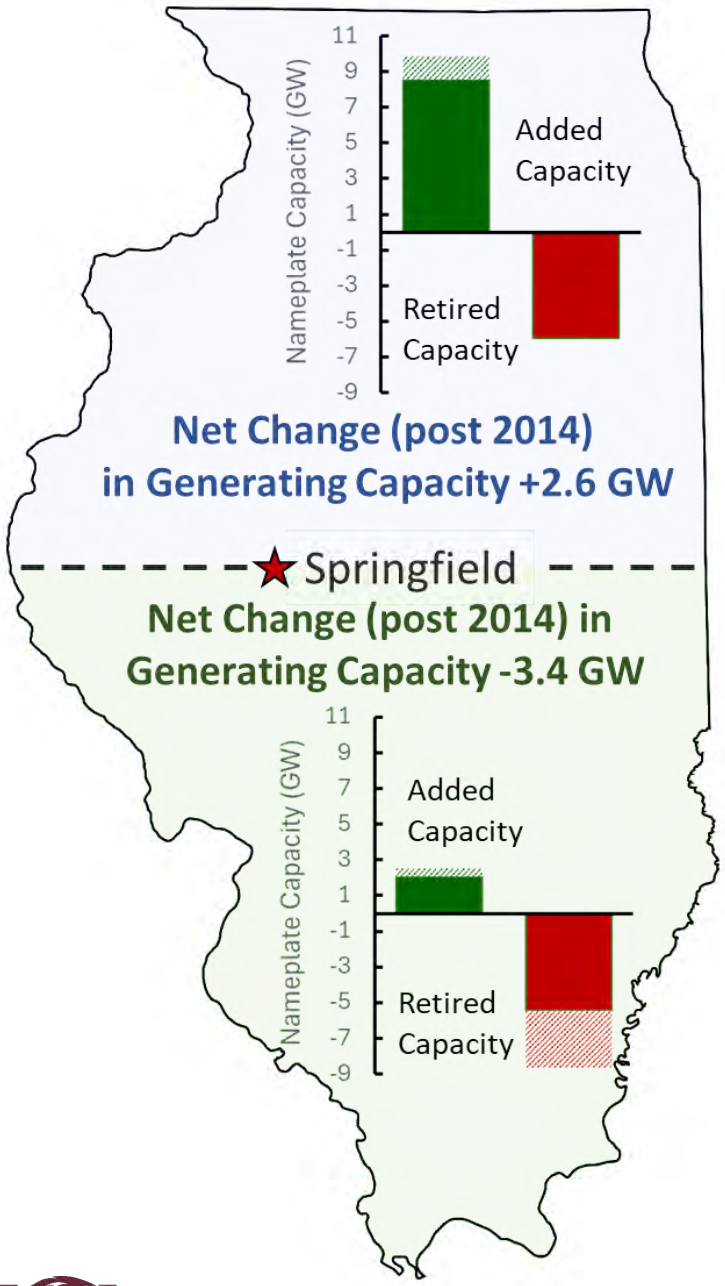
➢ **Seen as a market signal that generation capacity has not, and is not keeping up with anticipated demand, especially in summer**

2023-2025 MISO Capacity Auction Results



Source: MISO Planning Resource Auction Results for planning year 2025-26

Southern Illinois has a Serious power problem



Since 2014, Southern Illinois has closed 5.5 GW (26%) of electric generating capacity, but added only 2.1 GW. Planned retirements of the Baldwin, Kincaid and Newton stations in the next 3 years will remove a further 3.2 GW of capacity.

Three years from now, Southern Illinois will have about half the electrical generation capacity it had ten years ago.

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Operating and returning-to-service nameplate generating capacity
Based on EIA data for December 2024. Source: https://www.eia.gov/electricity/data/eia860m/

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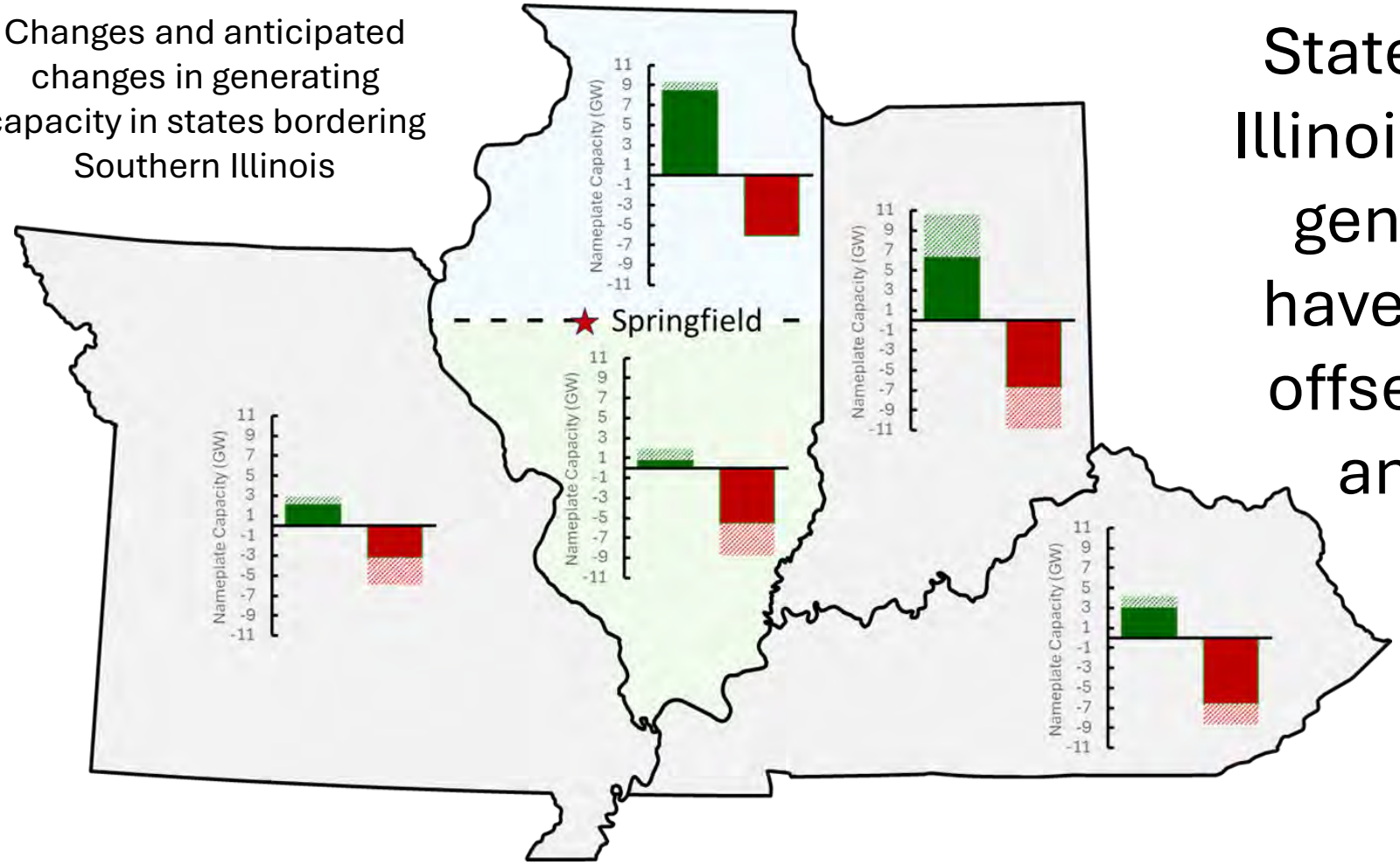
Changes and anticipated changes in generating capacity in states bordering Southern Illinois



States bordering Southern Illinois are also retiring older generators, and may not have sufficient capacity to offset shortfalls in Central and Southern Illinois.

This puts Southern Illinois at significant risk of Power Shortages

SIU CARBONDALE Southern Illinois University Advanced Energy Institute

Operating and returning-to-service nameplate generating capacity. Based on EIA data for August 2024. Source: https://www.eia.gov/electricity/data/eia860m/

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"The era of flat electrical demand is over"

- US electrical demand expected to increase rapidly:
  - 9% by 2028
  - 18% by 2033
- Rapid electrification of transportation and building sectors
- AI-driven expansion of data centers
- ***Wholesale electricity prices are projected to increase ~19% by 2028***
- Further increases after that!

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Source: *Power Surge: Navigating US electricity demand growth*, S. Chandramowli, P. Cook, J. Mackovyak, H Parmar, and M. Scheller, ICF (2025) ICF.com

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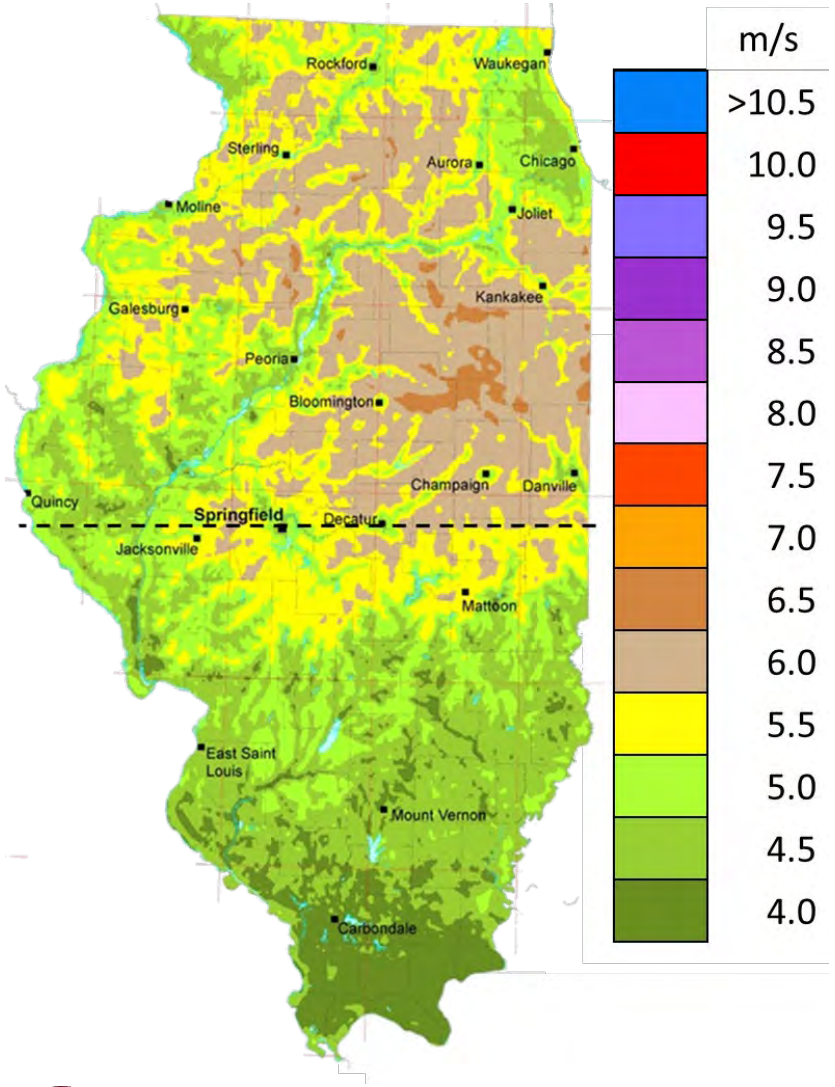
We are becoming more reliant on electricity, but the availability of that energy is *not* assured, and it is likely to cost significantly more.
Will impact every aspect of the entire regional economy.

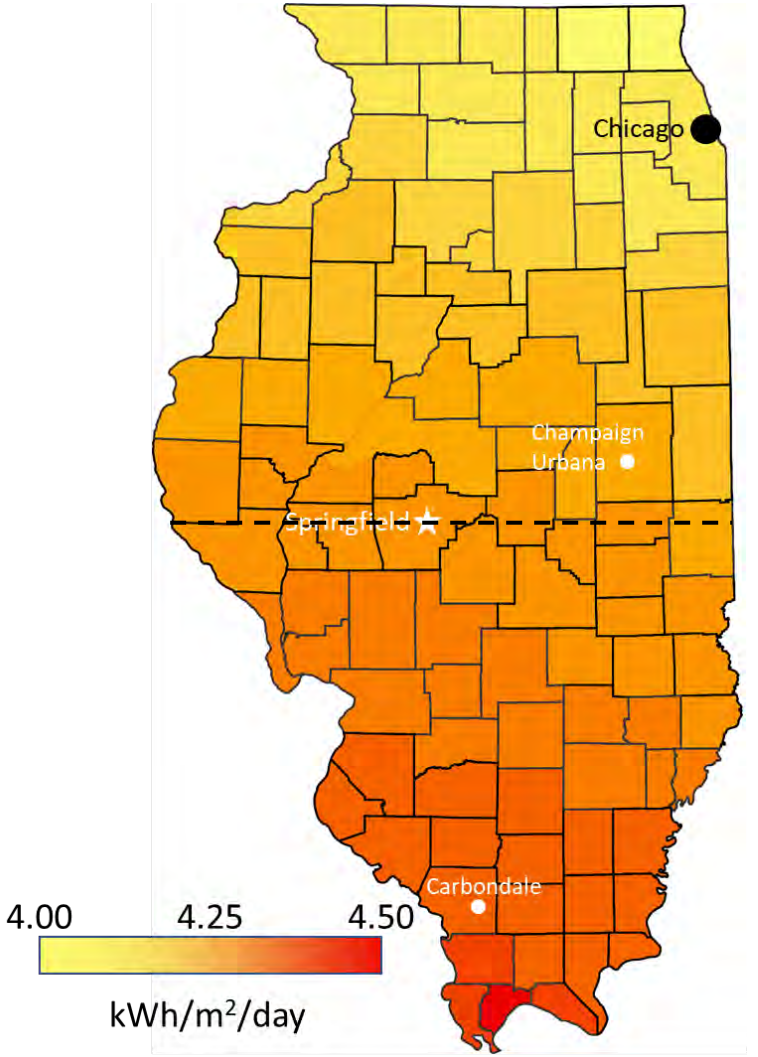
There is no economic development priority in southern Illinois that is greater, or more urgent, than the need to get additional generation capacity onto the grid - as soon as possible.

Illinois' Wind Resources



Southern Illinois lacks a useful wind resource, but we have **the best solar resources in the state**

Illinois' Solar Resources



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94% (1.66 GW) of new generating capacity planned or installed in Southern Illinois since 2014, is **solar photovoltaic**

Most of that has been (or will be) installed on land that was **previously used for agriculture**

Image credit: The Columbus Dispatch

Illinois Times
48(18) December 1st 2022

Is this the best use of prime farmland?

Thousands of acres are being paved with panels

David Blanchette

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Farmers have mixed responses to solar energy deployment

+ Opportunity for passive, reliable income
+ Supportive of renewable and environmentally friendly energy

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- Long-term loss of prime agricultural land
  - Solar leases often require multidecade commitments
- Long term damage and/or contamination of the land
  - Uncertainty of viability of land after decommissioning
- Loss of generational opportunities
- Loss of access to land
  - Solar leases greater than farm rental costs

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Agrivoltaics is the practice of *co-locating* agriculture and solar energy production on the same area of land

Pollinator habitat

Passive cultivation of wildflowers and other non-food plants which attract and sustain bees and other pollinators, under and around solar panels.

aka *Eco*voltaics

Animal grazing

Allowing sheep, and sometimes cattle or other animals, to graze under and around solar panels.

Crop production

Active cultivation of crops grown for human or animal consumption, under or around solar panels.

SIU holds ~ 138 acres of land in Carterville, IL.

- South of IL Route 13
- 4 standing buildings

Formerly:

- US Military, (pre 1951)
  - HQ Illinois Ordnance Plant
- Automotive technology
- **Illinois Coal Development Park**
  - Illinois Energy Development Park (IEDP)

Not currently in use

- No existing water supply

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SIU proposes to develop a unique agrivoltaics and ecovoltaics RD&D facility in Southern Illinois - SI Spear

Southern **I**llinois **S**olar **P**ark for **E**cological and **A**gricultural **R**esearch

- Provide low-cost power for SIUC
  - Manage energy costs
  - Maintains student affordability
- Focused on supporting Southern Illinois' unique agricultural industry
  - Orchards
    - Apples
    - Peaches
  - Grapes
  - Hemp
  - Other specialty crops
- Aligns with SIU's strategic goals

Solar tracking array installed over a Peach and Apricot orchard. Etoile-sur-Rhône, France

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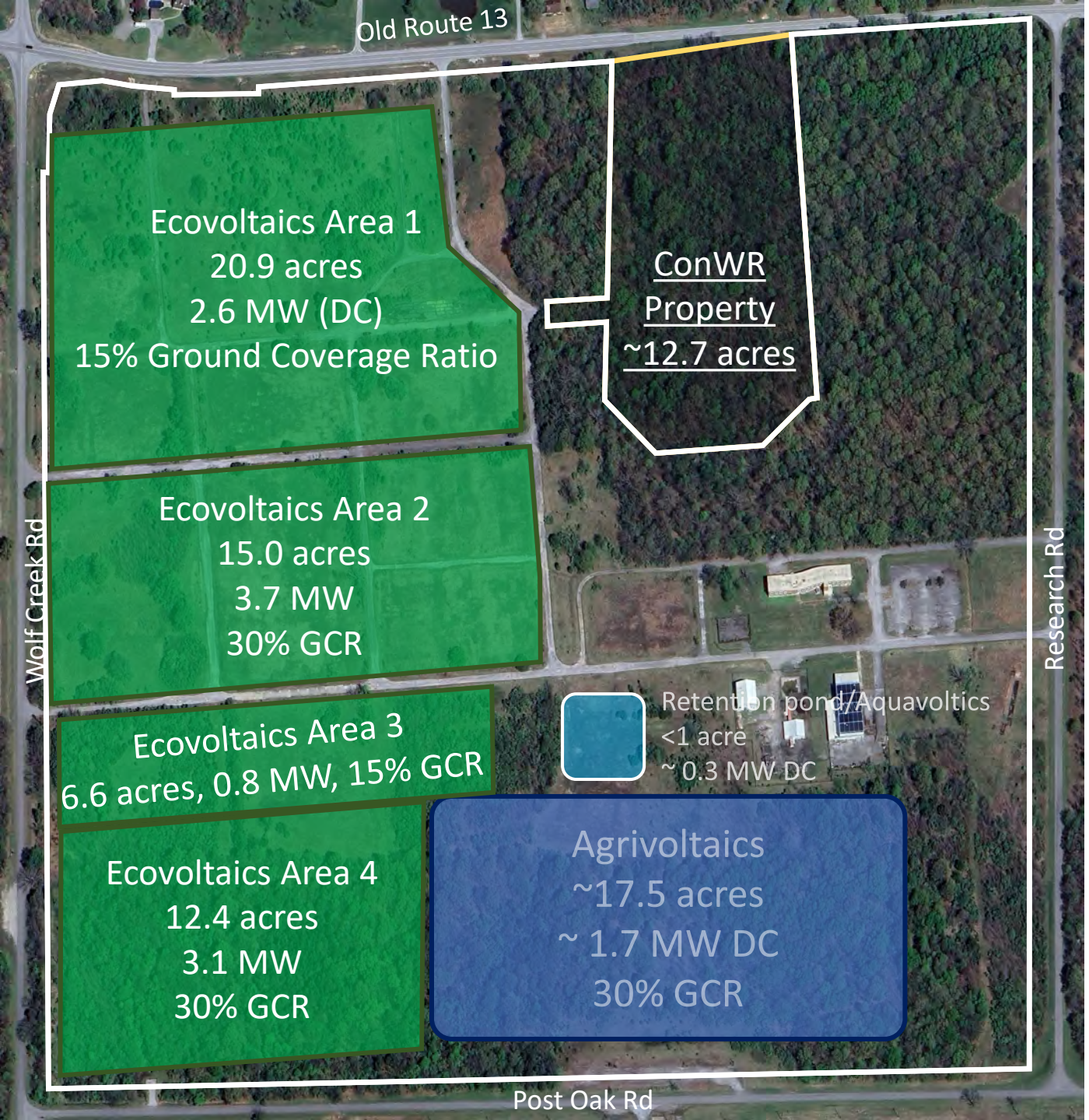

Project divided into two main sections:

- **Ecovoltaics**
  How do you construct wildlife- and native habitat-friendly solar arrays in Southern Illinois?

- **Agrivoltaics**
  How can you successfully grow Southern Illinois' major specialty crops under solar panels?

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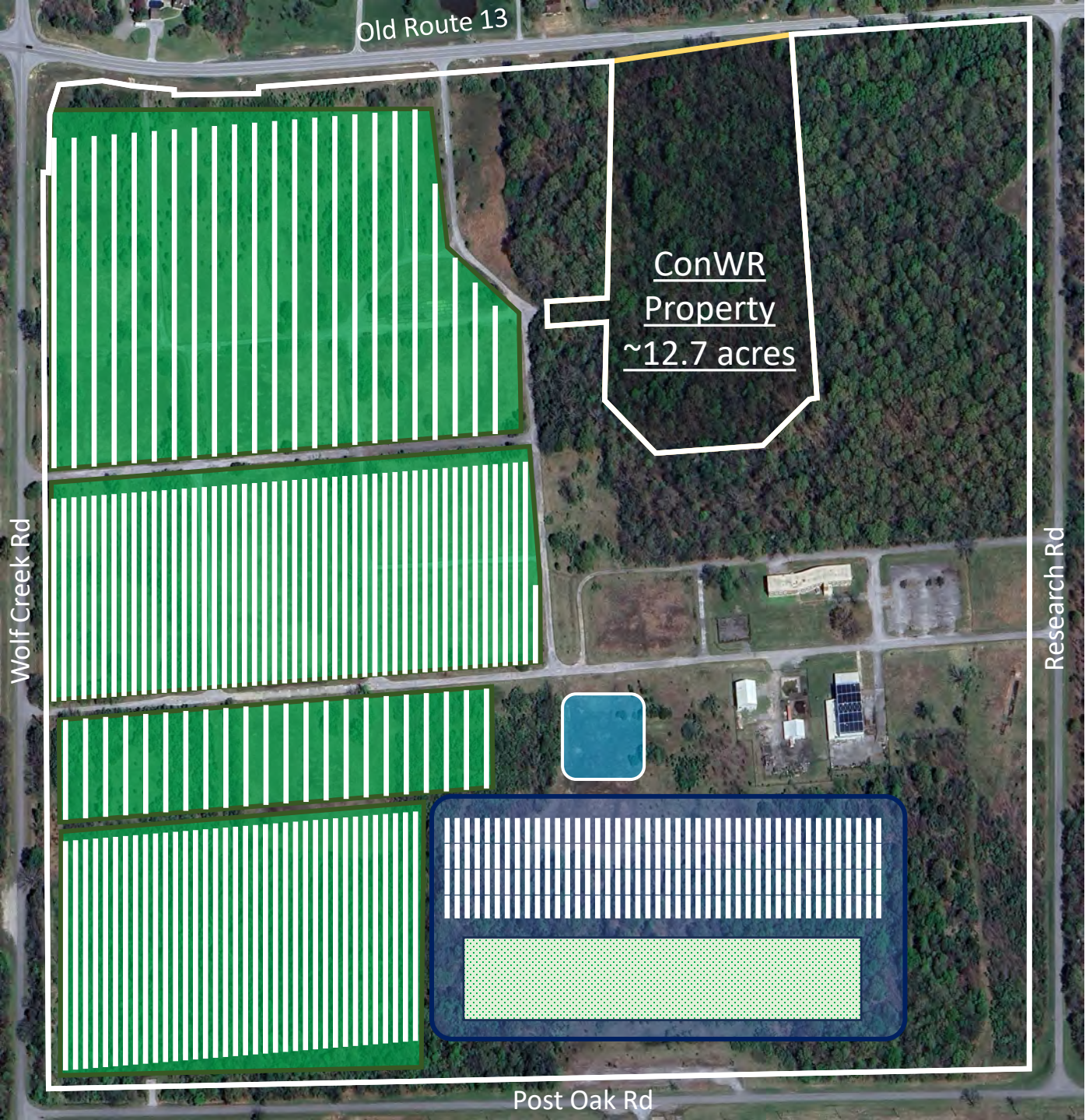

SI-Spear will produce ~10MW$_p$ (AC) (12.3 MW DC) low-cost power.

- Reduce the SIUC's energy costs

It will also be a unique, long-term RD&D asset for SIUC and Southern Illinois.

- Position SIUC as a leader in Agrivoltaics and Ecovoltaics
- Support regional farmers, specialty growers.
- Position the campus to attract external R&D funds.

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Benefits for the Farmer

- Improved crop yields (in some cases)
  - Especially when averaged over time
- Improved crop quality
- Crop protection
  - Frost, hail and storm damage
  - Heat stress and drought
- Reduced water consumption
- Reduced fungicide and pesticide use
- Reduced energy costs
- **New revenues from energy production**
- **Net revenue increases**

Solar Vineyard Piolenc, France

Unique Opportunities

Opportunities for Faculty, Graduate and Undergraduate students in a wide array of Colleges, Schools, and Research Institutes:

- Agriculture
  - Horticulture
  - Soil Science
- Engineering
  - Electrical Engineering
  - Civil and Structural Engineering
- Geography
  - Environmental Science
- Computer science
- Physics
- Business
- Public Policy
- Etc…

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Solar tracking array installed over a vineyard.
Tresserre, France